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The project builds on the intense research going on in many countries, including Member States of both the EU and the EAEU, the United States, China, Japan, Turkey and Ukraine, and on the outcomes of seven international workshops held at IIASA from June 2013 to April 2016, as well as several high-level conferences organized by IIASA in 2017. These multiple evidence-based meetings convened in the framework of the project were attended by renowned scientists, experts, business representatives and high-level policymakers, including representatives from the European Commission (EC) and the Eurasian Economic Commission (EEC) and resulted in a number of reports and publications.

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Disclaimer

Challenges and Opportunities of Economic Integration within a Wider European and Eurasian Space

Trans-Eurasian Land Transport Corridors: Assessment of Prospects and Barriers

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Abbreviations and definitions of key terms

AC	alternative current (e.g. applied for railway electrification)
AIIB	Asian Infrastructure Investment Bank
BCh	The Belarusian Railway
BRICS	Association of Brazil, Russia, India, China and South Africa
CIM	Universal legal prescriptions to the treaty on international rail freight transport
COTIF	Convention on International Carriage by Rail (Western Europe).
DB	Deutsche Bahn (German Railways)
DC	direct current (e.g. applied for railway electrification)
EAEU	Eurasian Economic Union
EBRD	European Bank for Reconstruction and Development
EFSI	European Fund for Strategic Investments
EU	European Union
EUISS	European Union Institute for Security Studies
NDB	New Development Bank
NPV	Net present value
OBOR	One Belt One Road - initiative
PRC	Peoples Republic of China
RZD	Russian Railways
SMGS	Agreement on International Railway Freight
TEN-T	Trans-European Transport Network

Trans-Eurasian Land Transport Corridors – Assessment of Prospects and Barriers

Anatoli Beifert, Yury Shcherbanin, Evgeny Vinokurov

Executive Summary

- **One of the key advantages of economic cooperation at the Greater Eurasian scale is the opportunity it presents to significantly increase land transport capacity and the trans-Eurasian flows of goods**. Raising efficiency of land transport corridors in Greater Eurasia will boost trade efficiency and create multiple opportunities for manufacturing and for the establishment of various supply chains.
- The Belt and Road Initiative (BRI), proposed by China, aims to provide access to new markets, optimal export terms, and further boost the economic development of its remote regions (Xinjiang Uyghur Autonomous Region, Tibet Autonomous Region, Qinghai, Gansu, and Inner Mongolia). Among other things, the initiative calls for the building of **a network of railways, roads, pipelines, and other infrastructure** that would link China to Central Asia, West Asia, South Asia, Europe, and Africa.
- For the countries of the Eurasian Economic Union (EAEU), a key advantage of continental cooperation within the BRI area is the promise of increased transport capacity, which would generate a number of positive effects for economic development. The EAEU countries' transport networks would be utilized in a more efficient manner to achieve potential trans-Eurasian links. In time, this should lead to **better internal connectivity between inner-Eurasian regions** (Central Asia, Siberia, Urals, and Caucasus). It is particularly important for the EAEU countries to promote the development of transport infrastructure in **landlocked countries**. Of the six EAEU member states, five are landlocked.
- Maritime transport currently dominates trade between China and the EU, accounting for about 98% of all cargo carried between EU countries and China; air transport accounts for 1.5–2%, and railway transport via the EAEU for 0.5–1%. Approximately 80% of EU‑China cargoes are carried in containers, including about 90% of cargoes brought to the EU from China (imports) and 70‑75% of cargoes carried from the EU to China (exports).
- At the same time, **over the last four years, cargo flows from China to Europe by rail through the EAEU have doubled every year** (although from a low base). They reached around 97,000 containers in 2016. In the opposite direction, from Europe to China, container freight flow in 2016 also almost doubled, reaching 50,000 containers a year, i.e., 147,000 containers in 2016. To attract additional cargo flows, in all countries along the China–EAEU–EU axis, both coordinated investment policies and the removal of trade barriers should be implemented. Based on the analysis of trade flows and tariff structure, **we forecast further growth in EU–China railway cargo turnover through the EAEU countries.**
- **The discrepancies in regulatory requirements (e.g., length of trains) is one of the most significant barriers.** The train length laid down by different rail administrations (Deutsche Bahn, Polish Railways, Russian Railways, Kazakhstan Temir Zholy, the Belarusian Railway, Chinese Railways)

depends on factors such as the length of the railway track at the station, train weight, traction capacity, route configuration profile, technical capabilities of stages of the railway (rail sidings and stations, overpasses and control posts, automatic blockages), shunting conditions at stations, technical and technological conditions at intermediate and local stations, sorting, etc.

- **Differences in gauges.** Transit operations are hindered by the difference in railway track gauges in China and the EU (1435 mm), and in Russia, Belarus, and Kazakhstan (1520 mm). This results in additional expenses being incurred during cargo transport as wheel pairs need to be changed at border crossings; the procedure is also time-consuming, particularly for large freight trains.
- **One of the main barriers to cargo turnover along the China–EAEU–EU axis is the insufficient level of procedural harmonization.** In most EU countries, railway transport is regulated in accordance with the provisions of the Convention concerning International Carriage by Rail (COTIF). At the same time, railway administrations in the CIS countries, Baltic States, Iran, China, and Mongolia are guided by the Agreement on International Goods Transport by Rail (SMGS). The differences in transport law lead to insufficiently harmonized procedures at the cross-border points, and goods taking a long time to clear customs and borders.
- **The future of cargo flows depends largely on the development of the Polish railway infrastructure and border-crossing points between Belarus and Poland.** There is no more capacity at the Brest–Małaszewicze border crossing. Moreover, the technical parameters of Polish railway infrastructure (length of freight trains, types of platforms needed for the transport of containers, maximum allowed weight per axle, maximum allowed speed of freight trains) do not permit large container trains to be processed. While the container trains travel through the territory of EAEU countries at an average speed of 45 km/h, in Poland they are dramatically slower at 18–20 km/h. While the length of freight trains can reach 1050 m in the 1520 mm gauge space, they have to be reduced to 600 m in length at Malaszewicze.
- **The Chinese subsidies represent both an opportunity and a systemic risk to trans-Eurasian container transit.** We estimate that a number of central Chinese provinces subsidize exports at an average level of USD2,500 per FEU (40-feet container). According to our estimates, this represents approximately 0.3–0.4% of the costs of export: thus, the relative costs are not high. However, this subsidy has dramatically improved the economics of land transport to the EU and the EAEU. The stability and possible expansion of subsidies is a key issue for the future dynamics of transit flows.
- **Trans-border investments in transport infrastructure are unlikely** for several reasons: i) the White Paper on Transport-2050 clearly articulates the main development priorities and these do not assume a significant increase in land transport; ii) the EU is very cautious about the Chinese capital or investment flows into European transport projects, referring to the possible risks; iii) the EU has consistently distanced itself from investing in Russia's transport infrastructure projects in general and in transit in particular; iv) while China invests heavily in the EAEU oil, gas, and mining industries, it has so far provided zero FDI in the transport sector.

  Our conclusion is that **large-scale investments in transport corridors will probably remain subject to domestic efforts**. A survey of 30 EU companies (exporters, transport, and logistics companies) carried out as part of the project strongly confirmed these conclusions.

- The survey conducted in the framework of the study also shows that one of the main risk factors is the cumbersome regulations and various non-tariff barriers in China. These mean extra challenges for EU companies if they pursue the opportunity of EU–China transport corridors. A factor frequently mentioned by European companies is the low quality of transport, customs, and logistics infrastructure in transit countries. However, although transport experts normally point to the long drawn-out customs procedures, inspections, and official procedures of border clearance of transported cargo, according to the survey this factor appears to be insignificant. Such factors as specific regulations within the bilateral intergovernmental agreements also appear to be insignificant for the assessment of trans-Eurasian transport corridor perspectives.
- We suggest of **number of recommendations**, including:
  - International coordination of the development of land transport corridors, including coordination of investment policies (details in the report).
  - Investments in infrastructural bottlenecks. We identify three of them:

    (1) border crossings (China–Russia, China–Kazakhstan, Belarus–Poland);
    (2) logistics hubs in the EAEU countries;
    (3) Polish railway infrastructure.
  - Regulatory convergence wherever feasible (details in the report).

Structure and Methodology

This report comprises a main report plus Annex.

Section 1 provides the executive summary.

Section 2 outlines the overall structure of the report and describes the methodology used by the study team and the data collection approach.

Section 3 provides analysis of cargo flows between EU, EAEU countries, and the People's Republic of China (PRC) and a quantitative assessment of prospects for cargo turnover along the China–EAEU–EU axis

Section 4 analyzes existing barriers to the development of international freight transport and transit along the China–EAEU–EU axis

Section 5 identifies the potential interest of EU countries in increasing trans-Eurasian overland transit and of EU investors in transport-infrastructural projects in China and the EAEU.

Innovation and significance of the study

The innovative methodology used for the data collection in the study is based on secondary and primary data analysis, including desktop research, personal interviews, and online questionnaire. The target groups of the study are:

- Transport related public/governmental authorities in Europe, China and transit countries (e.g., Russia, Kazakhstan, Belarus, etc.);
- Transport- and/or logistics-related service providers, including integrators, transport associations and logistics-related umbrella organizations with their operational area mainly in Europe and China;
- Importing/exporting business companies;
- Transport- and logistics-related research organizations.

This innovative characteristic of the study's methodology means that the findings reflect the viewpoints of all stakeholders concerned, thus helping to enable a more comprehensive and holistic standpoint at the EU policy level. Although the survey has limitations, the online survey results were useful for assessing potentials and barriers, and also the willingness of relevant stakeholders to invest in the transport infrastructure of an EU–China land transport corridor in the future.

Study limitations

Information included in the country profiles was collected from primary and secondary sources. Findings from the survey will be used as indicative and not for generalization, as the sample applied may not be representative at the global scale of the EU–China Land Transport Corridor.

Stakeholder interviews

To support the goals of the study, a number of stakeholder groups were identified, and selected stakeholders were approached for an interview, based on a structured script and/or semi-structured interviews (personal, telephone, and via Skype[1] interviews).

[1]Software application for video and audio calls. Further information: www.skype.com

On-line survey

A comprehensive web-based survey was prepared in English and can be accessed at: https://ru.surveymonkey.com/r/DD6BSJK (English version)

Cargo Flow Analysis between the EU, China, and the EAEU

Commodity flows volume and dynamics between the EAEU and China (including nominal values and physical volumes)

By the end of 2016 the volume of commodity flows between the EAEU and China had reached a 10-year maximum of approximately 130 million tons shipped along this route annually. The nominal value of shipments, however, is still small on the global scale (though it has increased 1.5-fold during the last decade). The positive dynamics of commodity shipment between the EAEU countries and China result from a growth of 75% in Eurasian Economic Union exports to China (the export commodity volume in 2016 reached 117 million tons). Import volumes from China to the EAEU are much smaller than exports (about 15 million tons annually) and they are not growing.

Fuel dominates the structure of Eurasian Economic Union exports to China (in terms of physical volume). Its share doubled during the past decade and reached 65% in 2016; at the same time the volume of shipment (in tons) tripled. Most of the exports in this group are oil (in 2016, 47.6 million tons were exported from Russia to China, and 3.2 million tons from Kazakhstan) and coal (16 million tons exported from Russia). Shipment volumes of petroleum products, natural gas, and other fuels have been much smaller.

About 15% of total EAEU exports to China are timber and lumber shipped from Russia (about 20 million tons in 2016). The share of minerals and chemicals had decreased to 10.6% in 2016 (compared to a 20% share earlier). This can be explained by decreased exports of iron ore (both from Russia and Kazakhstan) as a result of the fall in global iron ore prices. A significant share of EAEU exports to China is mineral fertilizers (4–5%, exported from Russia and Belarus), while shares of all other commodities is significantly lower.

The import structure for commodities coming from China into the EAEU is much more diverse. 25–30% of its volume is machinery and equipment, 15% is metals and metal products, 10% each chemical products, construction materials, and food and agricultural products; and 6–8% each minerals and chemicals; and clothes, shoes, and textiles. The shares of all other commodity groups are insignificant.

The growth in total trade volume and cargo shipment between the EAEU and China is creating a platform for the development of container cargo flows, in which case export flows will be more diversified and will include products that can be shipped in containers.

Analysis of commodity freight traffic between the EAEU and China (relevant to each member state of the EAEU) and its dynamics (including container flows)

Russia has the main share of the flows between the EAEU and China (75% of total import commodity flows and over 90% of export commodity outflows. Russia previously had about 75-80% of export outflows). In second place is Kazakhstan, but its share of export outflows has decreased from 20–25% to less than 10%, and in terms of import commodity flows, from 20–15%. Belarus has about 2% of both import and export commodity flows between the EAEU and China. Kyrgyzstan's share of EAEU imports from China is about 5%. Armenia's is about 1%; the share of these countries in export outflows to China is insignificant (about 0.1%).

Commodity flows between Russia and China

The structure of export commodity freight flows from Russia to China is, in general, almost identical to the structure of export freight flows to China from the EAEU (as Russia dominates the export outflows of the EAEU to China). Two-thirds of the total export volume from Russia to China in 2016 was fuel (its export volume was 4.7 times bigger than in 2007, while the share of exports increased 2.4-fold). About 15-20% of exports is timber and timber products (the share of this type of export has decreased twice due to the fall in roundwood exports). The share of mineral raw materials (consisting mainly of iron ore) has halved: from 15–20% to 8–10%; another 3–5% of export outflows consist of potassium and mixed mineral fertilizers. All the other types of export commodities are insignificant, including agricultural products and cellulose/paper.

The structure of export outflows from Russia to China is dominated by commodities that cannot be shipped in containers (fuel, raw materials, mineral fertilizers, timber, and agricultural raw materials), thus leading to the low proportion of container shipments (2–2.5%, according to Russian export statistics). In the last decade, the physical volume of Russian container shipments to China (almost 2.4 million tons in 2015) increased significantly (2.5-fold). Nevertheless, the increase in the share of this outflow in total export freight flow was only 0.5%—down from 2%–2.5%. The fact remains that container shipments are steadily increasing, allowing an optimistic prognosis about container export outflow growth in the transport and logistics infrastructure-development sector in Russia and the EAEU.

Import commodity flows from China to Russia match the entire China–EAEU inflow: equipment accounts for 25-30% of total supply; metals and metal products for about 15%; chemicals, agricultural, mineral raw materials, and construction products, account for about 10% each, while all the other commodity groups' shares are insignificant.

The share of Russian import container flow increased from 45-50% to 55-60% between 2007 and 2016, and the physical volume of container shipments increased from 4.5–5 to 5.5–7 million tons annually. The structure of container imports from China to Russia defines the growing level of containerization of import commodity flows.

Commodity flow between Kazakhstan and China

The structure of Kazakhstan exports to China (in tons shipped) is close to the export commodity outflow structure of Russia. The main commodity that Kazakhstan ships to China is fuel (mainly crude oil, but in 2016 also natural gas), which makes up half of national exports. Still, unlike Russia, the second significant commodity group shipped from Kazakhstan to China is "mineral and chemical raw materials" (up to 15 million tons—metal ores and sulfur), which account for 25–40% of export outflows (more than 50% in some years). The third group of commodities shipped to China is metal products (ferrochrome, copper, and steel), which account for to 5–10% of total Kazakh exports to China. At the same time, timber or mineral fertilizers are rarely found in Kazakh export outflows.

Imports from China to Kazakhstan are relatively low (2–3 million tons annually) and mainly consist of equipment (about 25% of total imports), metal products (about 20%), chemicals and construction materials (10–15%). The volumes of shipments of other products vary.

Commodity flow between Belarus and China

The basis of Belarus exports to China are potassium mineral fertilizers (89–90% of total exports, about 1–2 million tons annually). Roundwood and chemicals (polyamides) are also present in commodity export outflows from Belarus.

In return, Belarus imports a small volume of commodities (about 0.5 million tons annually), consisting mainly of equipment and machinery (about 35%) and metal products (15–20%).

Commodity flow between Armenia and China

The physical volume of export and import operations between Armenia and China are insignificant: exports and imports are about 100,000 tons annually. Exports are dominated by mineral raw materials (copper ore); imports consist of equipment, machinery, metal products, and construction materials.

Commodity flow between Kyrgyzstan and China

The volume of Kyrgyzstan's exports to China is also insignificant—about 100,000 tons annually, dominated by two commodity groups: fuel (coal); and textiles and leather, which make up to 80% of the export outflow.

The import structure is diverse. Of 600,000–700,000 tons annually, Kyrgyzstan imports 10–20% of total volume of each the following groups of commodities: agricultural products and raw materials; clothes, shoes, and textiles; machinery and equipment; and metals and metal products.

Overall, commodity export outflow from the EAEU to China consists of non-container goods; the share of container shipments is about 1.5–2% (2–2.5 million tons annually). This is the result of the export structure being dominated by non-container commodities (fuel, mineral raw materials, timber, mineral fertilizers, and agricultural raw materials).

The share of container shipments from China to the EAEU has significantly increased over the past decade: from 35% to 55%, while the physical volume has grown from less than 6 million tons annually to 7–9 million tons. Container-shipped commodities, the share of which is steadily increasing, dominate the import commodity inflow structure, unlike the export structure.

Overview of cargo shipment volume trends in the EAEU (railway and road transport)

An overview of Russia–China shipment volume dynamics (railway transport)

According to Russian international trade statistics, Russian exports transported by rail to China have decreased to about 24 million tons annually (about 30 million tons in 2011–2013) due to the decreased volume of iron ore exports. Railway is mainly used to ship significant volumes of mineral and chemical raw materials (iron ore, sulfur, etc.), namely, 6–11 million tons annually, along with mineral fertilizers (about 2 million tons annually), fuel (mainly coal, about 1.8 million tons annually), and cellulose and paper industry products (0.9 million tons annually).

These data match statistics presented by Russian Railways on export commodity shipments to China. At the same time the figures include not only direct shipments to China, but also shipment to maritime ports where commodities are loaded on to ships (for destinations in the eastern and south-eastern seaboard provinces), in other words, multimodal shipments. The commodity structure in this case is

dominated by timber and timber products (including cellulose and paper industry goods), fuels (coal and oil products), and mineral fertilizers and ore.

According to Russian statistics on international trade, only 1% of Russian exports by rail to China is shipped in containers (150,000–200,000 tons annually). Cellulose and paper- industry products, timber, and chemical raw materials dominate container shipments. Russian Railways transport statistics include multimodal shipments (railway/maritime and railway/road) in the volume of exports via railway along with the weight of the containers themselves, thus indicating higher level (2–4%) of container export share in total exports. The export structure of Russian Railways is dominated by timber and timber products (including cellulose and paper-industry products) and so-called "other products," which include chemicals, machinery, and equipment).

An analysis of official Russian Railways statistics indicates that the volume of TEU container exports from Russia to China has increased 2.5-fold during the last 7 years (from 69,000 TEU in 2010 to 171,000 TEU in 2016). At the same time, just 10–20% of commodity exports pass through customs on the inland border between Russia and China (21,000 TEU in 2016) while the majority of commodities are shipped on directly by rail and maritime routes as multimodal shipments. Almost all container cargo trains cross the border at Zabaikalsk (80–100% of the total inland railway shipments), but the importance of this border crossing is decreasing. The other major border-crossing point is Grodekovo (in 2016 its share increased to 18% of total inland exports). All the other customs points are almost empty, including those on the border between Kazakhstan and China. As for the contents of shipments, 93–99% of inland export outflows were "other commodities" up to 2015–2016; in 2016 half of exports became timber and timber products, and the other half continued to be "other commodities."

The short- and mid-term perspectives of Russian exports to China are related to the commodity group "84 TN–Machinery and equipment" (in the statistical databases developed by Russian Railways this type of commodity is included in "other commodities"). Currently, both the volume of shipment and its share of total exports are insignificant; but they have growth potential, in terms of developing Russian-Chinese industrial collaboration in the future.

Russian imports from China by rail represent about 2 million tons annually (according to Russian statistics bureau). 25% of this volume is machinery and equipment (0.4–0.6 million tons annually), 15–20% is in i) metal products and ii) construction materials, and iii) 10% each is in chemical products, fuel, minerals, and chemical raw materials.

The statistical bulletin of Russian Railways indicates that the volume of shipment is double the figure mentioned above: this is a state corporation and it includes both multimodal shipments and the weight of containers in the volumes of shipments. According to these statistics, 75% of total import shipments to Russia are "other commodities," including machinery and equipment, chemical products, food, etc.), and about 10% are metal products and 10% construction materials.

The increased share of container railway transport in the volume of Russian imports from China (which has increased to 60%, according to Russian Railways statistics) has extra growth potential. (For comparison, 100% of goods from Germany are shipped to China in containers). This growth potential is especially high for the "other goods" which are usually shipped in containers. Though in 2015–2016 container imports from China were insignificant, they do show a potential for exponential growth in volume in the mid-term.

According to the Russian Railways statistical bulletin, the level of import container shipment from China in the past years ranges from 200,000 to 250,000 TEU annually; and just 25% of this volume crosses the inland border (55,000 TEU in 2016). The majority of container cargo transported by rail is shipped to China via maritime ports (multimodal shipment). Almost all imports from China (and to China) cross the customs border in Zabaikalsk (90–98%) and Dostyk (the share of this border-crossing point increased in 2016 to 9%). Cargo shipment via other inland border-crossing points is currently insignificant. 95% of this volume is made of "other commodities," and about 1,000 TEU annually are "mineral and construction materials".

General trends in the volume of transport by road between the EAEU and the EU

The volume of Russian exports to China via regular roads (automobile transport) tripled between 2008 and 2015, but still is relatively small (about 1.2 million tons annually). Most of these shipments are of timber (roundwood and timber products), which occupy 60–70% of shipment volume (this decreased to 50% in 2015). At the same time the share of agricultural raw materials shipped increased significantly in 2015 (from 10–15% to 40%). Other types of commodities are rarely shipped to China by road.

It is almost impossible to find container shipments by road from Russia to China (a few thousand tons are shipped this way, mainly metal products and agricultural products). The share of container shipment by road ranges from 1% to 3%.

According to Russian international trade statistics, the volume of Russian imports from China (transported by road) is around 1.5–2 million tons annually. The main commodity groups for this type of shipment are: food and agricultural raw materials (30–50%), machinery and equipment (25–30%), and clothes, shoes, and textiles (about 10%).

30% of cargo shipped by road transport are containerized. This includes Chinese machinery and equipment, and also chemicals being shipped to Russia (50–60% of total import inflows by road to Russia); clothes, shoes, and textiles (30–40%), and agricultural raw materials (1–2%).

General trends in the development of traffic volumes by rail and road between other EAEU countries and China

According to Kazakhstan Temir Zholy (Kazakhstan national railways), Kazakhstan exports by rail to China are increasing, along with growing capacity at the border-crossing points, Dostyk-Alashankou and Altynkol-Khorgos, where there is a current volume of about 4.7 million tons per year. The export commodity structure includes mineral raw materials (sulfur, ferrous and non-ferrous metals), metal products (ferrochromium), fuel (liquid natural gas [LNG]) and agricultural raw materials (grain). The share of containerized cargo from Kazakhstan to China is about 15%, dominated by ferro-composites and non-ferrous metals. Kazakhstan has a clear logistical comparative advantage in terms of the supply of ferrochrome to the Chinese metal industry. There is thus a basis for growth in the containerized cargo flow of ferrochrome along the Kazakhstan–China railway route if demand from China increases. With container cargo currently focused primarily on machinery and equipment, chemical products, etc., it is unlikely that container export of commodities by rail will to increase mid-term.

The volume of Kazakhstan's railway imports from China (along with total imports) has decreased in the past years and, in nominal terms, constituted less than 1.5 million tons in 2016. This can be

attributed to the decline of demand for imported products in Kazakhstan, driven by a significant reduction of global prices for and export revenues from, the country’ s key export commodities. The structure of Kazakhstan’s imports from China by rail mainly includes machinery and metal products, and chemical products; at the same time, imports of petrochemicals have decreased. The fact that the prices of Kazakhstan’s main export products have now stabilized allows the growth of imports of machinery and equipment and household appliances to be predicted, which points to increasing container import inflows.

An analysis of the foreign trade and transport statistics in the EU, EAEU, and Belarus indicates that almost 100% of Belarus's exports to China are multimodal (railway and maritime transport) and are routed via the Baltic States ports (1–2 million tons annually). The exports are dominated by mineral fertilizers and roundwood, which is why container cargo has an insignificant share of (about 1–2%). Container exports are dominated by chemical products and equipment. Belarus’s export transit via railway in Russia and Kazakhstan is currently insignificant (6–8 thousand tons annually according to Russian Railways statistics) and consists mainly of “other commodities” shipped in containers (over 80% in 2016).

Belarusian imports from China are also mainly multimodal (railway–maritime and road– maritime transport) via the Baltic States ports. According to Russian Railways, Belarus imports by rail from China increased significantly in 2016 exceeding 60,000 tons which is almost 10% of the total imports from China to Belarus. The import structure is dominated by the “other goods" shipped in containers, which make up about 85% of the volume.

The volume of the railway exports from Kyrgyzstan to China is currently insignificant and dominated by coal and precious metals. This volume is limited by the network capacity of Kazakhstan railway at border-crossing points of Dostyk-Alashankou and Altynkol-Khorgos, which already fully in service to Kazakhstan. Railway imports to Kyrgyzstan from China are also insignificant: the volume does not exceed 100,000 tons annually; imports are mainly machinery and equipment, metal, and chemical products.

Exports and imports between Armenia and China are non-existent according to Russian Railways statistics.

The volume of Kazakhstan’s exports to China by road is about 50,000 tons annually and is dominated by agricultural raw materials. The reverse import flow is relatively small (about 100,000 tons annually) and is dominated by clothes, shoes and textiles, food, and construction materials.

There are currently no imports and exports by road between Belarus and China.

Exports from Kyrgyzstan to China by road do not exceed 50,000 tons annually and are dominated by agricultural raw materials. The volume of the reverse import flow is about 100, 000tons per year, and includes clothes, shoes, textiles, food, and construction materials.

There are currently no imports and exports by road between Armenia and China.

EU-China commodity flow structure

Overview of commodity structure, volumes of trade and its dynamics in value and physical dimensions between EU countries and China

Despite the large volumes of mutual trade between the EU and China (which recently stabilized at the level of USD560–600 billion annually), the physical volume of these operations is relatively small (about 90–110 million tons annually). The volume of EU imports from China over the past 5 years was approximately double that of exports in value terms and also approximately double in nominal terms, while the physical volume was about 25–40% higher. Nevertheless, the trade imbalance between the two is declining (especially in terms of physical volume). This tendency is considered positive, as it leads to a significant decrease in empty containers flowing from EU countries, something that was experienced by the parties over the past years.

The structure of EU exports to China in physical volumes is diverse and includes cellulose and paper-industry products (about 25% of total physical volume, mainly waste paper), mineral and chemical raw materials (10–20%), machinery and chemical products (8–12%), agricultural raw materials (3%), fuel (15-20%), metal products (7%), and timber (8%). The structure of EU imports is dominated by machinery, equipment, and industry products (35%), metal products (15–20%), construction materials (7–10%), clothes, shoes, and textiles (9%), chemical products (9%), mineral and chemical raw materials (7%). The share of other commodity groups is much lower.

China's largest trading partners in Europe (in terms of physical volume) are currently Germany, United Kingdom, and the Netherlands, followed by Belgium, France, Italy, Spain, and Poland. Statistical data indicate that 98% of both exports and imports is shipped by sea, 1.5–2% by air, and 0.5–1% by rail.[2]

Analysis of the commodity structure of freight flows transported by rail and road between EU countries and China (allocation of container cargo)

The turnover in EU–China trade by rail almost doubled from 400,000–600,000 tons in 2006 to 1 million tons in 2016. The volume shipped by air increased 1.5-fold (from 1.2–1.4 to 1.8–1.9 million tons), and maritime transport increased by 10–15%.

The fact that export volumes from the EU to China by rail have doubled over the past decade (reaching 400,000 tons in 2016) results from the railway shipment of cars and auto parts, and machinery and equipment (engines, transmissions, pumps, etc.); at the same time, machinery now represents half of the rail trade volume. Approximately 15–20% of European railway export to China is "metals and metal products"(the 2006 volume doubled to almost 70,000 tons in 2016). About 10% of railway cargo is chemical products; timber products also play a significant role (approximately 5–8% of trade volume). According to Russian Railways statistics, all EU–China transit is shipped in containers.

The structure of EU railway imports from China consists of 55% in machinery and equipment, 10–15% in metal products (the share is decreasing), 5–10% in minerals and chemical raw materials, chemical products, construction materials, clothes, shoes, and textiles, while the share of other import groups

[2]According to EuroStat about 5% of import volumes and 1.5-3% of export deliveries between EU countries and China are serviced by road transport, but these volumes are in fact multimodal when road transport is used exclusively to transport commodities from ports to temporary storage warehouses or bonded warehouses (under DDU/DDP Incoterms) or reverse (under FCA Incoterms). The main delivery is implemented by maritime transport. According to the Eurostat Transport Database, there is no road cargo transport between the EU countries and China

is low. Approximately 80% of multimodal maritime-railway cargo between the EU and China is containerized: this represents 90% of EU imports and 70–75% of EU exports.

Container turnover between the EU and China is steadily increasing and now exceeds 12 million TEU annually (as a result of increasing container shipments from China, which are 1.5–2 times higher than the counter flow). China's main counterparts in the container trade are Germany, the United Kingdom, and the Netherlands, which together form about 60% of the total Sino–European container turnover. For example, Germany's freight container turnover with China is 98% of total turnover, including 100% of the commodities imported by Germany from China, and approximately 95% of cargo outflow from Germany.

The 80% containerization level achieved in trade between the EU and China is due to containerization of maritime trade.

Russian Railways statistics on transit container railway deliveries from the EU to China show an exponential growth in railway shipments, from 1,300 TEU in 2010 to over 50,000 TEU in 2016. While up to 2014 almost all (95–100%) transit container freight traffic crossed the customs border at Zabaykalsk, in 2016 the share of this crossing decreased to 22%. Two-thirds of containers (about 34,000 TEU are now crossing the border at Dostyk, and another 5,300 TEU are crossing at Naushki. More than 95% of container cargo from the EU to China is commodities, referred as "other commodities."

The transit container freight flow from China to the EU increased from 5,600 TEU in 2010 to almost 100,000 TEU in 2016 and is twice as big as the counter-flow trade. Shipment volumes via border-crossing points are the same as EU–China transit volumes: the share of Dostyk has increased from 1% to 67%, and that of Zabaikalsk has decreased from 99% to 20% (while the volume of container cargo increased 3.5-fold during this time). Cross-border shipment also increased at Naushki (8% in 2016) and Altynkol (5%). Again, almost all container cargo is commodities, referred as "other commodities".

The dominance of container cargo along the route analyzed indicates growth potential for railway cargo transport from the EU to China and back in the coming years.

Brief analysis of cargo structure and dynamics between the EU and the EAEU (including container shipment). The main trends for each EAEU member state

EU–EAEU export and import structure and dynamics analysis (nominal values and physical volumes)

Though the European Union is rapidly developing economic collaboration with the countries from Asia-Pacific Region, the EAEU remains its most significant trading partner, both in terms of the physical and nominal values of shipments. The trade turnover between the EAEU and the EU is 550–575 million tons annually, and this figure has been stable from 2007–2016. The nominal value of foreign trade ranges from USD240 to 460 billion annually due to volatility of raw materials prices during this period. Exports from the EAEU countries to the EU significantly exceed imports: twice in nominal terms and 20–30 times in physical volume. The physical volume of EAEU exports to the EU has increased by 5–10%, from 510–530 million tons to 557 million tons annually during the past decade, while the nominal values has decreased from over USD300 billion to 155 billion in 2016. At the same time imports decreased both in physical values (from 30 to less than 20 million tons), and in nominal values (from USD100–150 billion to USD80 billion).

On the other hand, the import container inflow from the EU to EAEU countries, which has declined in the past 5 years due to both the dramatic decrease of EAEU countries export income from export and to the economic sanctions imposed by EU countries on Russia, has the potential to be restored to the pre-2014 level if there is no *force majeure*, thus leading to increased volume of container shipments. As the volume of container imports is currently relatively small (partly due to the under-developed logistics infrastructure in EAEU countries), container inflow to the EAEU has a great potential for increase.

EAEU exports to the EU are dominated by different types of fuel, which occupies 85–90% of the total export volume (450–490 million tons annually). For the other commodity groups, there are significant export volumes to the EU countries of mineral raw materials, timber, and metal products (about 15 million tons annually or 3–4% of the total exports) while all the other commodity exports are insignificant.

EAEU imports from the EU are dominated by chemical products, machinery and equipment, and agricultural products (3–5 million tons annually), each category taking up 15–20% of total import volume. Other commodity group imports do not exceed 10%.

The main export and import cargo flows between the EU and EAEU are generated by Russia, which provides 80–90% of all export and import volume between all EAEU countries. Kazakhstan provides about 10% of export and 5% of import volumes, Belarus 4–5% of exports and about 10% of imports. (In the last three years its share has grown to 11–14% due to the re-export of agricultural products from the EU to Russia). Armenia and Kyrgyzstan both provide about 0.5–1% of EAEU imports and almost zero in exports. The main EAEU trade partners in the EU (according to Eurostat) are Germany (about 20% of the physical volume in exports and imports), the Netherlands (11–14%), Italy (about 10%) and Poland (about 9%); among other significant trade partners in the EU are Finland, France, and the United Kingdom (approximately 5% each).

Analysis of commodity flow structure and dynamics between the EAEU and the EU (relevant to EAEU member states) and its dynamics (including container cargo)

Russian exports to the EU are dominated by fuel, which makes up about 90% of total exports (over 420 million tons in 2016). Crude oil, oil products, and natural gas dominate Russia's export structure, followed by a significant outflow of charcoal. Of the other 10% of exports, the main commodities are mineral raw materials and metal products (3–4% of total export) and timber (2%). The share of all other export products is insignificant.

The share of Russian container cargo exports to the EU is insignificant and does not exceed 1% (although it did increase from 0.4% to 0.6%). This is due to the complete dominance of large-tonnage cargo not intended to be shipped in containers (crude oil, natural gas, coal, iron ore, roundwood, mineral fertilizers, grain, and other agricultural raw materials, etc.).

The structure of Russian imports from the European Union is significantly smaller and yet much more diverse: about 15–20% of imports (per each of the three categories) are machines and equipment, chemical products, and mineral and chemical raw materials. Due to Russian countersanctions imposed on the EU in 2014, the share of agricultural raw materials decreased to less than 10%. A significant share of imports (5–10%) were food, cellulose and paper-industry products, chemical products, metal products, and construction materials.

The share of container cargo for Russian imports from the EU is 20–25%, or about 4–6 million tons of container shipments annually.

Kazakhstan's exports to the EU are dominated by fuel (mainly crude oil). This reached 98% in 2013-2016, while all the other export products became insignificant in terms of the country's exports to Europe. For comparison, in 2007–2008 about 5% of Kazakhstan's exports to the EU were metal products, mainly ferrochrome and copper.

Kazakhstan's imports from the EU are relatively small (about 1 million tons annually), and consist of machinery and equipment (20–30% of total import volume), chemical products (15–20%), agricultural raw materials (the share increased from 5 to 25%) and metal products (10–15%).

Of Belarus's exports to the EU, 75% belonged to 2 commodity groups: fuel (mainly petroleum products, the share of which decreased from 70 to 50% during the last decade) and timber (the share of which increased from 10% to almost 30% in the last decade). Significant Belarusian exports to the EU include mineral fertilizers (potassium), metal products, and mineral raw materials (4-8% per each commodity group).

The structure of Belarus imports from the EU has changed significantly in the last three years: the share of agricultural raw materials has doubled (probably due to the re-export of European products following Russian countersanctions). At the same time, the share of imports is declining: the share of machinery and equipment decreased from 15–20% to less than 10%, chemical products, from 20–15%, and timber, from 10–1%. Moreover, Belarus has been importing more mineral raw materials (limestone, cement) from the EU lately: the share of these products has increased from 10–15%.

Exports from Armenia to the EU are not significant (100,000–200,000 tons annually) and are dominated by mineral raw materials (copper and zinc ores); the share of these doubled in the last decade and reached 80%. The second most significant exports are metal exports (copper, aluminum), but their share has decreased from 40-50% to 15–20%. No commodity groups are exported on a regular basis.

Armenia's imports from the EU are equally small (200,000 to 400,000 tons annually) and have declined over the last 3 years. There are two main commodities: fuel (oil products) and agricultural raw materials, which together form 40–70% of the import volume.

The main export commodities from Kyrgyzstan to the EU are quite small (20,000–30,000 tons annually) and mainly include dried beans and non-ferrous scrap metal.

Imports to Kyrgyzstan from the EU (which declined in 2016 to less than 50,000 tons) are much more diverse. The most significant categories are machinery (mainly cars), chemical products, and timber.

The share of container cargo in EAEU exports to the EU is insignificant and is less than 1% (between 2007 and 2016 it ranged from 0.5% to 0.9%). The reason is as described above: the majority of commodities shipped from the EAEU (mainly Russia and Kazakhstan) cannot be containerized (oil, natural gas, coal, iron ore, grain, etc.) and only insignificant shares of other products are shipped in containers.

Container cargo represents 20–25% of the total import volume to the EAEU countries from the European Union. The physical volume of these shipments fell from 5.5–7 million tons annually in 2007–2014 to 4.5–5 million tons in 2015–2016.

The structure of EAEU–EU trade is defined by the commodity structure of their international trade supply. Fuel and mineral raw materials dominate EAEU exports to the EU and thus define the dominance of maritime and pipeline transport in EAEU exports to the EU. The share of maritime shipments in the last 5 years has been 54–57% of the total turnover volume, and the share of pipelines (oil, gas, and product pipelines) is 30–31%. Approximately 7–8% of exports from EAEU countries to the EU are moved by rail and only 2–3% by road.

The main mode of transport for EAEU imports from the EU is by road, and its share has increased from 55% to 60–65% in the past decade. The volume of road-transported cargo is stable: about 15 million tons annually. Approximately 25–30% of cargo is shipped by maritime transport. The share of railway transport decreased by half from 16–17% in 2006-2008 to 8.5% in 2016. The use of road transport along this trade route is due to the high shipment share of machinery, equipment, and chemical products, which are relatively small and thus easily shipped by road (the volume of single-unit shipments is also quite small). The double to triple decrease in railway imports can be explained by import structure changes: the Russian embargo on food imports from the EU countries (which were normally delivered to Russia by rail, especially from Poland) led to a significant decrease in this type of import and hence to a decrease in cargo volume.

Analysis of cargo volume development trends in EAEU member states, including different types of transport (railway and road)

General cargo volume development trends in railway transport between the EAEU and the EU

The turnover in railway trade between the EAEU and the EU had significantly decreased by 2009, and gradually decreased by 25% up to 2014, when it was 38 million tons annually. Of this volume, exports are about 10–20 times higher than imports.

According to Eurostat, the volume of railway exports from the EAEU to the European Union has decreased by almost 10 million tons (to 36.6 million tons) during the past decade (though in the last 3 years, they have had a positive trend). 35–40% of this volume is fuel (in 2013-2016, 12–13 million tons annually, mainly Russian coal and Russian and Belarusian oil products). About 30% of are mineral and chemical raw materials (8–11 million tons annually, mainly Russian iron ore and alcohol). A feature of recent years has been the increased volume of timber exports (8.3 million tons in 2016) and how the share of timber in railway cargo shipment to the EU has risen by 23% due to exports of Russian roundwood and Belarus fuel timber. The other growing exports to the EU are Russian and Belarusian mineral fertilizers (2.5 million tons annually and up to 7% of freight volume). The export of metal products (Russian and Belarusian steel) has declined by almost 50% to 1.5 million tons annually (3–4% of total export volume). Exports of agricultural raw materials grew by up to 0.5 million tons annually during the same time period and now represent 1.5% of total export volume.

The volume of other commodity trades is relatively low, and does not exceed 100,000 tons annually.

Railway imports from the European Union to the EAEU decreased three-fold over the past decade, dropping to 1.6 million tons in 2016. At the same time, the share of mineral raw material imports (dominated by cement exported to Belarus and Russia, and limestone exported to Belarus) increased to 35–40% despite a decrease in physical volume. 11–15% of EU exports are machinery, equipment,

and industry products, while the share of all other commodities is insignificant and varies significantly year on year.

According to Eurostat, the volume of Russian railway exports to the EU reduced significantly in 2009, but in 2013-2016 stabilized at the level of 23–27 million tons annually. 90% of this volume comes from three major groups: fuel (about 40%, dominated by coal and oil products), mineral and chemical raw materials (35%, dominated by iron ore) and timber (15%); another 3–6% from mineral fertilizers and metal products. The share of other commodity groups is insignificant.

According to Russian Railways statistics, the export structure is responsible for the low share of container cargo, which is about 1–2% of total volume. The only significant share (10–20%) is that of chemical products.

Imports to Russia from the EU countries by rail is low and continues to decrease for almost all types of imports (in total: from over 3 million tons to about 1 million tons in 2016). Major imports to Russia by rail are mineral raw materials (30–40%), machinery and equipment (15–20%), and chemical products (about 10%).

According to Russian Railways statistics, the share of container imports to Russia is gradually increasing, growing from 10% to 20% in the past decade. Such growth is represented by a significant decrease in the shipment of non-metal construction materials from the Baltic States, which were mainly shipped by rail.

According to Eurostat, the volume of Kazakhstan's exports by rail decreased two-fold during the past decade: from 2–2.5 million tons to about 1.1 million tons in 2016. The share of fuels still dominates Kazakhstan exports (75–80%), though the volume of shipment decreased by half and metal products exports have almost stopped. Kazakhstan's mineral raw material exports (mainly sulfur) are about 200,000 tons annually, while their share has increased to 15–20%.

As in case of Russia, the share of container cargo exported by Kazakhstan to the EU is insignificant, mainly due to the type of products exported.

Kazakhstan imports from the EU have decreased fourfold over the past decade to less than 200,000 tons, due to decreased income from fuel exports. The share of products that can be shipped in containers: machinery, equipment and timber, decreased threefold (to 10%) while railway imports of agricultural products increased both in terms of share (to 30%) and physical volume.

The share of container cargo in Kazakhstan's imports by rail is relatively low and is estimated at 10%.

According to Eurostat, the volume of Belarus’s exports to the EU by rail has increased 1.5-fold over the past decade, reaching 8.6 million tons. The overall growth in export volume results from increased timber shipment (non-container roundwood and fuel timber) and a relevant increased share of these products (50%). Shares of mineral raw materials and fertilizers remained stable (10–15%), while shares of fuels (oil products) decreased from 35% to 15%. This stable export structure means a low level of container shipments (5%).

Imports to Belarus by rail are much lower than exports, representing 0.3–0.5 million tons annually. Imports mainly consist of non-containerized mineral raw materials (limestone, cement), which occupy about 80% of imports. The share of container shipment in Belarus from the EU is estimated at around 10–15%.

Kyrgyz exports to the EU by rail are insignificant (1,000–2,000 tons annually) and mainly include dried beans, which are not containerized.

Kyrgyz imports from the EU by rail have always been relatively small, and have declined significantly in the last two years (to 12,000 tons in 2016); they mainly comprise agricultural raw materials, timber, etc.

Export and import cargo flows between Armenia and the EU countries are insignificant and are almost never transported by rail. According Eurostat, railway freight between Armenia and the European Union does not exceed 1,000 tons annually.

General cargo volume development trends in road transport between the EAEU and the EU

The physical volume of road-based trade turnover between the EAEU and the EU has been stable over the past decade and amounts to 25–30 million tons (about 25% less than the volume of railway trade turnover). Export and import volumes are almost equal, although in 2016, automobile exports from the EAEU to the EU exceeded imports.

According to Eurostat, road-based exports from the EAEU to the European Union increased by 17% and reached 13.3 million tons annually. Up to 40–50% of export is timber, the shipment volume of which reached 6.4 million tons in 2016 (this mainly included roundwood and fuel timber from Russia and lumber from Belarus). The share of metal products in export volume increased from 10–12 to 15–17% (1.8 million tons in 2016, mainly Russian steel). Another 10–15% is from fuel (1.5–2 million tons annually, mainly oil products from Russia). Other road export volumes are insignificant (about 300,000 tons annually).

The volume of road-based imports to the EAEU from the EU decreased from its 2013 maximum (20.6 million tons) to 12.8 million tons in 2016. The imports structure is dominated by three groups of products, each with approximately 20–25% of total import volume: machinery and equipment; food and agricultural raw materials; and chemical products. Significant growth in Belarus's imports of European agricultural products is due to their further re-export to Russia as a result of the implementation of Russian countersanctions. The shares of import flows of other commodities are insignificant.

According to Eurostat, the volume of road-based exports from Russia to the EU is stable at around 7-10 million tons annually. 40-45% of this export is timber (roundwood and fuel timber, which is mainly shipped to Finland), about 15% is fuel (oil products) and steel products. Volumes of other road-based exports are insignificant. Only 1% of automobile exports are shipped in containers.

The volume of imports by road to Russia from the EU increased to 17.5 million tons in 2013, and then decreased significantly to 9.3 million tons in 2016. About 45–50% of automobile imports are represented by two commodity groups (about 20–25% each): machinery and equipment, and chemical products. The share of agricultural raw materials decreased from 25% to less than 10% (due to Russian countersanctions); another 10% was cellulose, 10% was paper products, and 10% was food. The share of container cargo in automobile imports has decreased from 10% to less than 5% over the past decade due to reduction in container shipments of machinery, equipment, and chemical products.

According to Eurostat, Kazakhstan exports by road to the EU are very small (120,000–140,000 tons annually): long distances make road exports inefficient. Half of this volume is from agricultural raw

products (flax seeds), 10–15% from mineral and chemical raw materials (chromium oxides), textiles (cotton fibers) and metals. The volumes of automobile exports in other commodity export groups and the share of container cargo are insignificant.

The volume of Kazakhstan's automobile imports from the EU doubled over the past decade and reached almost 0.8 million tons in 2016. About 30–50% are machinery and equipment, 20-30% are agricultural products (fruit), and about 20% are chemical products (mainly plastic). Containerized automobile import inflow to Kazakhstan is relatively small; its share does not exceed 5–10%.

Belarus's exports by road to the EU are rapidly increasing. According to Eurostat they grew 2.5-fold cover the past decade, reaching 3.3 million tons in 2016. About half of this volume is from timber, 20% from metal products (steel construction, pipes), and about 10% from fuel (oil products). The share of containerized cargo is insignificant.

According to Eurostat, the volume of automobile imports from the EU to Belarus significantly increased during the past decade and reached 2.5–3 million tons annually. This growth was achieved by a six-fold increase in import by road of agricultural products (mainly apples, re-exported to Russia), the share of which reached 60% of total import volume; the imports of other commodity groups remained stable in physical volume but their share decreased. The share of container cargo was stable at around 5–10%.

Exports from Armenia by road to the EU are insignificant at around 10,000 tons annually. They mainly include metal products: aluminum foil and ferro-composites.

The volume of Armenia's imports by road from the EU is about 50,000 tons annually (according to Eurostat). These are mainly machinery, chemical products, and agricultural raw materials: each commodity volume is about 10,000 tons annually. The share of container cargo is stable at the level of 5–10%.

Kyrgyzstan's exports by road to the EU are —around 10-15 thousand tons annually. They include agricultural raw materials (dried vegetables) and metal products (non-ferrous scrap metal).

Kyrgyzstan's imports by road from the EU are relatively small according to Eurostat at the around 30,000–60,000 tons annually. They mainly comprise mechanical engineering products (50–70%) and chemical products (15–20%). The share of container cargo is stable at around 5–10%.

Analysis of existing barriers to the development of international freight transport and transit along the China-EAEU-EU axis

General overview of logistics-related barriers in the EAEU, EU, and PRC

To assess the international cargo transport on the PRC–EAEU–EU route several factors need to be taken into account in terms of their volume, structure, and potential. The main factors are economic (which affect freight pricing and thus the competitiveness of inland transport compared to maritime), technical (including the technical possibility of transporting original cargo along the route, which also affects its final competitiveness) and legal or institutional (including both physical and non-physical barriers). Although economic factors are one of the most important affecting Eurasian international projects, it would be a systemic mistake to exclude political factors from discussions of such issues.

This part of the research includes both analysis and assessment of existing barriers in EU–PRC inland transport projects.

Overview of railway related barriers in the EAEU, the EU and the PRC

"The speed of the squadron depends on
the speed of the slowest ship"
English proverb

Train length

A successful approach toward the sustainable development of the "One Belt, One Road" initiative can be more or less described by the above-mentioned English proverb, which illustrates the main tasks, i.e., to increase both speed and volume of the transported cargo along the Asia–Europe–Asia (PRC–EAEU–EU) route. Thus, the main goal here is to assess bottlenecks on the proposed routes and to develop an understanding of investment perspectives, transport planning, and new route development.

One of the key parameters affecting freight economy is train length. Maintenance services consider a number of technical factors when estimating the length of cargo trains. As railway maintenance services in China, Kazakhstan, Russia, Belarus, Poland, and Germany are fully aware of the technical state and limitations of national railway infrastructure, they perform their activities based on technical and technological parameters rather than economic or political ones. Hence, before making a decision on increasing cargo trains along the EU–China route, the technical limitations of national railways need to be assessed. We would stress that the length of trains is regulated by each national rail authority (DB, PKP, BCh, RZD, Kazakhstan Temir Zholy, Chinese Railways[3]) and is limited by a number of factors, including the length of station tracks, train weight, possibility of traction, route profile, technical capabilities of the route (stations, crossing points, overpasses, and road points, on-route posts, automatic blocking, and traffic lights), plan and profile of station tracks, conditions of shunting work at stations, technical and technological conditions of operation of intermediate and precinct stations, sorting, etc.

[3]It is worth mentioning that from Urumchi to Alashankoy and Khorgos, Chinese Railways are not developing and hence not planning high-speed cargo transport.

The loading of fitting platforms with containers is influenced by the length of trains. In EU–EAEU–PRC transport, 40-foot platforms are most popular length, as they can fit two 20-feet or one 40-feet container.[4] Longer 60- and 80-foot platforms are used at the Brest/Malaszwicze) border crossing.

Container trains from China reach the Kazakhstan border with 54 conditional carriages (1 equiv.= 13.92 m (14m) long carriages). A 54-carriage train would therefore be 756 m long; with locomotive and train setting we arrive at a total length of 801 meters. For Kazakhstan this length is acceptable, as Dostyk station rails allows trains of this length to operate.

In Russia, the average train contains 71 conditional carriages (994 meters), so the full train is 1040 meters long. The train length can be smaller (about 800 m) subject to certain factors.

Reference. *The length of the train depends on the maximum length of tracks at transit stations along the cargo train route. Thus, some trains consist of only 40 carriages, while others (ones that bypass these stations) could consist of 60 or more; the train length is thus limited by of the locomotive belt power and rail profile. For instance, on a single-track section common in Europe), the length of the train has to correlate to the distance between the exit traffic lights or the side-by-side border gaps. Thus, train length can range from 300 to 1200 meters*

If there are empty carriages the train can be even up to 100 carriages. On the other hand, if the carriages in the train are heavy, it would be shorter than a usual one; this is not a violation, but everyday practice. Normative length of the train (number of conditional carriages in the train) is a technological parameter that significantly defines rail maintenance management.

In case of BCh (The Belarusian Railway) the length of trains ranges from 57 to 65 conditional carriages, depending on the train route. The maximum train length in Belarus is up to 955 meters.[5]

The length of trains in Poland (on PKP) is much smaller. According to the national legal regulation of railway transport limits, train length is a maximum of 600 meters, but development of infrastructure to handle 750-meter long, and even longer, trains (up to 108 conditional carriages) is planned.[6]

Thus the train leaving Malaszewicze currently has a maximum of 43 conditional carriages long, and carries at most 86 TEU (86 x 20-feet or 43 x 40-feet containers). Hence if the train arrives at the Belarus border with 65 loaded conditional carriages, some of these containers will have to be reloaded to another train, meaning that another train will need to be created and maintained. The train can proceed if loaded with no more than 86 TEU, in accordance with PKP limitations on maximum weight of container trains. At the moment, the Brest–Malaszewicze train station is able to reload 9–10 trains per day so that they can proceed to Poland,[7] which means that the station has approximately 860 TEU capacity per day, or 314,000 TEU annually. According to existing agreements, container reloading on/to fitting platform from/to gauge 1435/1520 mm is the responsibility of the Polish side. Belarus's

[4]For instance, during Chinese visit to Poland in 2016 one of the events was arrival of the first container train from PRC – this one included 22 80-feet Sggrs platforms (driven by EU07). Each platform was loaded with 2 40-feet containers, thus making a "showroom train"

[5] Norms of weight and length of freight trains on the sections of the Belarusian Railway for 2014/15 /http://pandia.ru/text/80/230/80478.php

[6]Krzysztof Lewandowski. Long freight trains in Poland, what is the problem of its usage? The manuscript delivered: April 2016. https://www.researchgate.net/publication/309486866

[7]«Гудок», 30 августа 2017 г., среда, N 150 (26289).

cross-border reloading capacity is 6 container trains per day, so from West to East, this will place a limitation on further transit.

JSC “Transcontainer” estimates the potential Brest-Malaszewicze cross-border reloading capacity to be 200,000 TEU annually.[8] The share of containers, shipped via this route to European ports is about 0.2%. This volume would probably not affect the final container shipment volume. But this is not the only transport barrier: a few other factors need to be taken into account.

Furthermore, even within the EU countries, heterogeneous standards are being applied in terms of the maximum allowed length of cargo trains. The maximum allowed cargo train length e.g., in Belgium, France, Slovakia, Czech Republic is 750 m, including locomotive (for some routes like Paris–Marseilles it is 850 m), in Poland it is 800 m, in Germany, 835 m and e.g., in Spain it is only 450 m. However, in the framework of the European Agreement on Main International Rail Lines (AGC), all countries in Europe that sign this agreement are expected to provide the possibility of transporting cargo trains up to 750m in length.

Gauges, railways electricity infrastructure, axle load

In the former USSR, Finland, and Mongolia*, the gauge standard* is 1520 mm (in Finland, it is 1524 mm), which allows transit via these countries without limitations. The characteristics of carriages, brakes, coupling devices, etc. are also compatible.

In Western Europe, railways run on three different gauges. The most common is 1435 mm; in Spain and Portugal the gauge is 1668 mm; in Ireland it is 1600 mm.

The difference in gauges between the former USSR countries (1,520 mm), China (1,435 mm), and Western Europe (1,435 mm) requires trains to be reloaded when carriage change occurs at border stations. This increases the freight costs of cargo owners and slows down the delivery.

There are four main technologies for increasing the level of interoperability: i) transport in a container train with trans-loading of goods from rolling stock with a 1435/1520 mm track gauge to rolling stock with a 1520/1435 mm gauge; ii) use of a train with sliding wheel pairs for unobstructed transport; iii) extension of the 1435 mm gauge to the east (Belarus, Russia) and to the west (China, Kazakhstan) or, conversely, the construction of a wide gauge in central Europe and the PRC, and iv) bogie exchange at an interchange station.

A Ukrainian research paper regarding this challenge found as follows.[9] Net present value (NPV) calculations of the four opportunities indicate that the first solution leads to a traffic volume of 20-30 million tons annually, and hence to the highest NPV (+25–30%).

There are no technical limitations for carriages being reloaded to fit the European gauge, but, in that case, European carriages have to be placed on the forward and rear end of the train because in Western Europe a screw screed—a very old-fashioned type of engineering device) is used, while Russia

[8]Materials of the Round Table Discussion: "Problems and Prospects of Integration of Transport Systems of the EEMP Countries, Russia's Interests". September 14, 2017, Moscow, RISI.

[9]Курган Н. Б., Гусак М.А. Повышение уровня интероперабельности в международном железнодорожном сообщении Россия-Украина-Словакия-Австрия. Днепропетровский национальный университет железнодорожного транспорта имени акад. В. Лазаряна, Днепропетровск, Украина. УДК 339.9:625.1:656.213.073.23.

uses the automatic coupler CA-3 for the same purposes. Thus, a carriage has to have a screwed screed on one side, and an automatic coupler on the other. Covered carriages and tanks cannot be moved over the border to Europe due to size limitations. Furthermore, China uses Janey, an American type of automatic coupler, which is installed lower down than the Russian one, thus making hitching impossible. The height of the Chinese carriage is also lower than the Russian one.

When transloading containers from platforms of gauge 1435/1520 mm on the track, a number of procedures need to be carried out for the preparation of various documents.

The other factor limiting high speed railway transport are the *differences in electrification*—different countries use either direct or alternating current (AC) and, correspondingly, different voltage in electric networks. Currently, in Poland, which accepts trains from China, Kazakhstan, Russia, and Belarus, the voltage on the network is 3 kW, and is Direct Current (3 kV/DC). The same is true for neighboring countries: the Czech Republic and Slovakia. Germany and Sweden, which are end points for maritime transport, use 3 kV/DC and 15 kV/AC. Belarus, Lithuania, and Ukraine use 3 kV/DC and 25 kV/AC. Russia is aiming to develop only the 25 kV/AC segment, as this voltage allows train loading capacity to be used and lower unit costs as a result of increased locomotive power. Interchange from DC to AC requires locomotive replacement and thus extra time, which automatically increases the costs of transit.

Russia has had significant experience in operating 23.5 and 25 ton *axle load* carriages. Currently Russian Railways are experimenting with 27 ton axle load carriages, as this type of loading minimizes costs per 1 ton of cargo. In the future, axle load will be able to be increased up to 30 tons if the railway is modernized which will not require significant costs.

Transport companies indicate that this type of carriages is preferable, as Russian Railways is looking for the quickest way of increasing both cargo volume and speed, and technology-oriented ports are implementing equipment to serve this type of carriage.

In China, the USA, and Australia, the axle load ranges from 30 to 40 tons (25–30, 35, 40 respectively), significantly decreasing infrastructure maintenance costs. According to the Association of American Railways (AAR) data, when the axle load increases from 27 to 32 tons, the unit costs per 1 ton of cargo transport decreased by more than half.

However, each country is unique, and any transplant of international practices onto EAEU soil must be selective. In this case, everything hinges on infrastructure. One should remember that in all countries listed above rail tracks are normally laid on half-rock – this is true even for Canada, where most of the railway network is laid in the south, near the border with the USA. The situation in Russia is dissimilar – infrastructure which is built, for example, on marshy soil behaves under stress in a completely different manner.[10]

The following are among the types of weight and structural limitations applied to trains:

- universal: transit is allowed along the route with weight and length changes:
- parallel (elevated or lowered): transit is allowed along the route with weight and length changes for refrigerator-trains and trains used for certain purposes;

[10]«Гудок», 6 сентября 2017 года, среда, N 155 (26294), p.4

- partial: set according to locomotive capacity and rail length at a certain station.

Besides that, operations are implemented with differentiated weight norms, i.e., the maximum possible weight of the train, which is set for each rail section in accordance to main rail profile, the presence of construction, etc.

The weight and length the train along the route are defined by:

- for subnational railways: the chief of the section;
- for national railway routes: the state railway administration of the states (for instance, head of JSC RZD in Russia);
- for international railway routes: the CIS Railway Transport Council based on consultation with the national railways administration.

In exceptional cases, it is possible to deviate from the set normative length of the train, but by no more than one conventional wagon. This is a requirement which allows better transit, but does not imply length or weight interchange along the route.

Railway container transport has to switch to 80-foot fitting platforms in order to become competitive with maritime cargo transport which, in turn, requires development and technical implementation of this equipment on railways. Moreover, if the infrastructure allows (i.e., both the rails and the electricity infrastructure, or the diesel locomotive if there is no electricity infrastructure), it would be more efficient to load four 40-feet containers on the platform on top of one another, but this solution will significantly increase axle load. Nevertheless, the corresponding decrease in transport cost will be very significant.

According to the primary data collected, in this context two factors appear to be significant, i.e., gauge differences in both the PRC and the EU seem to affect experts' assessment of the perspectives for transport corridors. The difference in gauges in the EAEU seems to be insignificant, possibly due to the fact that if gauges become a problem for transit countries, exporters can simply choose a different route.

Table 1: Linear regression between assessment of inland transport corridors between EU and PRC to the difference in gauges[11]

Model		Standardized Beta	t	Sig.	Collinearity Statistics	
					Tolerance	VIF
1	(Constant)		2.573	.062		
	Difference in gauges (PRC)	1.259	2.607	.060	.338	2.957
	Difference in gauges (EU)	-1.205	-2.753	.051	.411	2.431
	Difference in gauges (EAEU)	-.468	-1.432	.225	.739	1.354

a. Dependent Variable: Rate_Silk_Road, variance explained: 68.4%

[11]based on own empirical data, collected in the period September 2017 to January 2018.

Speed of cargo trains

From our evaluation of discussions on the various types of Europe-Asia inland cargo transport, it would appear that the transport speed is viewed as the most important positive feature. The challenges related to the routes, operation time, operation time-related delays and changes in schedule are also of importance, as is unfair competition on which very limited information is available.

More than 80% of railway freight turnover in Russia today is concentrated in 20% of the railway network,[12] i.e., the north-western and southern directions connected to maritime ports (multimodal routes). This route is characterized by different average speeds on different parts of the route. For the most part, the average cargo train speed is 80 km/hour. Of the whole route, 90 km/hour can be achieved only on 6% of the average length, while the average speed of 70 and 60 km/hour is experienced on 4,000 and 5,700 km respectively. An important of the route has limitation on the speed of empty carriages.

The average speed on these main routes was more than 70 km/hour in the first half of the year 2017, the average section speed for cargo trains was 41.8 km/hour, while the average technical speed of cargo trains was 47.7 km/hour, so the route average speed is 692.2 km/day[13].

Analyzing the reasoning behind the speed changes has allowed us to identify more than 3,200 barrier sections of the main railway route with a total length of 22,800 km. These sections lead to decreased train speed.

In 2016 Russia launched a program targeting a reduction in the length of sections with an established speed of less than 80 km/h over 1,100 km of track. If the program reaches target indicators, the length of the route with an average speed of 90 km/h will double.

The average speed of freight trains in China is 35.6 km/h, but when trains approach Alashankou (at the border with Kazakhstan) the speed reduces to 28–30 km/h (due to single-track traffic: the second rail has not yet been opened).

The average speed of cargo trains in the EU countries is also low. On international sections, the average speed of cargo trains is about 18.2 km/h. According to a European Chamber of Auditors analysis, many EU countries have not paid enough attention to increasing the speed of cargo trains: lack of investment, not modernizing, etc.

It is worth mentioning that container train transport times in the EAEU countries are faster than in the EU (where there is a drastic decrease in train speed) while the cost of transport in Europe (in terms of tariffs) is much higher than in the EAEU. However, this might not really be important, as the distance from final the destination in the EU to the Belarus border is much shorter than the distance to the border of China/Kazakhstan, Russia/China, or Russia/Mongolia.

International cross-border points (Brest-Malaszewicze border point)

In the 1995–2015 period, the length of the main railway in Poland decreased by almost a quarter (23%) from 23,986 km to 18,510 km. At the same time, the length of the "two-way" is now 8,606 km (46.5%), and the electrified railway totals 11,777 km (63.6%).

[12]"Гудок", 06.09.2017, N 155 (26294), p.5

[13]http://www.rzd.ru/static/public/ru?STRUCTURE_ID=5232&layer_id=3290&refererLayerId=162&id=4083

According to A. Evsyuk, the first deputy head of the freight service and foreign economic activity of the Belarusian Railway, in the next few years it will be difficult to increase transit through Poland: the infrastructure, locomotive, and carload parks all require updating, and the average speed of Polish freight car is the lowest in the EU. Currently, instead of transferring 14 agreed schedule "threads" per day, Poland takes only 9–10 trains.

At the beginning of 2017 Poland received 17 billion euros EU funding for the period to 2020 to carry out technical modernization of sections of the railway to further the development of freight transport and transit.

One of the goals of the Polish railway company RRC is to return to freight traffic. In the last 20 years priority had been given to the passenger sector, and infrastructure investments were mainly directed to that sector. By 2014 only 15% of the network was modernized. The average speed of freight trains on the RRC network was 27 km/h; freight operators' access to roads was fraught with complexity.

Of the funds allocated by the EU, the first tender was carried out to modernize the sections of the route from Třebinia to Zebrzydovice (76 km, west of Kraków toward Czech Bohumin) in order to develop transit traffic from the Polish ports in the Baltic to the south of Europe, mainly to the Czech Republic.

However, there is a sense that up to 2020 (the timeframe for the implementation of investment plans) transit traffic of trains through Poland will remain at today's level. The capacity at the shoulder of Brest (Belarus)–Terespol (Poland) remains the same.

According to the rules of the Agreement on the international rail freight communication (SMGS), the side receiving the shipment transports the containers. When the cargo is transferred to Europe, the Polish side transports within Europe; Belarus transfers to Belarus. However, in the agreement, it is possible, by agreement, to delegate such powers to the party transmitting the cargo. In 2016, the Belarusian Railway invested heavily in the Brest transport hub and reduced the processing time of transit compounds from 36 to 10 hours with an overload and up to 6 hours without an overload.

Nevertheless, there are still no prerequisites for a radical increase in traffic volumes. Based on the existing conditions, with the reception on the Polish side of only 10 trains per day and the reloading of the containers on to the Polish platform, it is possible to take up to 300 trains a month, and approximately 3,600 in a year.

At the end of October 2017, a pilot container train service was launched from Poland to China with cargoes transhipped at Chernyakhovsk Station and then carried to the Chernyshevskoe–Kybartai (Lithuania) crossing point.

International agreements

SMGS - Agreement on International Railway Freight.

COTIF - Convention on International Carriage by Rail (Western Europe).

CIM – Universal legal prescriptions to the treaty on international rail freight transport (Annex B to COTIF).

The main commercial challenge to increasing cargo turnover between the countries of Europe and the CIS is the regulatory differences between them. In European countries railway transport is regulated by the provisions to the "Treaty on International Railway Transport" (COTIF / COTIF). The Ministries of

Transport and railway administrations of the CIS countries, Baltic States, Albania, Iran, China, the DPRK, Vietnam, Mongolia, Hungary, and Slovakia are regulated under the "Agreement on International Railway Freight" (SMGS).

SMGS and COTIF (subject to CIM[14]) govern the same issues, but resolve them in a completely different manner. This is true primarily for liability and compensation for partial loss of cargo and failure to meet delivery deadlines. The differences became more pronounced following the adoption of a new version of COTIF in 1999 (the so-called Vilnius Protocol of July 3, 1999). By way of an example, SMGS envisages the duty to transport the cargo, and the duty to set the freight rate. The new version of COTIF does not permit different contract models.

Therefore, acceptance and dispatch of cargoes throughout the entire route between COTIF and SMGS are impossible in terms of both transport law and compliance with customs requirements. Inasmuch as it appears impossible to unify legal norms at this stage, it was resolved, at a series of joint meetings of representatives of CIT/OSJD (Central [European] Institute of Transport/Organisation for Cooperation of Railways), to create a shipping document that would be recognized by all stakeholders, and contain all data required by both COTIF and SMGS.

To do this, the SMGS was modified, but this modification did not fit in with Soviet and the Russian railway legal regulations, which form the basis of the SMGS.

These amendments included a few positions that influence container shipments along the PRC–EEA–EU axis. Two new annexes appeared in the Agreement: Rules for cargo transport (an annex 1 to SMGS) and Rules for the transport of the carriage that does not belong to the transport company (Annex 4 to SMGS).

International transport planning and the reloading of goods from one national railway to another has fundamentally changed. Previously, the receiving railway body was obliged to transport all the cargo from the sending organization in the country of departure. However, under the new regulations and before concluding a contract for the carriage of goods, there has to be preliminary coordination by direct international communication between the sender and carrier.

The fact that planning and actual transportation of foreign trade shipments are subject to approval prevents the exporters from being sure that their applications for shipments will get a positive response. The supplier has to coordinate the transport infrastructure application with transport organizations, administrations of other national railways. The transport company can also run into restrictions on the route for the foreign trade cargo delivery, or lack of technical and technological capabilities for the delivery of goods in direct international traffic, etc. All this forces the exporter to seek ways of influencing certain structures that will provide him/her with an uninterrupted procedure for coordinating the international carriage of goods. The SMGS article referring to the Rules for the Goods Transport contains a new legal regulation for the SMGS:

> The contract between the consignor, the consignee and the transport company participating in the transport may establish special conditions for the carriage of goods, these conditions have priority over the conditions that are not set by the Agreement – and there is no way to evaluate what risks are involved which are defined by the treaties and not assessed by the

[14]CIM – Uniform Rules Concerning the Contract for International Carriage of Goods by Rail (Annex B to COTIF).

agreement. Such fears are reflected by Article 39 § 3 of the SMGS, which deals with of the responsibility of the transport company. The carrier is not responsible for the loss, shortage, damage of cargo accepted for transport, if they occurred during transport of cargo on special contractual terms, and exemption from liability is provided for by these special contractual conditions.

To reduce these risks, it is very important to explain details of these new Articles of SMGS from national railway company.

The normative time of goods delivery has increased. Now the delivery time for large-capacity containers is calculated based on the norm of 150 km per day, and for the remaining shipments of cargos, 200 km per day. A significant improvement in delivery time is unlikely to satisfy the sender. For this SMGS provides a contractual opportunity to increase the speed of delivery and thus shorten the delivery period. It should also be noted that the regulatory speeds for the delivery of goods (small, large, with passenger-trains) in the previous versions of the SMGS are not available in the latest version of the Agreement.

Basic changes involve the responsibility of the railways. First of all, there are procedural changes for calculating damages, including partial loss of cargo caused by the fault of the rail transport company. If the carrier has to reimburse the damage caused by the loss of the cargo proved by the consignor or consignee, the amount of the damage to be paid must correspond to the value of the goods. In the legislation of different countries, the value of cargo is treated differently (market value, cost on the waybill, etc.), which introduces its own serious ramifications.

Documentation requirements

The set of documents for a container train on the Belarusian Railway/ Polish railways consists of the following:

1. Notification of the OKP and customs office on the time and the way of arrival of the train and the way out to the train: internal station documentation
2. Border–customs control: 25 min.
3. Delivery of carriage documentation to the wagon transfer point: 15 min.
4. Registration of carriages documentation: 2 min.
5. Delivery of carriage documentation to the agent of the corresponding road (CU/ RCP): 1 min.
6. Reception, maintenance, and commercial inspection of the train: 65 min.

TOTAL - 97 minutes. Estimated time is given only for registration of documents.

These operations are designed for a container train carrying up to 60 containers. The composition includes either 20 specialized platforms (three 20-foot containers or one 40-and one 20-foot container) or 30 specialized platforms with two 20-foot or one 40-foot containers.

If more platforms are accepted, the times increase.

Tariffs

It is reported that Chinese transport tariffs are being subsidized from the state budget. According to analysts from Moscow Carnegie Center, linking a project to a large concept like the Silk Road makes it easier to obtain budget funding. The main reason for the whole concept was the development of a transcontinental logistics infrastructure. This makes almost every Chinese region regularly report on successes in the opening or modernization of the East-West transport routes. However, in practice, all these routes are unprofitable, and for the sake of maintaining their existence, local administrations interested in preserving the showcase of their "successes" are forced to subsidize them.

As for Russia, the main volumes of containers are carried out by OTLK Corporation, which includes legal entities from Russia, Kazakhstan, and Belarus.

In accordance with the Annex to the Protocol on the coordinated transport policy (Appendix No. 24 to the Treaty on the Eurasian Economic Union (hereinafter referred to as the Treaty)), the Organization of Rail Transport, irrespective of the consumer's belonging to a particular Member State (or legal form) provide him with access to rail transport services taking into account this Procedure and the laws of the Member States. According to paragraph 4. Member States shall ensure that carriers of Member States have access to infrastructure services in accordance with the principles and requirements specified in Annexes 1 and 2 .... A.6. Tariffs for railway transport services and (or) their maximum level (new limits) are established (modified) in accordance with the legislation of the Member States and international treaties, with the possibility of differentiating tariffs in accordance with the legislation of their Member State with observance of the following principles: ... 3) ensuring the transparency of tariffs for railway transport services, 4) ensuring publicity of making decisions on setting tariffs for railway services.

When cargo is transported by rail, the unified tariffs for the types of operations (export, import, and domestic tariffs) apply to the territories of the CIS.

When transporting goods from the territory of one CIS state in transit through the territory of another Member State to third countries and in the opposite direction (except for the carriage of goods through seaports of Member States), as well as for the carriage of goods from third countries to third countries through transit through territories (coordinated) tariff policy in accordance with the Concept for the Establishment of an Harmonized Tariff Policy for Rail Transport of the Member States of the Commonwealth of Independent States of 18 October 1996.

Policy recommendations and measures for removing barriers in international freight transport

The infrastructural initiative “One Belt, One Road” (OBOR) is positioned by the Chinese government as a mega-project, which is planned to be developed and implemented in a number of countries, using own investment resources and those of the partner countries involved. Any international initiative of such a scale requires the participation of the state and its governmental institutions to provide political status (for instance, as a financial guarantor and to be responsible for infrastructural land allocation, spatial planning authority, environmental conclusions, and other feasibility studies, etc.). Of 16 megaprojects being implemented today worldwide, with an approximate investment volume of USD0.5 to 31 billion focusing on transport and infrastructure development, four projects are initiatives of China and four of the USA, and all of them are being carried out in OBOR countries, mainly using

their own resources. There is no confirmed information from available or public sources on the actual OBOR infrastructural investments that China has made as at the end of 2017. However, plenty of information, sometimes very controversial, is being published that describes, for example, the creation of an investment fund varying in size from USD700 to 900 billion; “concrete” implementation plans of the OBOR initiative; creation of several intergovernmental and other commissions aiming to promote the OBOR initiative, etc. At the same time, of the intensity of the Chinese capital activity is noted in the south and southwest direction, e.g., toward the Indian Ocean, where its goal is to create a sustainable railway–port infrastructure so that some of the cargo flow from overloaded Chinese ports on the eastern coast of the country can be diverted.

The business community of the EU countries understands that attracting significant capital from the PRC to the transport infrastructure of Europe is not possible for several reasons:

(1) The White Paper on Transport-2050 clearly articulates the main development priorities that do not assume a significant increase in land transport (cf. environmental policy);

(2) Europe is very careful about the Chinese capital or investment flows into European transport infrastructural projects and their possible risks;

(3) In 2013 the European Union refused the proposal of the former President of the Republic of Korea for creating a Eurasian transport corridor from Seoul–London, pointing out the necessity to focus rather on domestic issues and saying that there was "already a high level of maritime transport development independent of the transit policies of third countries";

(4) The EU has consistently distanced itself from investing in Russia’s transport infrastructure projects in general and transit in particular. The EU refused Russia's proposals for joint investment projects that might have significantly increased cooperation in the field of transport (for example, in the 1990s, the construction of seaports in the Baltic Sea region, such as Primorsk, Ust-Luga, Batareinaya, in order to create a so-called “European Deepwater Ring” through the reconstruction of the Volga-Don and Volga-Baltic canals and other related projects. The refusal was mainly motivated by lack of interest and the need to focus on internal projects.

In the medium-term perspective, the development of Eurasian cargo transport will focus on the maritime segment. This is mainly due to increased cargo capacity of ships, the deployment of high-speed reloading/handling machines and mechanisms, the development of new warehouse technologies and innovations, etc. In 2016, approximately 59.8 million tons of cargo were delivered from China to the EU countries, of which 58.1 million tons were seaborne trade. At the same time, shipments from the EU countries to China amounted to approximately 49.1 million tons, of which 48 million tons were transported by sea.

In the framework of the Eurasian overland freight traffic, the main cargo volumes are being transported by rail. However, even with a possible increase in absolute figures (e.g., up to 310,000–350000 TEU per year), railway transport will lag significantly behind sea shipping. In 2016, approximately 0.6 million tons were delivered from China to the EU countries, and 0.4 million tons in the opposite direction.

In 2016 the cargo flow from the EAEU countries to the EU countries amounted to approximately 36.6 million tons, whereas 23 million tons (fuel and minerals) were delivered to the Baltic ports and over 8 million tons of timber to Finland. "Pure" or "dedicated cargo to "distant" EU countries accounted for about 1.5 million tons; the same amount was imported by rail to the countries of the EAEU.

In 2013 in the export-import the "peak years," around 30 million tons of goods from various countries were transported by road through border crossings points Belarus/Russian Federation to the EU. In 2015, 26.1 million tons were transported. According to experts, an increase of up to 35–40 million tons per year in cargo transport is possible, but in practice these volumes have never been achieved; moreover, the possibilities of border crossings at these loading levels have not yet been properly studied.

Compared to the maritime mode, rather less attention is paid to the development of railway transport in Europe. In the last 7–8 years, the share of railway in the total volume of domestic transport has not exceeded 18.3%, while the share of road-based transport accounts for up to 75–75.2% (in terms of freight turnover).

This study, inter alia, indicates that Belarus, Kazakhstan, and Russia are consistently increasing the capacities of their railways in various parameters, taking into account not only traditional transport of goods by this mode, but also respecting the current requirements of environmental policy regulations.

The growth of transit cargo transport in the framework of the Eurasian transport corridor will depend heavily on the technical conditions of the Polish railways (PKP S.A.) and also of the German Railways (Deutsche Bahn [DB]). At the moment, the input parameters of the Polish railways do not allow railway-traffic trains formed by RZD and BCh to fully enter the PKP S.A. railway infrastructure for a number of technical reasons. In particular, these technical constraints are: the length of freight trains (maximum allowed number of wagons in a freight train), types of fitting platforms for the transport of containers, maximum allowed load on axle, maximum allowed speed of freight trains (commercial, sector speeds, etc.). Thus, the length of the train by RZD averages 1040 m (cf. in Poland it is 600 m), the load on the axis may be 23.5 and even 25 tons (cf. in Europe, 22.5 tons). Furthermore, train speed parameters vary significantly (for example, the routing speed of freight trains in the Russian Federation is 692.2 km/day). The electrification of railway networks in Europe is not uniform in terms of voltage and electric current.

Such factors as the reloading of containers from platforms of gauge 1520 mm on to platforms of gauge 1435 mm and other way round, which also applies to the Kazakh-Chinese border crossings points, is also contributing to a reduction of the overall speed of the freight trains.

In terms of other barriers, it can be noted that customs procedures at the border-crossing points of the EAEU/EU normally take time, in accordance with the regulations of the respective countries/roads; and how long clearance takes on one side or the other is approximately the same, especially during the period of mutual sanctions. Another important factor, which, in our opinion, is practically neglected in publications and at relevant conferences, is the different regulatory and legal framework, i.e., the SMGS and COTIF agreements. In particular, this refers to transfer on border-crossing points, the authority for possession of goods, risks, liability, etc. In the present research study, the criteria mentioned have a significant impact on the transport economy, especially in terms of increased costs.

With regard to the allocation of projects for the development of transport infrastructure that would meet the political objectives set by the government in Kazakhstan and Russia and targeting the national transport business, the following may be mentioned:

In Russia, construction within the BelKomUr project, which has an estimated capacity of 30 million tons per year, is proceeding very slowly for number of reasons. When the project is completed and deployed, cargo will be partially shipped from the Baltic to Murmansk and Arkhangelsk so that the railway capabilities released can be efficiently utilized by EAEU partners. These considerations are quite viable and are being asked for on condition that the investment requirements, as well as material balances for cargo flows, are investigated appropriately.

Based on this study, some suggestions concerning cross-border technologies could be also proposed.

The international coordination of Euro-Asia container transport is under “the Umbrella” Coordinating Council on Trans-Siberian Transport (CCTT). Presently the CCTT has more than 100 member societies from 23 countries, including the railways of Europe, Asia, and the CIS states, leading shipping companies, operators and forwarders, ports and stevedoring companies, public organizations, administrations and municipalities, telecom and marketing companies, security services, and mass media. CCTT is in a close dialogue with OSJD, UIC, UNECE Inland Transport Committee, CIT, EAEU, ESCAP, OTIF, WCO and UPU. The international mechanisms have thus been created and now need to be used to activate cooperation in OBOR.

Investments in infrastructure are needed. Real bottlenecks could appear along the railway routes and roads if traffic intensity were to rise significantly. As demonstrated above, some modernization of the carrying and transshipping capacities are needed in border-crossing points (like China–Russia, China–Kazakhstan, Belarus–Poland). Enlargement of double tracks up to 100 km into the hinterland of border zones direction are needed to carry container trains faster away from these zones.

Building and the effective use of new container terminals across the PRC, the EAEU, and the EU need to be fully defined. It is necessary to separate transit transports (without intermediary stops) and commercial transport with cargo addressed to domestic clients.

The task to improve transport via Polish railway infrastructure has to be correlated with the EU’s Polish plans for the next 20–25 years. New research in the transport sphere shows the possible appearance of high modern transport technologies and large changes in rolling stock machinery.

Potential interest of the EU countries and China to increase trans-Eurasian overland transit

During the last decade, socioeconomic cooperation and the bilateral investment climate between the European Union and China has intensified significantly, e.g., in the areas of environmental protection, research and innovation development, education, trade interaction, etc. With respect to strategic development papers such as the Europe 2020 strategy, the Strategic Investment Plan (also known as "Juncker Plan"), the PRC's 13th five-year plan, the EU-China 2020 Strategic Agenda for Cooperation,[15] the EU–PRC Investment Agreement, it can be stated that this cooperation has a sustainable character and its intensity will increase in the very near future. One of the practical examples of this cooperation is the *One Belt One Road* (OBOR) initiative.

Initiated by the Chinese government in the year 2013, OBOR (also known as "New Silk Way" or "Belt and Road Initiative") cannot be called a precise or a definite development program with a clear budget, nor does it have definite stakeholders with defined responsibilities. The OBOR initiative can be seen rather as a very broad conceptual framework including future possible political, economic, and transport development policies that aim for economic and transport integration with a special focus on connectivity in the whole Eurasian space and between Europe and China in particular. In spite of the fact that OBOR implies a broad area of multilateral cooperation between the countries involved, the main focus is rather on the strategic development of the land-based transport corridor between China and Europe in a very wide perspective. Although according to the official document of the Chinese Government: "Vision and Actions on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road", which supports an inclusion principle, i.e., it is open to any country or private investors interested in the development of common infrastructural projects, the OBOR is identified not as a strategy but as an *initiative*, which means the development of infrastructural projects that have been identified and planned in advance.[16] At the same time, the Chinese government has clearly stated that OBOR is a non-exclusive international initiative, which implies open participation of all EU member states and other countries in ongoing activities and encourages them to 1propose their own. Moreover, it has also been declared that OBOR is fully compliant with the existing relevant national and European infrastructure development and connectivity plans.

Formally, the European Union has already positively responded to the OBOR initiative, by suggesting a Connectivity Platform for EU–China cooperation on infrastructure and transport. Apart from political statements of commitment and express of interests, not a single European country, nor the EU Commission has formulated a clear and comprehensive action identifying concrete measures that EU countries might contribute to in developing the OBOR initiative. Moreover, a number of the EU member states see OBOR rather as a political framework that aims to advance China's relationship with the transit countries and especially with the Russian Federation.[17]

[15]http://eeas.europa.eu/china/docs/20131123_agenda_2020__en.pdf
[16]http://en.ndrc.gov.cn/newsrelease/201503/t20150330_669367.html
[17]cf. Europe and China's New Silk Roads | ETNC Report, December 2016

OBOR-related legal environment and investment funds

Although the Chinese authorities claim that 65 countries have already declared their interest and commitment to the OBOR project,[18] no official list of the participating countries or of involved stakeholders has been presented. It should be added that no generally accepted definition of the OBOR initiative has been identified to date that describes the project's geography, involved stakeholders, allocated budget, etc. The OBOR projects may therefore imply any activities of China or other involved stakeholder that contributes to improved connectivity across Eurasia. The declared financial commitment to the OBOR initiative according to different sources varies from USD 500 to 1400 billion.[19]

Although at the moment, there is no common EU-level strategy, no officially appointed fund operator, and no official financial instruments in terms of coordination or management of the infrastructural projects within OBOR. The following financial instruments that contribute to improved connectivity between Europe and Asia and that may be associated with OBOR are listed here:

- Development Cooperation Instrument (DCI);
- Partnership Instrument (PI) for cooperation with third countries;
- European Neighbourhood Instrument (ENI);
- Silk Road Fund (SRF);
- Asian Infrastructure Investment Bank (AIIB);
- 16+1 mechanism, created for multilateral cooperation between China and Central and Eastern European countries (CEE);
- Affiliated financial structures within the Eurasian Economic Union, e.g., Eurasian Development Bank.

DCI – aims not at infrastructural projects, but rather at inter-regional integration projects, such as trade facilitation, internet connectivity, research and development projects between Europe and Asia.

PI – focuses on cooperation projects in the fields of transport, energy, digital economy, trade, and investment. However, it should be noted that the PI instrument is used mainly as a preparation framework for future direct investments, not as a fund for direct investments.

ENI – along with the projects that aim at energy, digital connectivity, the ENI instrument also supports important cooperation in the field of cross-border management, including security, trade facilitation, harmonization of regulatory frames in transport. In this context, such programs as Horizon2020 or the TEN-T infrastructure development fund, which aim at cohesion, interconnection, and interoperability of the trans-European transport network.

SRF - is more related to OBOR, was created in 2014 with a budget of USD 40 billion, aims to finance rail and port infrastructure projects in Southeast Europe; the most relevant project is the Piraeus-Belgrade-Budapest corridor,[20] which e.g., involves the construction of a new high-speed rail line linking the Balkans and Hungary. In terms of the financial coverage of OBOR investments, the last

[18]https://www.weforum.org/agenda/2017/06/china-new-silk-road-explainer/
[19]a) EURASIAN COUNCIL ON FOREIGN AFFAIRS, December 2015, The New Silk Road: A Path to Regional Security?; b) https://www.weforum.org/
[20]Balkan rail part of Chinese "express lane" to Europe – Euractiv, 18 December 2014.

investment in SRF took place in November 2017, and deals with energy infrastructure collaborative development.

AIIB – was created on the initiative of China in December 2015 as an intergovernmental regional bank and started functioning in January 2016 with the endowment of ca. 100 billion USD[21]. AIIB's capital is shared by 57 countries, including 14 EU member states which represent 19.43% of its share and China which has 25.6%. Compared to the Silk Road Fund (SRF), which mostly focuses on the investments of land and maritime infrastructure development projects, the AIIB has a bigger coverage and is seen as a financial instrument that supports OBOR-related investments in the whole Asia. At the moment, there are a number of ongoing OBOR-related projects that, although implemented outside the European Union, involve European stakeholders, applying e.g., to infrastructure development projects in Africa or in Asia. In this context, AIIB, which comprises 14 EU member states as founding members with a strong focus on Asia, acts totally independently and may not formally be following the OBOR policy or Chinese guidance; on the other hand, the current AIIB strategy is closely related and fully compliant with the OBOR initiative and its actions.

CEE - in spite of the inclusive approach for the participation in the OBOR initiative declared by China, China is focusing on certain European regions in setting priorities for promotion of infrastructure investments. In this context, China identified two target regions in terms of OBOR investments' i.e., Central and Eastern Europe (CEE) and Southern Europe or Mediterranean countries. To promote OBOR actions in CEE countries, in April 2012 a so-called "16+1" mechanism was created by 16 CEE countries and China. Apart from such topics as expanding the economic and trade scale, investment liberalization, and facilitation, this structure aims to encourage participating countries to invest into transport- related projects, including land, sea, air, and also Internet connectivity. Furthermore, the "16+1" platform currently actively involves other Eastern European countries like Belarus, Moldova, and Ukraine in OBOR-related actions. Although no platform similar to 16+1 has been established so far for the six Mediterranean countries (here: Greece, Malta, Cyprus, Italy, Spain and Portugal), China's officials have clearly declared their interest in investing in transport, agricultural and maritime sector projects.[22] In the context of current political tensions with Russian, European skepticism should be mentioned in connection with China's clear statements that it will respect Russia's perceived sphere of influence within OBOR initiative. For example, some EU countries believe that China did not allow Moldova and Ukraine to join the 16+1 mechanism due to Russian concerns.[23]

The main focus of OBOR investments funds is transport or infrastructural projects, e.g. container terminals, rails, etc. However, the fund is also investing into such areas as energy, environment, and innovation.

Not only European, but also Chinese investors are showing great interest in the infrastructure development projects in Europe, e.g., COSCO - China's shipping and logistics giant has invested or has expressed an interest in investing in port infrastructure development projects in such countries as Belgium, the Netherlands, Croatia, Slovenia, Italy, Portugal, Spain, Latvia, and Lithuania.[24] In terms of

[21]http://www.mid.ru/drugie-finansovye-organizacii/-/asset_publisher/km9HkaXMTium/content/id/2517438#_ftn1
[22]Cf. Think-tank Network on China (2016). Europe and China's New Silk Roads, ETNC report 2016, pp 10-15
[23]Makocki, M. (2017). China's Road: into Eastern Europe, European Union Institute for Security Studies (EUISS), February 2017
[24]cf. Christina Lin (2016), 'China Drops Anchor in Mediterranean Ports', MERICS Blog, 25 May 2016

the railways, such examples of the EU-China common projects that are relevant to trans-Eurasian overland transit as the planned construction of a new Belgrade–Budapest railway may be mentioned.[25] Furthermore, a number of Chinese local authorities and Chinese companies are involved in the overland freight services, connecting various Chinese cities with destinations in Belgium, Germany, Finland, Poland, the Netherlands, Belgium, France, Italy, Spain, and the UK. Related to this, it should be mentioned that many of these EU–China port and rail infrastructure development projects started before the OBOR had been initiated, and at the moment all of them have been generally "labelled" or "upgraded" as OBOR-related projects.

In spite of the clear interest from EU member states to the OBOR initiative, the European Commission has underlined the importance of monitoring the investments implemented in the framework of OBOR, especially the investments on EU territory, which are expected to comply with the relevant EU strategies.[26] The rather optimistic perceptions of Chinese declarations of intent in 2012–2015 in terms of financing of infrastructural project in CEE, has not matched the reality of the European stakeholders. A number of evaluations of ongoing Chinese investments related to OBOR demonstrate that recipient countries can expect a number of organizational and technical problems.[27]

From the European point of view, the optimistic anticipation of possible Chinese investments and associated economic growth within OBOR corridor cannot be treated separately from other basic socio-political factors or the potential entry of China into the European Fund for Strategic Investments (EFSI) and its role in the decision-making process of the Asian Infrastructure Investment Bank.

Furthermore, the Juncker Plan implies the deployment of a European Fund for Strategic Investments (EFSI), that would deliver ca. 315 billion euro (expanded to 500 billion euro) into long-term investment projects. [28] Chinese officials have already expressed their interest in participating in projects mentioned in the Investment Plan for Europe. These plans are also expected to be co-funded by the TEN-T and ENI funds.

According to Europe and China's New Silk Roads Report, the investments in OBOR are mostly limited to AIIB investment projects.[29] While China's OBOR approach has been mainly targeting the CEE and Mediterranean countries, other parts of Europe have not been entirely neglected and the list of countries forming part of OBOR is evolving. In accordance with existing agreements, OBOR-related investments are also being implemented in such countries as: Spain, Poland, Netherlands, Italy, Greece and Hungary, while the rest either do not fulfill European requirements, or are of no interest to Chinese partners.

In terms of the transit countries, as was partly indicated earlier, although the investment character in the countries concerned is related rather to national infrastructure development plans than directly to the OBOR initiative, these countries have still clearly demonstrated their interest in participation in

[25]https://www.forbes.com/sites/salvatorebabones/2017/11/27/chinas-bid-to-buy-eastern-europe-on-the-cheap-the-161-group/#773ca7943467

[26] Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010

[27]Makocki, M. (2017). China's Road: into Eastern Europe, European Union Institute for Security Studies (EUISS), February 2017

[28]Same.

[29]Europe and China's New Silk Roads | ETNC Report, December 2016

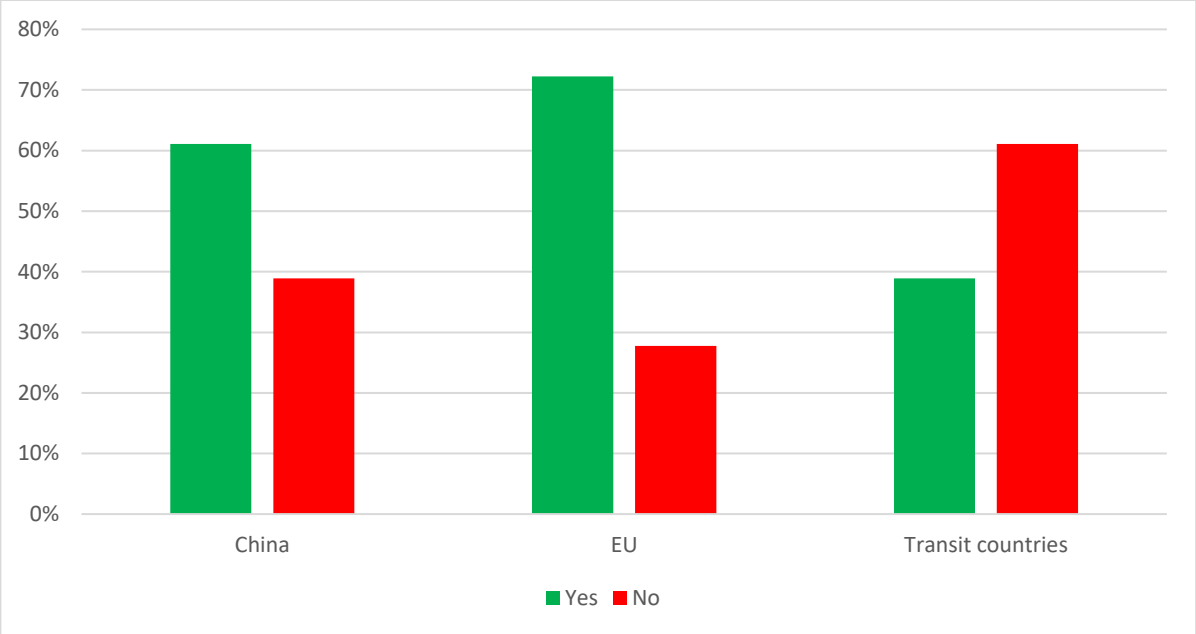
the OBOR projects and in deploying the above-mentioned European and Chinese investments instruments for implementing them.

Evaluation of potential interest of the EU countries and businesses in making use of the trans-Eurasian land corridors

According to the primary data gained, at the moment, the general will of the potential investors from the EU countries to participate in the OBOR related projects greatly depends upon the level of sustainability and transparency in terms of investments decision making rather than on economic profitability or project payback.

To analyze the general interest of organizations involved, private companies or investors in infrastructural projects within OBOR, the stakeholders interviewed were asked to estimate their general willingness to invest in OBOR infrastructural projects with a break down into three geographical scope areas (here: China, EU, and transit countries like Kazakhstan, Russia, Belarus, etc.) and into two time perspectives, i.e. in the mid-term perspective (here: by 2015) and in the long-term perspective (here: by the year 2040).

Figure 1. Investments considerations into OBOR related projects by 2025[30]



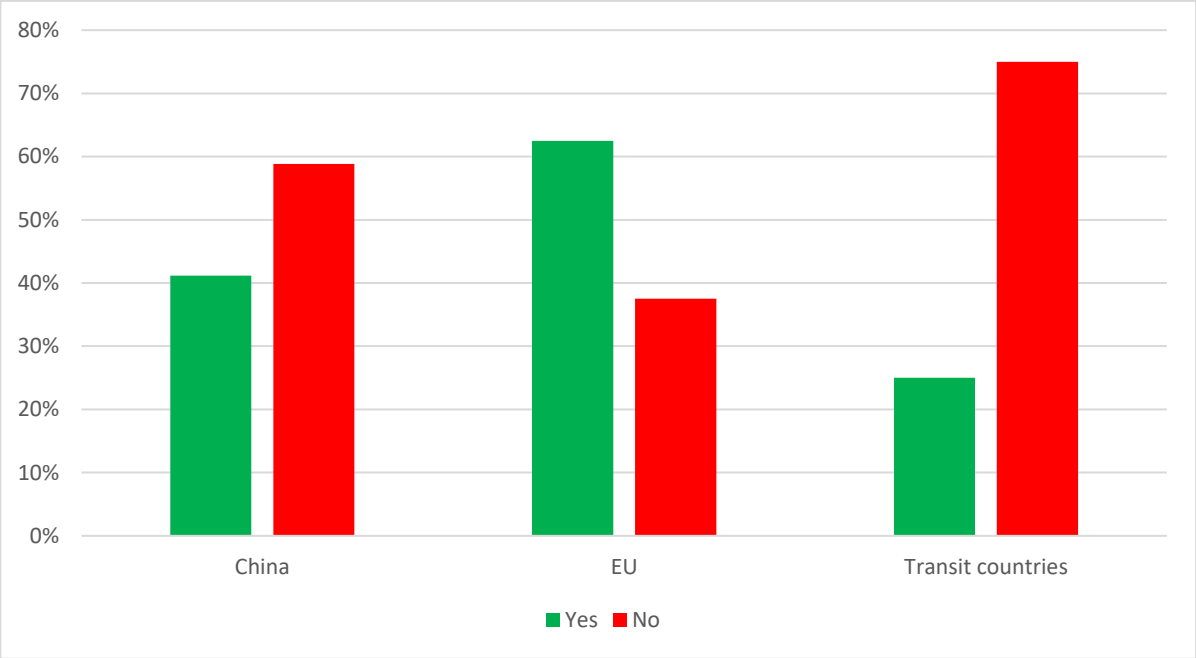
Results showed that European investors are currently ready to invest in OBOR-related infrastructural project in China, Europe, and transit countries such as Russia, Belarus, Kazakhstan, etc.

As expected, the risk perception of the companies interviewed grows in the long term, along with a corresponding reduction in the willingness to invest in all target areas. It must be mentioned, however, that in China and the transit countries, negative dynamics decreased disproportionately over the long

[30]based on own empirical data, collected in the period September 2017-January 2018

term compared with EU member states. The companies interviewed explained this by the high level of uncertainty regarding political and economic stability in China and the transit countries.

Figure 2. Investments considerations into OBOR related projects by 204031

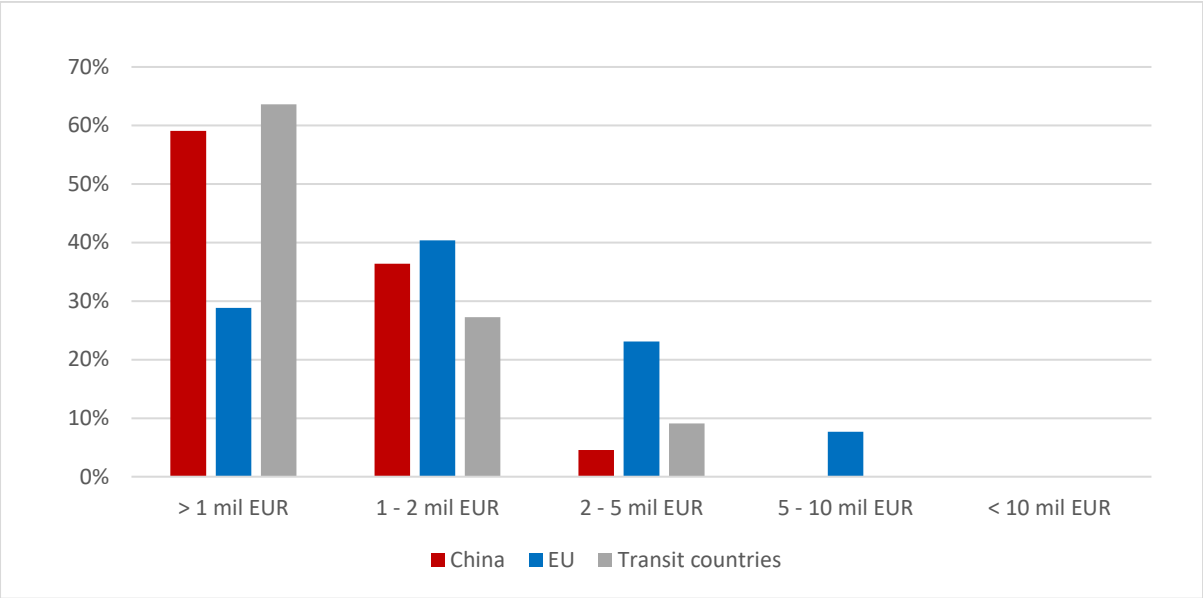


To increase the attractiveness of OBOR-related projects in the mid- or long-term perspective, the European stakeholders indicated that potential Chinese investors should be rather motivated to direct participation in infrastructure development projects instead of just lending financial resources to European or other involved partners. These direct investments and the commercial risk sharing could improve the investment attractiveness of OBOR projects in general and for European stakeholders in particular, and it could be viewed as the sign of favorable and sustainable investment climate.

The following figure shows the estimated framework of the possible investments into OBOR-related projects broken down into three geographical scope areas (here: China, EU and transit countries like Kazakhstan, Russia, Belarus, etc.). Whereas the potential stakeholders contemplating investments into European infrastructural projects, stated their interest in form of relatively larger investments frames (e.g. 1-2 or 2-5 million euro), the potential investors in OBOR related initiatives in China or in the transit countries clearly voted for rather moderate or small investment volumes. This decision was again explained by the companies interviewed by the relatively high level of uncertainty in terms of political and economic stability in China and in the transit countries.

[31]based on own empirical data, collected in the period September 2017-January 2018

Figure 3. Estimated distribution of investments' volumes into OBOR infrastructural projects[32]



In the framework of the primary data collection, the organizations interviewed were asked to evaluate a number of criteria that might be relevant to the investments in logistics operations decision making (e.g. quality of transport and logistics infrastructure, efficiency of cross-border procedures, etc.; cf. Annex).

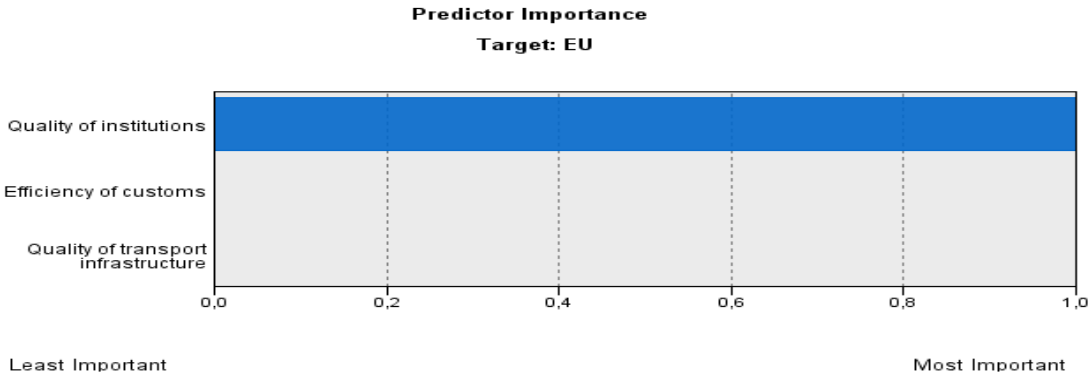
To develop an understanding about correlation of the factors analyzed with a potential decision to invest (i.e., what factors might influence investor's willingness to invest in OBOR-related infrastructural projects) an automated linear regression analysis was conducted. As can be seen (cf. figure 4), potential stakeholders' willingness to invest depends surprisingly on ***quality of institutions*** (in EU and China), and such factors as *customs efficiency* and *quality of transport infrastructure* also play an important role.

As seen from the figure, European investors' willingness to invest in the EU parts of OBOR infrastructure depends almost solely on the quality of institutions in China (e.g., investment in Polish railway infrastructure might be positively considered by investors, if they are sure that Chinese institutions are stable).

In the case of Chinese investments, the willingness to invest in China is related to the quality of Chinese infrastructure: thus, the investors are not ready to invest in Chinese infrastructure projects from scratch. On the other hand, where investments from Chinese side are already committed and ongoing, the European investors might positively consider sharing the commercial and political risks.

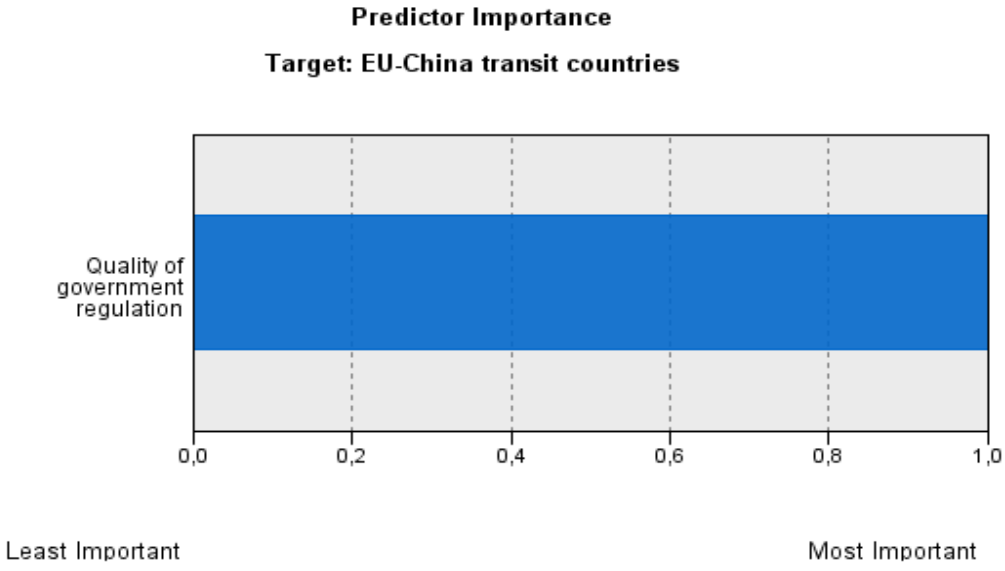
[32]based on own empirical data, collected in the period September 2017-January 2018

Figure 4. Correlation of investment willingness to selected criteria[33]



Regarding the transit countries, the willingness to invest in OBOR-related projects has been defined solely by the quality of government regulations in the transit countries. Hence, investors might be willing to invest in transport-related infrastructure if they are certain that institutional quality in China will at least remain sustainable or will be improved in the future, i.e., conditioned to the potential investors' confidence in the sustainability of governmental regulations, and regulation quality and transparency in the transit countries.

Figure 5. Correlation of investment willingness in EU and China to selected criteria[34]



[33]based on own empirical data, collected in the period September 2017-January 2018
[34]based on own empirical data, collected in the period September 2017-January 2018

Note that both factors are so-called “soft” factors (e.g., regulation-based and not infrastructure-based), and therefore the potential investors might tend to overestimate the risks as they are confident about the dynamics of institutions and future government regulations. One consequence or option named by companies interviewed was to postpone investments until risks are predictable and policymaking became more transparent or sustainable.

To evaluate willingness to invest in the EU, PRC, and transit countries in terms of development of transport corridors, another automated linear regression analysis was implemented targeting willingness to invest in EU, PRC, transit countries. The set of independent variables included over 300 positions (cf. Annex), and significant correlations were considered.

The correlations analysis suggested that the willingness to invest in infrastructural projects in China, the EU, or transit countries as a part of transport corridors is mainly related to:

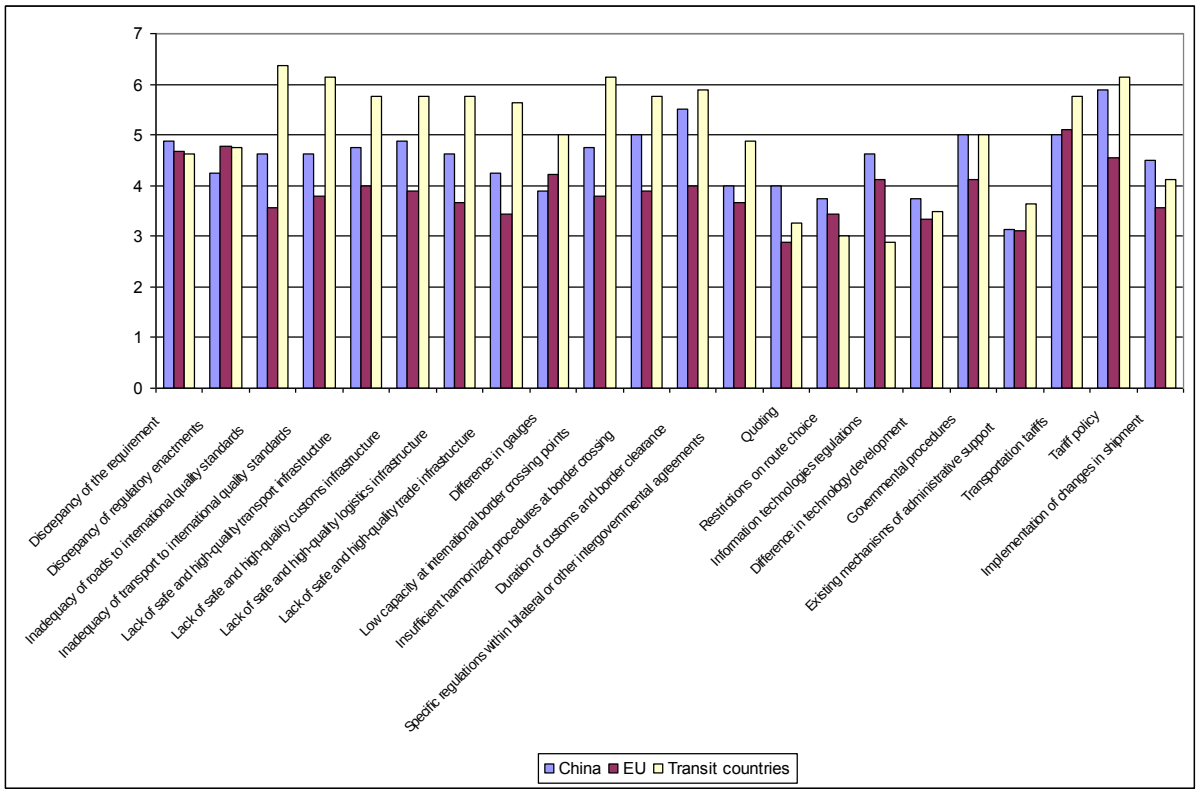
- quality of national logistics infrastructure;
- quality of institutions;
- logistic-related costs.

However, these factors have to be considered for different countries differently, e.g., it has been noted that national logistics infrastructure and quality of institutions are significant for China only and in this particular case of the quality of Chinese institutions has been evaluated as high.

Furthermore, logistics-related costs seem to be very significant especially for the transit countries, i.e., the willingness to invest in infrastructure projects decreases if investors are not confident about logistics related costs/tariffs and their possible dynamics on a sustainable basis.

The following figure indicates the relevance of selected challenges to investment perspectives in terms of overland transport. As can be seen, European investors still perceive the challenges and risks in the transit countries as relatively higher than in the EU or in China, for instance, such criteria as difference in gauges, as identified above, in transit countries or unsustainable transport tariffs. On the other hand, tariff policies are significant challenges for PRC and EAEU countries, while EU exporter might not be prepared to deal with changes that depend so much on authoritarian procedures in these countries.

Figure 6. Evaluation of logistics and transport related challenges in China, EU and transit countries (1 – not important, 7 – extremely important)[35]



Furthermore, in the expert interviews conducted, the following factors were named as important for increasing investment attractiveness of OBOR-related projects in the future:

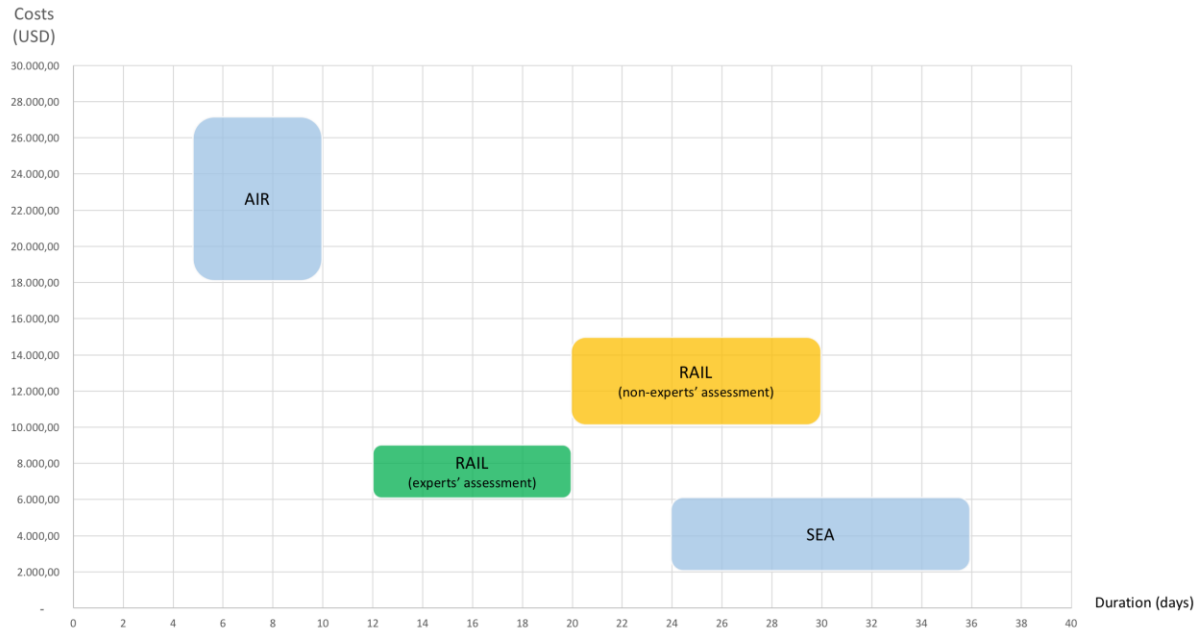
- Integration initiatives of hard (e.g., trains, railway terminals, wagons, etc.) and soft (i.e., technologies, standards, development strategies, etc.) infrastructure components in the EU, EUAU, and China – also as a prerequisite for the sustainable corridor development;
- Improved international coordination of land transport corridors and associated projects, including coordination of investment policies of the countries involved;
- Increasing transit potential through the development of new business models and utilization of available train capacity of different integrators. Development and implementation of integrative common projects (e.g. XL-train - enlargement of the length of cargo trains, efficient utilization of fitting platforms for cargo trains, etc.);
- Stable and sustainable tariff system, potential improvement suggestion, e.g., establishment of a fixed infrastructure tariff for basic railway services for a period of at least three years;
- Decreasing unit costs for transport, e.g. through reduction of the wagon component and the possibility of a reduction in the complex transport rate;
- Increasing the West-East loading factor (e.g., expected return load factor is increasing: 55% in 2017 and 60% in 2018);

[35]based on own empirical data, collected in the period September-January 2017

- As there is currently limited transit cross-border potential in some directions (e.g. Poland), increasing transit potential by developing of new routes (e.g. via the Kaliningrad region).

Furthermore, **raising awareness** among potential stakeholders and investors, especially from the EU member states (e.g., EU goods shippers, consignors and consignee) of EU-EAEU-China land based transit projects, the OBOR initiative in general, and the real current capabilities of the EU-China land-based (here: mainly railway) transit routes and options.

Figure 7. Estimation of the standard TEU container shipment from China (e.g. Chongqing) to Western Europe (e.g. Duisburg, Germany)[36]



The figure above shows the assessment of different transport modes (here: air, maritime and, railway) in terms of costs and duration of a standard TEU container from China to Western Europe. A breakdown of the results (here: responders' estimations) demonstrated a considerable knowledge and experience gap between experts involved in EU-China overland transport (e.g., integrators, railway terminals operators) and non-involved experts (e.g. seaport operators, consignors, etc.). The analysis provides empirical evidence, that non-involved potential stakeholders evaluate capacity of the EU-China overland transit route as cost-intensive and relatively slow. Correspondingly, according to non-expert evaluation, the railway-mode should not be considered as an object for potential investments, as it costs considerably more than e.g., sea-borne transport with approximately the same transport duration time.

Thus, to increase the investment attractiveness of OBOR-related projects, among other things, a targeted marketing campaign will be started aimed at raising awareness of the OBOR initiative in general and the real capacities and potential of EU–China overland transit in particular.

[36]based on own empirical data, collected in the period September-January 2017

Annex

Evaluation (linear regression analysis) of the most important factors relevant to investment in the OBOR initiative[37]

	Transport corridor perspective Transport corridor perspective	Invest in 2025			Invest in 2040		
		China	EU	transit countries	China	EU	transit countries
Your organization operations can be mainly described as	.809**	-0.112	-0.112	-0.112	-0.112	-0.112	-0.112
What country are you currently working for	-0.561	0.487	0.487	0.487	0.487	0.487	0.487
Quality of logistics infrastructure	0	.873**	.873**	.873**	.873**	.873**	.873**
Quality of trade infrastructure	-.783*	-0.267	-0.267	-0.267	-0.267	-0.267	-0.267
Ease of arranging shipment	-0.439	-.808*	-.808*	-.808*	-.808*	-.808*	-.808*
Match of expected and factual shipment dates	0	.866**	.866**	.866**	.866**	.866**	.866**
Ability to track the shipment	-.678*	-0.424	-0.424	-0.424	-0.424	-0.424	-0.424
Transport personnel competence	-0.289	0.429	0.429	0.429	0.429	0.429	0.429
Logistics personnel competence	-.771*	0.535	0.535	0.535	0.535	0.535	0.535
Trade personnel competence	-.814**	0.339	0.339	0.339	0.339	0.339	0.339
Government personnel competence	0.183	.772*	.772*	.772*	.772*	.772*	.772*
Environmental friendliness	0.513	.731*	.731*	.731*	.731*	.731*	.731*
Ease of customs procedures	-0.085	0.606	0.606	0.606	0.606	0.606	0.606
Quality of institutions	-0.213	.882**	.882**	.882**	.882**	.882**	.882**
Quality of government regulation	0.151	.756*	.756*	.756*	.756*	.756*	.756*
Government personnel competence	-0.039	.673*	.673*	.673*	.673*	.673*	.673*
Environmental friendliness	0.034	.693*	.693*	.693*	.693*	.693*	.693*
Ease of customs procedures	-0.335	.742*	.742*	.742*	.742*	.742*	.742*
Quality of government regulation	0.28	.742*	.742*	.742*	.742*	.742*	.742*
Efficiency of customs	0.579	0.559	0.559	0.559	0.559	0.559	0.559
Quality of transport infrastructure	.781*	0.419	0.419	0.419	0.419	0.419	0.419
Ease of arranging shipment	.734*	0.507	0.507	0.507	0.507	0.507	0.507
Match of expected and factual shipment dates	.734*	0.507	0.507	0.507	0.507	0.507	0.507
Logistics personnel competence	0.096	0.545	0.545	0.545	0.545	0.545	0.545
Trade personnel competence	-0.302	.756*	.756*	.756*	.756*	.756*	.756*
Government personnel competence	0.539	.763*	.763*	.763*	.763*	.763*	.763*
Environmental friendliness	.668*	0.519	0.519	0.519	0.519	0.519	0.519
Ease of customs procedures	.723*	0.601	0.601	0.601	0.601	0.601	0.601
Quality of institutions	0.376	0.608	0.608	0.608	0.608	0.608	0.608
Quality of government regulation	0.62	0.523	0.523	0.523	0.523	0.523	0.523

[37] based on own empirical data, collected in the period September 2017-January 2018

Inadequacy of roads to international quality standards	-0.399	0.116	0.116	0.116	0.116	0.116	0.116
Specific regulations within bilateral or other intergovernmental agreements	0.609	0.419	0.419	0.419	0.419	0.419	0.419
Restrictions on route choice	.740*	0.394	0.394	0.394	0.394	0.394	0.394
Information technologies regulations	.795*	0.301	0.301	0.301	0.301	0.301	0.301
Difference in technology development	.781*	0.265	0.265	0.265	0.265	0.265	0.265
Transport tariffs	-0.592	0.378	0.378	0.378	0.378	0.378	0.378
Insufficient harmonized procedures at border crossing	0.098	0.504	0.504	0.504	0.504	0.504	0.504
Duration of customs and border clearance	0.031	0.459	0.459	0.459	0.459	0.459	0.459
Quoting	0.192	.785*	.785*	.785*	.785*	.785*	.785*
Difference in technology development	0.482	0.55	0.55	0.55	0.55	0.55	0.55
Governmental procedures	0.047	.670*	.670*	.670*	.670*	.670*	.670*
Existing mechanisms of administrative support	0.446	.719*	.719*	.719*	.719*	.719*	.719*
Tariff policy	-0.15	0.457	0.457	0.457	0.457	0.457	0.457
Implementation of changes in shipment	0.125	.713*	.713*	.713*	.713*	.713*	.713*
Discrepancy of the requirement	0.24	-0.158	-0.158	-0.158	-0.158	-0.158	-0.158
Lack of safe and high-quality transport infrastructure	-0.541	-0.173	-0.173	-0.173	-0.173	-0.173	-0.173
Lack of safe and high-quality logistics infrastructure	-0.395	-0.204	-0.204	-0.204	-0.204	-0.204	-0.204
Lack of safe and high-quality trade infrastructure	-0.447	-0.143	-0.143	-0.143	-0.143	-0.143	-0.143
Difference in gauges	-0.179	0	0	0	0	0	0
Quoting	.752*	0.357	0.357	0.357	0.357	0.357	0.357
Restrictions on route choice	.756*	0.338	0.338	0.338	0.338	0.338	0.338
Information technologies regulations	0.664	0.355	0.355	0.355	0.355	0.355	0.355
Difference in technology development	.718*	0.283	0.283	0.283	0.283	0.283	0.283
Existing mechanisms of administrative support	0.38	0.253	0.253	0.253	0.253	0.253	0.253
Transport tariffs	-0.593	-0.173	-0.173	-0.173	-0.173	-0.173	-0.173
Implementation of changes in shipment	0.573	0.243	0.243	0.243	0.243	0.243	0.243
Warehousing/transloading charges	-0.57	0.357	0.357	0.357	0.357	0.357	0.357
Rail infrastructure	0	.686*	.686*	.686*	.686*	.686*	.686*
Pipeline infrastructure	0.167	.706*	.706*	.706*	.706*	.706*	.706*
Road transport service providers	-0.467	0.516	0.516	0.516	0.516	0.516	0.516
Pipeline transport service providers	0.232	.770*	.770*	.770*	.770*	.770*	.770*
Sanitary inspection agencies	0.178	.707*	.707*	.707*	.707*	.707*	.707*
Related non-profits	0.2	.743*	.743*	.743*	.743*	.743*	.743*
Airport charges	-0.038	.830**	.830**	.830**	.830**	.830**	.830**
Road charges	0.204	.703*	.703*	.703*	.703*	.703*	.703*
Rail charges	0.096	.906**	.906**	.906**	.906**	.906**	.906**
Pipeline charges	-0.065	.954**	.954**	.954**	.954**	.954**	.954**

Warehousing/transloading charges	0.221	.855**	.855**	.855**	.855**	.855**	.855**
Agent fees	0.156	.803**	.803**	.803**	.803**	.803**	.803**
Pipeline transport service providers	-0.033	.982**	.982**	.982**	.982**	.982**	.982**
Road charges	-.711*	0.286	0.286	0.286	0.286	0.286	0.286
Pipeline charges	-0.16	.721*	.721*	.721*	.721*	.721*	.721*
Import shipments are delivered as scheduled	-0.138	-0.617	-0.617	-0.617	-0.617	-0.617	-0.617
Export shipments are delivered as scheduled	-0.195	-0.637	-0.637	-0.637	-0.637	-0.637	-0.637
Importing procedures are transparent	-0.234	-0.619	-0.619	-0.619	-0.619	-0.619	-0.619
Exporting procedures are transparent	-0.163	-0.608	-0.608	-0.608	-0.608	-0.608	-0.608
Regulation changes are implemented efficiently	0	-0.535	-0.535	-0.535	-0.535	-0.535	-0.535
Traders demonstrate high level of compliance	-0.085	-0.567	-0.567	-0.567	-0.567	-0.567	-0.567
Policy recommendations are taken into consideration	-0.362	-0.524	-0.524	-0.524	-0.524	-0.524	-0.524
Major delays in pre-shipment	-0.458	-0.552	-0.552	-0.552	-0.552	-0.552	-0.552
Customs procedures are transparent	-0.121	-0.504	-0.504	-0.504	-0.504	-0.504	-0.504
Importing procedures are transparent	-0.348	-0.577	-0.577	-0.577	-0.577	-0.577	-0.577
Exporting procedures are transparent	-0.348	-0.577	-0.577	-0.577	-0.577	-0.577	-0.577
Regulation changes are implemented efficiently	-0.221	-0.58	-0.58	-0.58	-0.58	-0.58	-0.58
Traders demonstrate high level of compliance	-0.151	-0.583	-0.583	-0.583	-0.583	-0.583	-0.583
Policy recommendations are taken into consideration	-0.264	-0.607	-0.607	-0.607	-0.607	-0.607	-0.607
Major delays in warehousing and transloading	-0.522	-0.433	-0.433	-0.433	-0.433	-0.433	-0.433
Major delays in pre-shipment	-.735*	-0.406	-0.406	-0.406	-0.406	-0.406	-0.406
Customs procedures are transparent	-0.271	-0.575	-0.575	-0.575	-0.575	-0.575	-0.575
Regulation changes are implemented efficiently	0.516	-0.339	-0.339	-0.339	-0.339	-0.339	-0.339
Traders demonstrate high level of compliance	0.296	-0.459	-0.459	-0.459	-0.459	-0.459	-0.459
Customs procedures are transparent	0.598	-0.267	-0.267	-0.267	-0.267	-0.267	-0.267
How many government agencies you usually deal with in EU-China transit countries:	-0.359	-0.535	-0.535	-0.535	-0.535	-0.535	-0.535
How many forms do you usually submit per action in EU-China transit countries:	-0.561	-0.57	-0.57	-0.57	-0.57	-0.57	-0.57
What share of procedures (%) can be done electronically in China	-0.338	-0.567	-0.567	-0.567	-0.567	-0.567	-0.567
What share of procedures (%) can be done electronically in EU	-0.116	-0.64	-0.64	-0.64	-0.64	-0.64	-0.64
What share of procedures (%) can be done electronically in EU-China transit countries	.878**	-0.218	-0.218	-0.218	-0.218	-0.218	-0.218

*significant at 0.05

**significant at 0.01