Belt and Road Transport Corridors: Barriers and Investments

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This report presents the results of an analysis of the impact that international freight traffic barriers have on logistics, transit potential, and development of transport corridors traversing EAEU member states. The authors of EDB Centre for Integration Studies Report No. 49 maintain that, if current railway freight rates and Chinese railway subsidies remain in place, by 2020 container traffic along the China-EAEU-EU axis may reach 250,000 FEU. At the same time, long-term freight traffic growth is restricted by a number of internal and external factors. The question is: What can be done to fully realise the existing trans-Eurasian transit potential? Removal of non-tariff and technical barriers is one of the key target areas. Restrictions discussed in this report include infrastructural (transport and logistical infrastructure), border/customs-related, and administrative/legal restrictions. The findings of a survey conducted among European consignors is a valuable source of information on these subjects. The authors present their recommendations regarding what can be done to remove the barriers that hamper international freight traffic along the China-EAEU-EU axis.

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ACRONYMS AND ABBREVIATIONS

BRI — Belt and Road Initiative
CIM — Uniform Rules concerning the Contract for International Carriage of Goods by Rail
CIS — Commonwealth of Independent States
CIT — Central (European) Institute of Transport
COTIF — Convention Concerning International Carriage by Rail
DPRK — Democratic People's Republic of Korea
EAEU — Eurasian Economic Union
EAEU CC — Customs Code of the Eurasian Economic Union
EDB — Eurasian Development Bank
EDB Centre for Integration Studies — Centre for Integration Studies of the Eurasian Development Bank
EU — European Union
FEU — Forty-Foot Equivalent Unit, a conventional unit used to describe the cargo capacity of container carriers and container terminals
FEZ — free economic zone
IIASA — International Institute for Applied Systems Analysis
KTZ — JSC National Company Kazakhstan Temir Zholy (National Railway Company of Kazakhstan)
OSJD — Organisation for Cooperation of Railways
PKP S.A. — JSC Polish State Railways
PRC — People's Republic of China
SMGS — Agreement on International Goods Transport by Rail
TEU — Twenty-Foot Equivalent Unit, a conventional unit used to describe the cargo capacity of container carriers and container terminals
tf — tonne-force (metric unit; force applied to a body with a mass of one metric tonne (1,000 kg))
TLC — Terminal and Logistics Centre
UNCTAD — United Nations Conference on Trade and Development

Major Trans-Eurasian Corridors

Source: EDB

Summary

- In our previous report, we came to the conclusion that **rapid growth of EU-China container traffic using EAEU railways will continue in the short term**. The current through-freight rate (including Chinese subsidies) of $5,500 per FEU may encourage further growth of container traffic to 500,000 FEU in 2020 (a three-fold increase over three years). However, to attract additional freight traffic, it is necessary to further expand transport infrastructure and remove a number of barriers. The EAEU and China's domestic railway networks and their transport capacities are quite sufficient to meet the existing transport needs along the China-EAEU-EU axis. Container trains currently boast schedule compliance rates of up to 99%, with routes and schedules having been negotiated and approved by all transcontinental freight traffic stakeholders.
- **That said, long-term growth of container traffic is inhibited by certain external and internal factors, and by the risk that Chinese provinces will discontinue export container traffic subsidies.** Further growth will be contingent upon investments to remove physical bottlenecks in the EAEU railway infrastructure, lower freight rates, and guarantee the preservation of PRC transport subsidies.
- **A critical infrastructural restriction is imposed on the future growth of trans-Eurasian transit by the inferior transport and processing capacity of Polish railways, including crossing points at the Belarus-Poland border.** The most intensive container train traffic is at the crossing point Brest (Belarus) — Małaszewicze (Poland). It is included in almost all routes linking China and the EU. Given the current state of Poland's railway infrastructure, locomotive fleet, and rolling stock, any significant increase of container traffic through the Brest-Małaszewicze crossing point is bound to be extremely problematic. Even today, the Polish side processes only 9–10 trains per day instead of the negotiated 14 trains.

  The aggregate capacity of existing and prospective Polish processing infrastructure is considerably lower than the volume of container traffic planned by many trans-Eurasian transit participants. The PRC seeks to have 5,000 Europe-bound trains by 2020, with Kazakhstan projecting a container transit increase to two million TEU. According to our estimates, the anticipated expansion of the Belarusian Railway container train processing infrastructure at the Bruzgi-Kuźnica Białostocka and Swislocz-Siemianówka crossing points will not resolve the problems related to the exhaustion of technical capabilities required to boost the Brest Hub's processing capacity. **This calls for additional investments and a substantial effort to upgrade Polish border crossing points**, as well as an overall improvement of Polish railway infrastructure in the East-West direction. However, Poland is refraining, at least for the time being, from investing in

China-EU routes, and is instead channelling all available resources into railway routes linking Baltic ports to South Europe (North-South). This is contrary to the interests of trans-Eurasian transit.

Differences in container train lengths impose another restriction on the development of transcontinental transit along the PRC-EAEU-EU axis. While in Russia an average train has 71 conventional railway cars (994 m), and in Belarus 57–65 conventional railway cars (up to 910 m), in Poland the technical regulations limit train length to 600 m. Accordingly, trains leaving Małaszewicze can have a maximum of 43 cars carrying 86 TEU. As a result, if a 65-car container train arrives at the border with Poland, the cars have to split up: a 43-car train is composed as the containers are transhipped in Brest, while the remaining 22 cars have to wait at the marshalling station for the next train to be made up. This results in loss of time, accumulation of containers at crossing points, and higher costs.

The low speed of freight trains in EU countries has a negative impact on delivery time, which should be the key competitive advantage of land container transport. Container trains hurtling through the EAEU at an average section speed of 41 km/h slow down dramatically as they enter the EU. Cargo trains travel through international segments of European railways at an average speed of 18.2 km/h, with Poland posting the lowest cargo train speeds in Europe. However, European countries still charge much higher railway freight rates than countries such as Russia. Over the last several years, freight train traffic in many EU countries has been neglected, with shortage of investment capital and lack of modernisation efforts giving rise to a noticeable delay in the development of railway infrastructure.

- **Insufficient standardisation of shipping documents and technical regulations is the main administrative and legal obstacle to the increase of freight traffic among the PRC, EAEU member states, and the EU**. In most European countries, railway freight traffic is regulated by the Convention concerning International Carriage by Rail (COTIF). CIS countries, the Baltic states, Albania, Iran, the PRC, the DPRK, Vietnam, Mongolia, Hungary, and Slovakia use the Agreement on International Goods Transport by Rail (SMGS). The use of the CIM/SMGS common consignment note gives a strong competitive edge to railway shipments through Eurasian space. However, more work needs to be done to standardise normative documents and technical regulations used in Eurasian countries (rules for shipping various types of cargoes, rolling stock operating parameters, environmental standards, etc.).
- **It is often claimed that differences in track gauge and border/customs inspections act as major barriers to increasing freight traffic along the PRC-EAEU-EU axis. We, however, believe that these two barriers are not critical in their impact on the cost and speed of delivery**. Differences in track gauge necessitate container transhipment or bogie exchange at border crossing stations. This takes from two to six hours, on average. Completion of border/customs formalities in EAEU member states usually requires a maximum of four hours.

EAEU member states pursue a coherent policy designed to standardise border/customs rules and documents, and to streamline related regulations to minimise the time required to complete border/customs formalities.

- **Long-range investment activities in EAEU member states:**

  — No mega-projects are required to expand the transport capacity of land corridors along the PRC-EAEU-EU axis and boost their competitiveness vis-à-vis sea routes. What we need is not a "second Trans-Siberian Railway" but **selective elimination of transport infrastructure bottlenecks**, which can be managed with limited financial outlay: construction of additional railways, electrification of new railway sections, upgrade and modernation of locomotives, acquisition of special rolling stock, improvement of border crossing infrastructure, etc.

  — **Creation of backbone transport hubs/terminal and logistics centres (TLCs) in Russia, Kazakhstan, and Belarus**. The lack of backbone TLCs in the EAEU pushes up mileage and, accordingly, shipping costs incurred by consignors, and increases cargo accumulation and distribution times. Objectives for the creation of transport hubs/TLCs in the EAEU include the following: (1) processing (in border-adjacent areas) of container cargoes entering the EAEU (from the PRC and from the EU) and their subsequent distribution by railway/road transport; (2) accumulation of container cargoes in hubs/TLCs and their subsequent export to the PRC and EU countries by railway/road transport (short-haul operations); (3) possible future accumulation of container cargoes in hubs/TLCs for additional loading of transit container trains travelling along the PRC-EAEU-EU axis.

  — Expansion of international freight traffic by using special containers/cargo boxes (for chemical and mineral cargoes) and refrigerator containers (for food products).

  — Investing in alternative East-West container train routes, as EAEU member states cannot speed up construction of railway infrastructure in Poland. Possible key investment targets include: (1) expanded use of the Saint Petersburg transport hub; (2) international transit use of the transport and logistical infrastructure of Kaliningrad Region (transhipment stations in Chernyakhovsk and Kaliningrad). To assure full-scale use of the route, it may be necessary to invest in boosting the processing capacity of transhipment stations and improving the border crossing infrastructure (Poland-Kaliningrad Region, Lithuania-Kaliningrad Region).

- **Involvement of Chinese direct investors will make BRI projects more attractive for European investors**. In the opinion of potential European investors, direct investments by companies from the PRC (rather than credits extended by Chinese banks) may increase the investment appeal of BRI projects, signalling the emergence of a favourable and stable investment environment in the target area.

- **European consignors do not have enough information on the advantages/terms of using trans-Eurasian land transport corridors** (delivery times, number of active transport modalities, door-to-door delivery capability, delivery costs) or on the development status of transport corridors and available routes (primarily railway routes). A survey conducted among European consignors has shown that companies that have no trans-Eurasian shipping track record estimate the time of delivery of a 40-foot container at 20–30 days and the cost of delivery at $10,000–15,000 (see Figure A). In both cases, the actual figures are much lower. **It is necessary to promote the use of trans-Eurasian railway transport along the PRC-EAEU-EU axis. This may generate additional freight traffic from the EU to the PRC and, accordingly, reduce the share of empty return containers.**

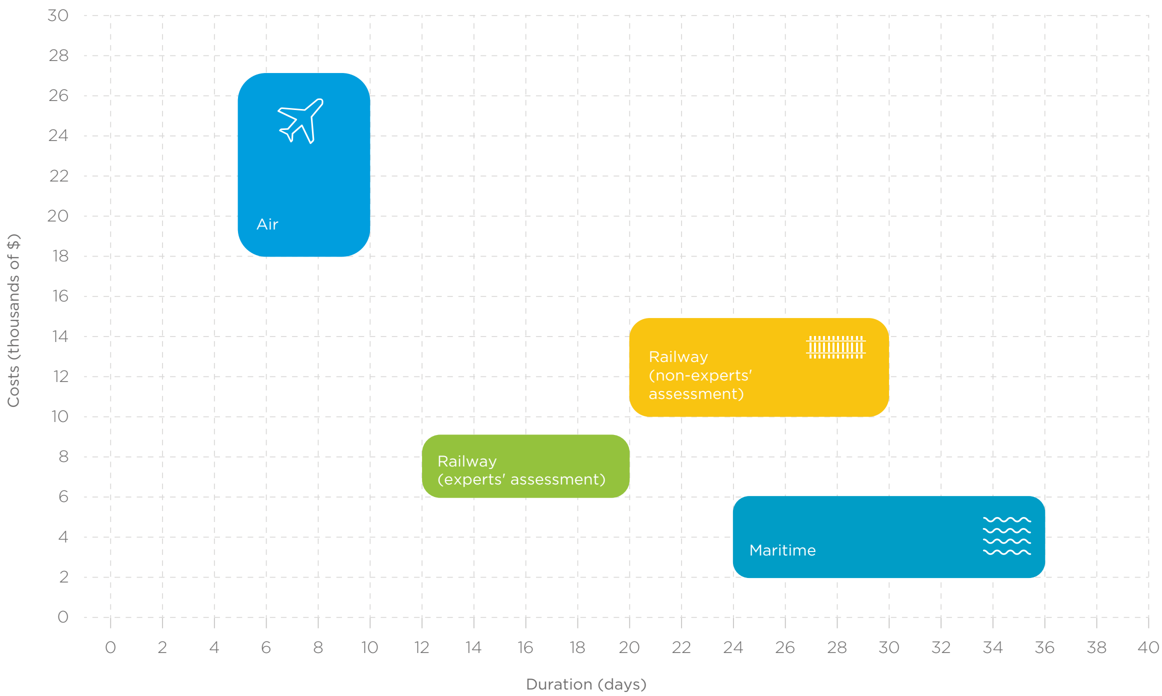


Figure A
Estimated Cost and Duration of Freight Transport by Standard 20-Foot Containers from China to Western Europe

Source: IIASA (2018)

1. Existing Barriers in the PRC, EAEU Member States, and the EU, and Their Impact on Freight Traffic along the PRC-EAEU-EU Axis

Non-tariff barriers to international railway freight traffic can be classified as follows:

- infrastructural barriers (transport and logistical infrastructure);
- border/customs-related barriers;
- administrative/legal barriers.

Existing barriers and short-term difficulties related to the provision of international railway freight services only have an indirect impact on the transport component of foreign trade prices, because container shipping costs are determined in advance by the rates charged for specific processing and delivery operations.

At the same time, in the medium and long term, the emergence of barriers associated with issues such as transport infrastructure bottlenecks or administrative/legal procedures may significantly influence the ultimate cost of a foreign trade operation by increasing expenses, partially reducing the profit received by the consignor, or even rendering the use of a specific delivery route completely unviable in economic terms. If a container train suffers an excessive delay when crossing the border (due to inadequate transport capacity of the crossing point or differences in track gauge), the operator may indemnify the consignor at the expense of the railway company that caused the delay. However, due to the loss of time and the failure of the consignor to properly discharge its contractual obligations before third parties, total containerised cargo shipping costs may greatly exceed the through-freight rate, and the share of the transport component in the total costs may plunge the profitability of the relevant foreign trade operation below the breakeven point.

1.1. Infrastructural Barriers

Transport Capacity of Railway Infrastructure

The volume of Eurasian railway container freight (primarily between China and Europe[1]) generally remains quite modest, despite its rapid increase in recent years (see EDB Centre for Integration Studies, 2018). Russian, Kazakhstani, and Belarusian railway infrastructure is used primarily to transport massive high-tonnage cargoes (coal, iron ore, metals, mineral construction materials, timber, etc.) and passengers.

Considering that container trains travel on agreed schedules, the transport capacity of railway infrastructure in EAEU member states, China, and EU countries has had little, if any, restraining effect on the volume and intensity of railway container traffic

[1] In this report, the terms “European countries” and “Europe” refer to European Union member states.

along the China-EAEU-EU axis. Container trains currently boast schedule compliance rates of up to 99%, with routes and schedules having been negotiated and approved by all stakeholders, including railway companies from China, Russia, Kazakhstan, Belarus, and EU countries (see Attachment).

The situation with the transport capacity of domestic railway networks along the PRC-EAEU-EU axis is currently as follows:

- *China.* The infrastructure of the rapidly growing Chinese railways is more than sufficient to support future container traffic along the PRC-EAEU-EU axis. The westbound high-speed train service ends at Urumqi. In addition, there is a plan to launch a high-speed freight transit service at the Urumqi-Dostyk section by 2026, within the framework of the Central Eurasian Corridor development project.
- *Russia.* The main East-West transport corridor railway lines crossing Russia[2] are fully electrified, double-track lines, equipped with automatic block systems[3]. Work continues to modernise turnouts from the Trans-Siberian Railway going down to the border with China (Karymskaya-Zabaykalsk) and Mongolia (Zaudinsky-Naushki). The Zabaykalsk-Borzya and Borzya-Olovyannaya sections are the most heavily loaded in terms of transport capacity utilisation. Russian Railways is currently completing electrification of those sections, and concurrently implementing a comprehensive reconstruction project at Zabaykalsk Station.
- *Kazakhstan.* Kazakhstani railway infrastructure along international transit routes is characterised by lack of sufficient transport capacity reserves. To adequately support future transit container traffic, it will be necessary to:

  — enforce common network standards, including those governing cargo train lengths;

  — build second main tracks at sections with limited transport capacity;

  — modernise SCB (signalling, centralisation, and blocking) and communication devices, among other things, by replacing semi-automatic blocking systems with fully automatic blocking systems or centralised traffic control systems;

  — build bypass routes around major transport hubs (e.g., Almaty Railway Hub);

  — electrify sections leading to crossing points at the border with the PRC.
- *Belarus*. Transit container traffic traverses Belarus primarily through Osinovka-Orsha-Brest, an electrified double-track section. A fibre-optic cable is laid throughout the length of the transport corridor across the Republic of Belarus. There is a plan to modernise SCB and communication devices by 2020 to enable a high-speed train service. About $2.5 billion was invested in 2011–2017 in projects designed to enhance the Belarusian Railway's capacity, including a $700 million investment in the development of Belt and Road routes. Specifically, the country purchased 30 modern electric locomotives, and paid considerable attention to the electrification of sections making up the key transport corridors (Ananyev, 2017).

[2] (1) Krasnoe–Moscow–Nizhny Novgorod–Kotelnich–Perm–Yekaterinburg–Omsk–Novosibirsk–Krasnoyarsk–Irkutsk–Petrovsky Zavod–Karymskaya–Volochaevka–Nakhodka/Vanino/Khasan; (2) Krasnoe–Moscow–Yekaterinburg–Kartaly.

[3] Automatic block system (in railway transport): a system enabling automatic regulation of train traffic within a railway section using intermediate light signals.

- *EU Countries.* The transport capacity of EU railway infrastructure is limited, and in the medium term may prove incapable of supporting the growing transit container traffic. This is largely attributable to the technological and regulatory differences between railway transport operations in the PRC, the EAEU, and the EU (see following sections).

Processing Capacity of Railway Infrastructure at International Crossing Points

Until 2017, the intensity of freight traffic through international crossing points remained relatively low. In 2016, the number of container trains reached 1,700 (1,130 from China to Europe, and 572 from Europe to China), but the average number of trains crossing the borders between China and Russia/Kazakhstan/Mongolia in the east and the Poland-Belarus border in the west was fewer than five per day. In 2017, the total number of trains went up to 3,700 (2,400 from China to Europe, and 1,300 from Europe to China), and the number of trains crossing eastern and western EAEU borders exceeded 10 per day (CRCT, 2018).

For example, according to the 2017 train schedule, the crossing point at Dostyk-Alashankou was used by no more than five container trains per day, even though the potential processing capacity of Dostyk Station is about nine container trains per day (Bektiyarova, 2016). The crossing point at Zabaykalsk-Manchuria is used by a maximum of two container trains per day, while its potential processing capacity is about 10 per day (RZD TV, 2014).

Modern processing equipment installed at the new crossing point at the China-Kazakhstan border (Altynkol-Khorgos), including a dry port facility, covers all transit by a wide margin, and may lure away some of the freight traffic currently going through Dostyk. According to PJSC TransContainer, the crossing point at Zabaykalsk-Manchuria will support an almost tenfold increase in the volume of processed transit container traffic (up to 470,000 TEU per year), and half of that increase could be achieved at relatively short notice (RZD TV, 2014).

Currently, insufficient processing capacity of the crossing points at the Belarus-Poland border remains the narrowest bottleneck deterring expansion of China-EU transit container traffic. The most intensive container train traffic is registered at the Brest (Belarus)-Małaszewicze (Poland) crossing point. It is included in almost all routes linking China and the EU. Over the first nine months of 2017, the number of transit container trains travelling by the Belarusian Railway from China to Europe and from Europe to China amounted to 1,109 and 759, respectively. According to the Belarusian Railway, an average of eight PRC-Europe-PRC container trains run through Belarus every day (BELTA, 2017; The Belarusian Railway, 2017).

Due to the current state of Poland's railway infrastructure, locomotive fleet, and rolling stock, a significant increase of container traffic through the Brest-Małaszewicze crossing point appears to be very unlikely. Even today, the Polish side only processes 9–10 trains per day instead of the negotiated 14 trains. Poland anticipates that upon completion of the modernisation of Polish railway infrastructure to improve freight transit across the Belarus-Poland border, all five railway crossing points[4] with a higher aggregate processing capacity (including transhipment on the Belarusian side of the border) will be up and running, alleviating the current situation with respect to processing container trains (Tonin, 2017).

[4] Brest–Małaszewicze, Bruzgi–Kuźnica Białostocka, Swislocz–Siemianówka, and Wysokie Litewskie–Czeremcha (which currently has no dual gauge), all used for freight traffic and equipped for customs clearance, and Bierestovica–Zubki, currently out of service.

It should be noted that the EU Multiannual Financial Framework 2014–2020 envisages allocation of resources from a special-purpose €10.2 billion fund to finance development of Polish railway infrastructure (Jesionkiewicz, 2017); however, almost all relevant ongoing and scheduled projects focus on the improvement of North-South lines. The European Commission has already approved the allocation of €475 million to continue the implementation of eight major Polish railway infrastructure development projects until 2020. Four projects with a total cost of €319.3 million deal with the modernisation of the railway connecting Masovian and Łódź provinces (voivodeships) and have been designed to improve railway access to Warsaw. The European Commission will also provide €74.6 million to modernise the Czempiń-Poznań railway, part of the Baltic-Adriatic Corridor of the trans-European TEN-T Network. In addition, the Polish government has approved €81.5 million to modernise railways in the Pomorze region, another part of the Baltic-Adriatic Corridor. Implementation of the project will enhance the railway network in the environs of Gdańsk (including the Gdańsk Port) and Gdynia (RZD-Partner, 2016). Besides, within the framework of two tenders (one that ended in March 2017 and one that started in July 2017), PKP S.A. is going to invest a total of PLN 543 million (€127.5 million) in the modernisation of several sections of the Trzebinia-Zebrzydowice route, which is used to transport transit cargoes from Baltic ports to the south of Europe (Pletnev, 2017). Experts anticipate that problems associated with running transit trains through Poland will persist throughout the entire period of the modernisation of Polish railways (Pletnev, 2017).

Infrastructure bottlenecks in Poland have resulted in up to 3,500 cars having been detained at the Brest-Małaszewicze crossing point (Tonin, 2017). Several major consignors, including Hewlett-Packard (HP), have expressed grave concerns about that crossing point. According to HP representatives, the company's trains running from Chongqing to Duisburg may have to wait for the crossing for 2–3 days, while trains running from other Chinese cities may be delayed by 5–6 days. Most delays occur at the Belarus-Poland border. Such delays impair the competitiveness of the route, which is supposed to offer consignors significantly shorter delivery times compared to sea routes (RZD-Partner, 2017).

It should be noted that Belarus has commenced an investment project to modernise the Brest-North Station. This is expected to boost the average daily processing capacity of the station, reduce cargo processing times, and accelerate train passage. Work is scheduled to be completed in 2018–2019. Total investments will amount to about $8 million (The Belarusian Railway, 2017).

Infrastructure improvement work is also underway at Bruzgi station (the Bruzgi-Kuźnica Białostocka crossing point) and Swislocz crossing point. The objective is to boost the processing capacity of cargo terminals and enable proper handling of the ever-increasing West-East-West freight traffic. Total investments will amount to approximately $10 million (The Belarusian Railway, 2017).

We believe that the Belarusian Railway's proposal to organise the processing of container trains at the Bruzgi-Kuźnica Białostocka crossing point (the first container train was processed there in July 2017) and the Swislocz-Siemianówka crossing point is not likely to resolve the problems related to exhaustion of the technical capabilities required to boost the

Brest Hub container-processing capacity, as the total processing capacity of both existing and future Polish infrastructure is considerably less than necessary to deal with the container traffic planned by the PRC for 2020 (5,000 Europe-bound trains per year).

Break-of-Gauge Sites

Due to the difference between track gauges used by Russia, Belarus, Kazakhstan, and Mongolia (1,520 mm) on the one hand and by European countries and China (1,435 mm) on the other, the use of international railway routes along the China-EAEU-EU axis necessitates cargo transhipment, bogie exchange, or use of automated gauge conversion technology. Accordingly, break-of-gauge sites exist at both the western and the eastern borders of the 1,520-mm area.

Break-of-gauge crossing points in the West:

- Belarusian-Polish border:
  - — Brest (Belarus) — Małaszewicze (Poland);
  - — Bruzgi (Belarus) — Kuźnica Białostocka (Poland).
- Polish-Russian border:
  - — So far, transhipment stations in Kaliningrad Region have not been used for international freight transit. 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 (TASS, 2017).

Break-of-gauge crossing points in the East:

- Kazakhstani-Chinese border:
  - — Dostyk (Kazakhstan) — Alashankou (China);
  - — Altynkol (Kazakhstan) — Khorgos (China).
- Russian-Chinese border:
  - — Zabaykalsk (Russia) — Manchuria (China).
- Chinese-Mongolian border:
  - — Erenhot (Erlian) (China) — Zamyn-Uud (Mongolia).

Productivity of break-of-gauge sites is determined primarily by their technological capabilities.

Technological Barriers Hampering International Railway Freight Traffic

Train length. The length of trains composed by various railway companies (Deutsche Bahn, PKP S.A., the Belarusian Railway, Russian Railways, KTZ, China Railways) depends on a number of factors: length of station tracks, train weight, locomotive power, route profile, technical capabilities of route legs (crossing points/stations, side tracks, passing tracks and waystations, whether automatic block systems are employed, intermediate light signals), station track plans and profiles, shunting work conditions at individual stations, technical and technological capabilities of intermediate and line stations, marshalling yards, etc.

The length of the train determines the load — in this case, the number of containers loaded onto container platforms. Most container trains travelling along the PRC-EAEU-EU axis use 40-foot platforms, which can hold two 20-foot containers (TEU) or one 40-foot container (FEU). The use of 60-foot platforms and 80-foot platforms from Brest in the direction of Małaszewicze and further on is currently restricted[5].

Most container trains from China reaching China-Kazakhstan border crossing points consist of 54 conventional railway cars (one conventional railway car = 13.92 m, rounded to 14 m). Therefore, the length of the train (counting only the platforms) is 756 m. The full length of the train, including the length of the locomotive (about 33–35 m) and location tolerance (10 m), is 801 m. Taking into consideration the length of the tracks at Dostyk station, that train length is quite acceptable for Kazakhstan.

In Russia (Russian Railways), an average train is composed of 71 conventional railway cars (994 m), which, together with the locomotive length and location tolerance, produces a total train length of 1,040 m. Depending on a number of factors, the "cars-only length" can be shorter, about 800 m. The standard useful length of arrival-departure tracks is 850 m, 1,050 m, 1,250 m, or 1,550 m.

The length of the train depends on the length of the side tracks at holding stations to be passed by the train. As a rule, the train is composed of 40 cars; however, a "through-running" train can have more than 60 cars.

The key factor affecting train composition is not the length, but rather the weight, as well as the locomotive power and relevant track section profile. At single-track sections (which are not uncommon in Europe), the length of the train should not exceed the distance between exit signals or side-track limit signals. Therefore, the length of the train can vary from 300 m to 1,200 m, with 1,000 m occurring most frequently.

Empty trains can be even longer, with up to 100 cars. The length of a train with many heavy cars is often less than the standard length, and this is everyday practice rather than a violation.

The standard length (number of conventional railway cars making up a train) is a technical parameter that plays an important role in managing railway operations.

Thus, for train composition purposes, a reduced standard length is an advantage, as it minimises car storage and processing costs. Increasing the standard length of the train increases the time required for transit train processing at intermediate stations, as these two values are directly proportional to one another.

[5] One of the protocol events that took place on June 20, 2016, during the visit of PRC President Xi Jinping to Poland, was the arrival in Warsaw of the first China Railway Express container train. The train was composed of twenty-two 80-foot six-axle Sggrs container platforms (locomotive: EU07), with two 40-foot containers on each platform. It was, essentially, a demo train (Xinhua, 2016).

On the other hand, a higher standard train length has a beneficial effect on train schedules (by reducing the amount of traffic, albeit at the cost of slower train speeds) and operation of locomotives. The more income is generated by each car, the more economic sense it makes to invest in curtailing car turnover periods.

In Belarus (the Belarusian Railway), the length of the car portion of the train varies from section to section, ranging from 57 to 65 conventional railway cars (up to 910 m). Together with the length of the locomotive and location tolerance, train lengths reach up to 955 m.

Train lengths used by PKP S.A. (Poland) are considerably shorter. According to applicable norms and regulations, train length may not exceed 600 m. However, there are plans to enable the use of trains with lengths of up to 750 m, or even 2,332 m (108 cars plus locomotive) (Lewandowski, 2016).

We can assume that trains currently leaving Małaszewicze have a maximum of 43 cars carrying 86 TEU. As a result, if a 65-car container train arrives at the border with Poland, a 43-car train is composed as containers are transhipped in Brest, while the remaining 22 cars have to wait at the marshalling station for the next train to be made up. Alternatively, the number of containers delivered to the transhipment area should be exactly the same as the number of containers that can be loaded onto a container train pursuant to PKP S.A. terms and conditions (i.e. 86 TEU).

Railway Track Gauge, Railway Electrification, and Axle Loads. In the former USSR and Mongolia, railway track gauge is 1,520 mm; in Finland it is 1,524 mm, and rolling stock can enter those countries without any hitch or hindrance. Moreover, acceptable car dimensions, braking systems, couplings, etc. are identical.

In Western Europe, railways have one of three track gauges. The most frequently used one is 1,435 mm; in Spain and Portugal it is 1,668 mm; in Ireland, 1,600 mm.

The difference in railway track gauges between former USSR countries (1,520 mm), the PRC (1,435 mm), and Western Europe (1,435 mm) requires the transhipment of cargoes or exchange of bogies at border crossing stations. Naturally, this increases transport costs borne by cargo owners, and extends delivery times. There are four main technologies used to increase interoperability: (a) delivery by container trains with transhipment from rolling stock running on 1,435/1,520 mm gauge to rolling stock running on 1,520/1,435 mm gauge; (b) use of variable gauge rolling stock, enabling seamless transition from one gauge to another; (c) bogie exchange at an interchange station; and (d) extending the European gauge to the east (Belarus, Russia) and to the west (PRC-Kazakhstan), or, conversely, laying broad-gauge tracks in the EU or the PRC.

Transhipment of containers from platforms running on 1,435/1,520 mm gauge to platforms running on 1,520/1,435 mm gauge requires the completion of various official documents.

One of the factors hindering high-speed carriage of cargoes by railways is associated with electrification differences, in particular the use of direct or alternating current, and the resultant differences in overhead contact system voltage. Currently the overhead contact system voltage in Poland, the usual point of entry for trains travelling from the PRC/Kazakhstan/Russia/Belarus, is 3 kV/DC. The same is true for railways in the neighbouring Czech Republic and Slovakia. In Germany and Sweden (destinations mostly used by ferried passenger trains), the voltage is 3 kV/DC and 15 kV/AC; in Belarus, Lithuania, and Ukraine, 3 kV/DC and 25 kV/AC.

Only the 25 kV/AC segment will be developed in Russia. This system assures a much higher economic efficiency than the old direct current systems do (3 kV/DC). The resultant tractive force enables the use of heavier trains at lower unit freight costs. On the other hand, transition from direct current to alternating current requires replacement of locomotives, re-examination of the whole train, etc. — i.e. it requires more time, which automatically increases total costs.

As for axle loads, their increase in Russia is envisaged by the Railway Equipment Development Strategy 2030. Russia has already created an ample database on the operation of railway cars with axle loads of 23.5 tonne-force and 25 tonne-force (tf). Russian Railways is currently testing freight rolling stock that uses bogies with 27-tf axle loads. In the future, axle loads may be increased to 30 tf, subject to a relatively inexpensive modernisation of existing tracks.

In China, the USA, and Australia, axle loads range from 25 tf to 40 tf (25–30 tf; 35 tf; 40 tf, respectively), with infrastructure maintenance costs decreasing exponentially. 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 that is built, for example, on marshy soil behaves under stress in a completely different manner (*Gudok*, 2017a).

Train weight and length standards stipulated by train schedules are assigned to one of the following categories:

— unified standards, which apply to constant weight/length of through trains;

— parallel (increased or decreased) standards, which apply to constant weight/length of exit route trains, accelerated trains, container and refrigerator trains, and special trains;

— section standards, which are set subject to locomotive power and station track length for the given section.

In addition, differentiated weight standards may be used in routine operations, with maximum train weights set for each run depending on the main track plan and profile, the existence of artificial structures, etc.

In exceptional cases, it is possible to deviate from the standard by reducing train length by a maximum of one conventional railway car. A single unified standard is set for the entire route to enable passage of constant-weight through trains in accordance with route specialisation.

As regards the delivery of containers by railway transport, a critical competitive advantage compared to maritime transport can be provided by the development, implementation, and active operation of the so-called 80-foot container platform capable of carrying two 40-foot containers. Moreover, subject to the limits imposed by the infrastructure (not only by railway tracks, but also by the overhead contact system[6] — or lack thereof where diesel locomotives are used), it may be possible to load each platform with four 40-foot containers, with two containers stacked up on top of another two, which will result in a massive increase of the load borne by the axle and, consequently, by the track, and in a notable reduction of total freight costs.

Freight Train Speeds. Delivery speed is often mentioned as the main argument in favour of using land transport to support freight traffic between Europe and Asia. As a rule, proponents of that argument cite indicators of high speed, superior efficiency of container unit trains, etc. However, they seldom (if ever) raise issues related to route lines and their actual use, and those related to time limits that are allocated for final operations and which, if breached, may necessitate adjustments to those very route lines (schedule disruptions).

Today the bulk of freight traffic in Russia (more than 80%) uses only 1/5 of the entire railway network: specifically, the Eastern Polygon and railway lines leading to seaports in the north-west and south of the country. Different sections of those railway lines have different speed limits. In most sections, freight trains may travel at 80 km/h. Only 6% of total mainline length has a permitted speed of 90 km/h, while the lengths of sections with speed limits of 70 km/h and 60 km/h are 4,000 km and 5,700 km, respectively. A considerable portion of railway lines has speed limits for empty cars. The need to observe speed limits often prevents trains from travelling at permitted speeds through adjacent sections, as it takes time for them to accelerate and decelerate. There is a paradox here: while the average weighted mainline speed is more than 70 km/h, section speeds barely exceed 40 km/h. Incidentally, this speed mode bears a cost penalty due to higher fuel consumption by locomotives (Tsypleva, 2017).

For reference: At the end of 1H 2017, freight train speeds in Russia were as follows: average section speed — 41.8 km/h; average technical speed — 47.7 km/h; and route speed — 692.2 km/day (RZD, 2017)[7].

[6] The overhead contact system consists of wires, structures, and devices used to transmit electrical energy from traction substations to current collectors installed on electrically propelled rolling stock. The overhead contact wire is suspended at a height not less than 5,750 mm and not more than 6,800 mm.

[7] Section speed is the speed at which the train travels between two locomotive change stations, subject to stopovers at intermediate stations.

Technical speed is the speed at which the train travels excluding stopovers at intermediate and section stations.

Route speed is the average daily speed of a route train subject to stopovers at all stations along the route, with the exception of the departure station and the arrival station. Route speed shows how fast route trains travel from the departure station to the arrival station.

Russian experts analysed the impact of speed limits, and identified more than 3,200 problem spots (total length: 22,800 km) preventing further mainline speed increases. A program targeting reduction of the length of sections with permitted speeds of less than 80 km/h by almost 1,100 km was launched in Russia in 2016. Its implementation will enable a twofold increase in the total length of mainline sections where freight trains may travel at 90 km/h (Tsypleva, 2017)[8].

The average freight train speed in the PRC is 35.6 km/h, going down to about 28–30 km/h as trains approach Alashankou at the border with Kazakhstan (single-track service, second track not yet in operation) (IIASA, 2018).

The average freight train speed in EU countries is rather modest. In international sections, it amounts to 18.2 km/h[9]. According to a report published by the European Court of Auditors, over the last several years, freight train traffic in many EU countries has been neglected, with shortage of investment capital and lack of modernisation efforts giving rise to a noticeable delay in the development of railway infrastructure (ECA, 2016).

Container trains travelling through the EAEU at relatively high speeds slow down dramatically as they enter the EU, although European freight rates are much higher than those charged in Russia, for example.

Terminal and Logistical Infrastructure

Expansion of the terminal and logistical infrastructure associated with the railway network along the China-EAEU-EU axis assures provision of modern logistical services to consignors and consignees involved in both domestic and international freight traffic, including transit traffic. Now that transit cargoes are transported by container trains along direct routes without the need for remarshalling (sorting) in EAEU member states, priority in creating a backbone network of terminal and logistical centres is given to projects designed to meet domestic export/import needs, rather than international transit needs (with the exception of 1,520/1,435 break-of-gauge points).

Along with certain other investors, Russian Railways is implementing a large-scale infrastructural project: the creation of a TLC network in the Russian Federation. The new network (more than 50 TLCs and their satellites, plus renovated railway infrastructure facilities), joined together by regular container trains, will make it possible for Russian Railways to support land freight traffic along the EU-EAEU-China axis, one of the tasks formulated by the federal special-purpose programme *Development of the Russian Transport System*.

In 2012, the Russian Railways Management Board approved a document entitled *Conceptual Framework for the Creation of TLCs in the Territory of the Russian Federation*. The document envisages phased construction and commissioning of TLC facilities. At the initial stage, it is necessary to create a backbone network that will serve as an incentive for potential investors to join terminal and logistical infrastructure development projects.

[8] By the end of 2016, the speed was increased to 90 km/h along more than 1,100 km of total track mileage. By the end of July 2017, speed limits were increased along a 95.0 km section for passenger trains, and at a 76.9 km section for freight trains; it is expected that upon completion of repair works, passenger and freight trains will be able to travel at higher speeds along sections with a total length of 1,357.0 km and 1,167.4 km, respectively (Tsypleva, 2017).

[9] This is not "section speed". In this particular case, this is the speed at which the train moves from the time it leaves the departure station to the time it comes to the arrival station.

Information on first-stage TLC network facilities, as well as on the extent of completion and a brief description of the relevant projects, is presented in Table 1.

Pursuant to the *Conceptual Framework for the Creation of TLCs in the Territory of the Russian Federation*, new TLC network facilities will be linked to each other by regular container trains.

Another major railway administration actively involved in the development of logistics is the Kazakhstani company KTZ. The Government of the Republic of Kazakhstan has assigned to that company the status of a National Integrated Trans-Logistical Operator.

Several projects designed to put in place logistical infrastructure integrated with Eurasian international transport corridors are being implemented as part of the plan for the development of the transport and logistical system of the Republic of Kazakhstan. One of the largest of these projects envisages the creation, by 2020, of the Khorgos-Eastern Gate Free Economic Zone. The Khorgos International Cross-Border Cooperation Centre, complete with the region's largest railway port, will serve as its cornerstone. The volume of freight traffic that is expected to pass through Khorgos-Eastern Gate FEZ is estimated at more than 10 million tonnes (Goreltsev and Polyakova, 2015).

The total territory of Khorgos-Eastern Gate FEZ components (multimodal logistical zone, industrial zone, and FEZ infrastructure) is projected to exceed 1,600 hectares (3,300 hectares including reserved sites).

There are also plans to build priority TLC facilities in various districts of the following Kazakhstani cities: Dostyk, Almaty, Aktau, Astana, Oral, Aktobe, and others. The key objectives of those projects are to realise the transit potential of Kazakhstan and to develop Eurasian corridors along the Asia-Pacific-China-Kazakhstan-Europe axis (Goreltsev and Polyakova, 2015).

1.2. Border and Customs Barriers

Time Required for Completion of Border/Customs Formalities

Border/customs formalities in EAEU member states currently do not represent a serious barrier to international transit and trade. EAEU member states pursue a coherent policy designed to standardise border/customs rules and documents, and to streamline related regulations to minimise the time required to complete border/customs formalities.

The Customs Code of the Eurasian Economic Union (EAEU CC), which came into effect on January 1, 2018, envisages:

- automation of all customs systems;
- transition to e-declarations (discontinued use of paper declarations);
- limitation of the list of documents submitted for customs declaration purposes to e-declarations (other documents are to be furnished only in special circumstances);
- use of the “single window” system (EEC, 2018).

Table 1 Priority Facilities Comprising the Russian Railways TLC Backbone Network

Source: Institute of Economy and Transport Development

No.	TLC Name	Connecting Station	Extent of Completion
1	Bely Rast	Bely Rast	SCC[10] registered, utility network connection specifications approved, inert cargo terminal put into operation. Construction of container terminal underway (scheduled completion: 2018)
2	Nizhny Novgorod	Doskino	First-stage TLC in operation: GEFCO road terminal
3	Yekaterinburg	Reshety	PJSC TransContainer container yard in operation at Gipsovaya Station
4	Kazan	Vakhitovo	Technological concept
5	Volgograd	Maxim Gorky Station	Technological concept
6	Kaliningrad	Dzerzhinskaya-Novaya	Business plan development completed
7	Baltiysky (railway port)	Shushary	Until recently, CJSC Logistika-Terminal acted, for all intents and purposes, as a dry port for the First Container Terminal (FCT) and the Ust-Luga Container Terminal (ULCT). In August 2017, control of the terminal passed to PJSC TransContainer, which opened the way for increased cooperation with other terminals at the Saint Petersburg and Ust-Luga ports.
8	Tamansky (railway port)	9th Kilometre Side-track	Technological concept
9	Primorsky (railway port)	Ugolnaya (alternative option: Ussuriysk)	Ugolnaya and Uglovaya Stations for container operations. For all practical purposes, the stations are operating as dry ports.
10	Novosibirsk	Kleshchikha	Business plan development completed

This will ensure:

- improvement of customs administration in line with the latest advances in information technologies;
- a shift in customs regulation from a national to a supranational level;
- broad implementation of international best practices in EAEU laws and regulations.

In addition, the new EAEU CC sets a limit on the time that the customs authority may spend on completion of customs formalities (four hours), subject to prior notification by the railway carrier, and provided there are no circumstances warranting an additional examination.

Even now, the prescribed duration of border/customs formalities at border crossing points in Russia is much less than stated above. Pursuant to the Order of the Federal Customs Service of Russia dated August 5, 2015, No. 1572, *On Approval of Procedures for the Use*

[10] SCCs are subsidiary and controlled companies whose shares and units are owned by Russian Railways. LLC Terminal and Logistical Center “Bely Rast” was registered on December 20, 2010 (Russian Railways equity stake: 100%).

of Uniform Automated Customs Information System for Completion of Customs Formalities with Respect to Railway Vehicles and Goods Transported by Railway Vehicles as Part of International Freight Traffic Subject to Submission of Documents and Information in Electronic Form, the time allocated for completion of all operations performed by customs authorities to exercise government control at railway border crossing points has been reduced to two hours, subject to submission of all requisite information (documents) with respect to the relevant goods and vehicles, and provided that no such goods or vehicles have been identified as "risk deliveries" that require an additional document check and/or physical inspection.

It is critically important that, once customs formalities have been completed at the external border of any EAEU member state, the cargo can then be freely moved across internal borders between EAEU member states without the need to perform any additional customs operations. Therefore, transit container trains travelling along the most intensively used transcontinental routes (China-Kazakhstan-Russia-Belarus-Poland) are subjected to customs and border inspection only at the Kazakhstan-China border and the Belarus-Poland border (subject to preliminary notification by the railway carrier, and provided there are no circumstances warranting additional examination).

The "full-cycle" processing of container trains, including break-of-gauge and border/customs inspection at the Russian border, is performed only at the Zabaykalsk-Manchuria crossing point (see above).

When container trains pass through the Naushki-Sukhbaatar (Russia/Mongolia) and Vyartsilya-Niirala (Russia/Finland) crossing points, they undergo border/customs inspections, but there is no break of gauge. Completion of border/customs procedures at those crossing points takes up to 100 minutes. After modernisation of the Niirala-Vyartsilya crossing point, the transport capacity of the station increased to 550 cars per day (about 105 minutes per container train) (RZD TV, 2015).

The Grodekovo-Suifenhe (Russia/China) international crossing point is currently not involved in transcontinental railway container transit between China and Europe, but is used for (rather insignificant) bilateral container shipments between Russia and China, and by the Primorye-1 International Transport Corridor for delivery of Chinese container cargoes through Russian Far Eastern ports (Vladivostok and Vostochny). As transcontinental container traffic between China and Europe increases, and other crossing points that give access to the Trans-Siberian Railway/Baikal-Amur Mainline (Zabaykalsk-Manchuria, Naushki-Sukhbaatar) reach their maximum loads, this crossing point may be used more intensively for transcontinental transit from Asia to Europe. Container transhipment time in Suifenhe has been reduced to four hours (up to six trains per day), and the annual transport capacity of the terminal at Suifenhe has increased from 50,000 TEU to 300,000 TEU (Mikhaylov, 2017).

Electronic Document Management

Implementation by EAEU customs authorities of electronic document management systems and extensive use by all EAEU railways of uniform consignment notes have contributed to unrestricted growth of transit railway freight traffic between China and the EU.

The first step was the introduction of mandatory prior notification of goods imported by rail (Russia: 2014) and exchange of electronic documents and data during customs inspections of railway vehicles and goods carried by rail. This made it possible to reduce the time required for customs clearance of goods and vehicles at railway crossing points to two hours. The share of foreign trade participants using electronic declarations is close to 100%.

Subject to previous experience of performing customs operations in connection with declaration of goods, the new EAEU CC now includes provisions that replace mandatory submission of documents at the time of filing of customs declarations with on-demand submission based on assessment of the risk of non-compliance with the existing customs legislation.

This enables customs officers to assess the reputation of the consignor in advance using a proprietary risk management system, and to determine which cars may need to be taken aside for selective inspection (so that the switch locomotive can start working as soon as the train arrives at the station), and which operations can be omitted to save time (Solntsev, 2017).

Notably, in 2001 China launched the so-called Golden Customs Project. It is designed to accelerate development of electronic document management systems with a view to reduce costs and save time. An Internet-based customs clearance system was implemented in 2002 throughout China (Aliev et al., 2017).

1.3 Administrative and Legal Barriers: Consignment Note-Processing Systems

Differences between transport law systems are the main administrative and legal obstacle to the increase of freight traffic among the PRC, EAEU member states, and the EU. In European countries, freight traffic is regulated by the Convention concerning International Carriage by Rail (COTIF). CIS countries, the Baltic states, Albania, Iran, the PRC, the DPRK, Vietnam, Mongolia, Hungary, and Slovakia use the Agreement on International Goods Transport by Rail (SMGS).

SMGS and COTIF (subject to CIM[11]) govern the same issues, but resolve them in a completely different manner. This is true primarily regarding 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 countries and SMGS countries 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 recognised by all stakeholders, containing all data required by both COTIF and SMGS.

[11] CIM — Uniform Rules concerning the Contract for International Carriage of Goods by Rail (Annex B to COTIF).

In addition, more than ten years ago, the International Rail Transport Committee, jointly with the Organisation for Cooperation of Railways, developed the CIM/SMGS common consignment note[12], which was also recognised as a customs document. As of September 1, 2006, it has been used in all cross-border railway freight traffic, and is available in electronic format, which is particularly important due to the EU preliminary notification requirement.

The use of the CIM/SMGS common consignment note in freight traffic between China and Europe makes it possible to reduce cargo delivery times and simplify border crossing procedures, as it is no longer necessary to switch between the two transport legal systems.

The key advantages of the CIM/SMGS common consignment note are as follows:

- idle time at border crossing points is reduced;
- freight costs are reduced by the cost of drawing up a new set of documents;
- customs procedures are significantly simplified, as the CIM/SMGS common consignment note is recognised as a transit customs and bank document, and also as a document that can be used for combined shipping (for dispatching route trains, car groups, individual cars, and containers) (Tsvetkov et al., 2015).

The Chinese National Railway Administration announced that, as of May 1, 2017, all transcontinental container freight traffic would be using the CIM/SMGS consignment note. The appropriate document was forwarded to the OSJD Committee. CIM/SMGS consignment notes will be issued for all container trains travelling from China to Europe and back through railway crossing points in Alashankou, Manchuria, Erenhot, Suifenhe, and Khorgos (*Gudok*, 2017b).

This decision represents one more step towards establishing a seamless interface between the EAEU and the Belt and Road Initiative. The use of the CIM/SMGS consignment note will remove barriers and regulatory discrepancies between legal regimes governing freight traffic in the PRC, EAEU member states, and EU countries, lending an additional competitive edge to railway transport in Eurasian space.

For the time being, though, the CIM/SMGS consignment note has not been implemented by all players using SMGS and CIM consignment notes. The positive experience with the CIM/SMGS consignment note shows the importance of its further spread among all members of the International Rail Transport Committee and the Agreement on International Goods Transport by Rail, and the need to switch to electronic document management systems using an electronic digital signature.

The CIM/SMGS consignment note has made it possible to reduce international cargo delivery times by minimising time losses at border crossings.

[12] The CIM/SMGS consignment note confirms execution of freight contracts in accordance with the Uniform Rules concerning the Contract for International Carriage of Goods by Rail (CIM) and the Agreement on International Goods Transport by Rail (SMGS) with respect to cargoes transported between states using CIM and SMGS.

2. Recommendations Regarding Removal of Barriers to International Freight Traffic

Our analysis has shown that the main source of growth of container freight traffic along the China-EAEU-EU axis is the trade between China and EU countries, and that a significant part of that trade can be switched from maritime transport to railway transport. In the immediate future, the potential for increasing container traffic between the EAEU and the EU and between the EAEU and China is objectively limited by the relatively small volume of cargoes that could be switched to railway transport.

No mega-projects are needed to expand the transport capacity of land corridors along the PRC-EAEU-EU axis and boost their competitiveness vis-à-vis sea routes. What we need is not a "second Trans-Siberian Railway", but selective elimination of transport infrastructure bottlenecks, which can be managed with limited financial outlay: construction of additional railways, electrification of new railway sections, upgrade and modernisation of locomotives, acquisition of special rolling stock, improvement of border-crossing infrastructure, etc.

There are two main factors preventing the growth of container traffic between China and EU countries:

1. *Imbalance between container traffic from China to the EU and from the EU to China*. According to our calculations, when container traffic between the PRC and the EU reaches 200,000–250,000 FEU in 2020, the share of actual railway deliveries to China of EU export cargoes switchable to railway transport will stand at approximately 25%, while the share of such cargoes transported by railway transport from China to Europe will be merely 7%. When China-EU container traffic reaches 500,000 FEU in 2030, the total potential of relevant European deliveries to China and Chinese deliveries to the EU will have been used by almost 70% and by only 17%, respectively.

2. *Insufficient transport capacity of crossing points at the Belarus-Poland border*. In 2017, the processing capacity of the Brest-Małaszewicze crossing was almost completely exhausted. Accordingly, railway companies started to use all other crossing points at the Belarus-Poland border and crossing points in Kaliningrad Region.

To boost the processing capacity of crossing points at the Belarus-Poland border, it is important to ensure that investments in relevant infrastructure are made not only by Belarus, but also by Poland. The critical factor is the rate of implementation of investment projects. If it is too slow, the insufficient capacity of crossing points at the Belarus-Poland border will significantly diminish the competitive edge of railway routes going through the EAEU. However, EAEU member states have no way to speed up construction of railway infrastructure in Poland.

Investing in alternative East-West container train routes could become an alternative solution to the problem created by Polish railways. In that scenario, investors could focus on: (1) extended use of the Saint Petersburg transport hub;

(2) international transit use of the transport and logistical infrastructure of Kaliningrad Region (transhipment stations in Chernyakhovsk and Kaliningrad). To assure full-scale use of the route, it may be necessary to invest in boosting the processing capacity of transhipment stations and improving the border crossing infrastructure (Poland-Kaliningrad Region, Lithuania-Kaliningrad Region). In any event, in the medium and longer term, it would be crucial to make sure that any such project is supported by Polish railways.

The problem could be partially resolved by using the broad-gauge Polish railway line Hrubieszów- Sławków leading to the new Euroterminal Sławków (processing capacity: 240,000 TEU per year), provided that a broad-gauge connection to that line is built from the Belarus-Poland border. It should be noted, however, that implementation of that project can start only at the initiative of the Polish side. Besides, the terminal will need to be substantially expanded.

The rate of utilisation of the EAEU railway infrastructure (its transport capacity) by container traffic along the China-EAEU-EU axis is still quite modest, and does not have a restrictive effect on either the volume or the intensity of such traffic. However, spare transport capacity is hardly sufficient to support the anticipated traffic increase until 2020 and for the longer term. Nevertheless, if existing plans to modernise the most heavily used sections of Russian Railways, KTZ, and the Belarusian Railway along the China-EAEU-EU axis come to fruition, the resultant transport capacity will be sufficient to support projected international transit container traffic.

Projects envisaging creation of backbone transport hubs/TLCs in Russia, Kazakhstan, and Belarus have already become important investment targets. The lack of backbone TLCs in the EAEU pushes up mileage and, accordingly, shipping costs incurred by consignors, and increases cargo accumulation and distribution times. Priority objectives for the creation of transport hubs/TLCs in the EAEU should be as follows: (1) processing, in border-adjacent areas, of container cargoes entering the EAEU (from the PRC and from the EU), and their subsequent distribution by railway/road transport; (2) accumulation of container cargoes in hubs/TLCs, and their subsequent exportation to the PRC and to EU countries by railway/road transport (short-haul operations); (3) possible future accumulation of container cargoes in hubs/TLCs for adding to transit container trains travelling along the PRC-EAEU-EU axis.

Plans for the development of transport and logistical centres in EAEU member states (such as the *Conceptual Framework for the Creation of TLCs in the Territory of the Russian Federation* [Russian Railways] and the *Master Plan for the Development of the Transport and Logistics System in the Republic of Kazakhstan* [KTZ]) will also stimulate growth of container traffic, primarily in terms of increasing the complexity of the "topology" of both mutual (China-EAEU, EU-EAEU) and transit cargo flows.

Expansion of international freight traffic can also be accelerated by using special containers/cargo boxes (for chemical and mineral cargoes), and refrigerator containers (for food products). This niche has still not been fully captured by EAEU businesses. Meanwhile, manufacturing these products offers very good prospects, including investment opportunities.

To eliminate existing barriers to international freight traffic, it is very important for the countries hosting the main container transport routes to share long-term (5–10 years) mutual railway traffic growth forecasts: long-term freight traffic directions and volumes, projected average daily numbers of railway cars processed through break-of-gauge points, etc. Exchange of information will enable an advance assessment of the administrative and technical measures required to expand railway and related infrastructure so as to assure problem-free delivery of cargoes within approved timeframes.

It is necessary to fully unify administrative and legal standards governing the passage of container trains along the PRC-EAEU-EU axis. The progress achieved in minimising delays caused by the completion of border and customs formalities and the processing of shipping documents (subject to the new EAEU CC that came into effect on January 1, 2018, and the use of CIM/SMGS consignment notes for all transcontinental container shipments approved by the Chinese National Railway Administration on May 1, 2017) brings closer the complete elimination, both at the EAEU-China border and within the EAEU, of all administrative and legal barriers to realisation of the full freight traffic potential. Since 2018, all relevant operations can be performed during the break-of-gauge procedure without taking any extra time.

3. Business Surveys and Interest of EU Companies in Using Trans-Eurasian Transport Corridors

This section presents the most interesting facts learned in the course of an International Institute for Applied Systems Analysis (IIASA) 2017 research project, *Trans-Eurasian Land Transport Corridors (EU-EAEU-PRC): Assessment of Prospects and Barriers*. The project was initiated by the EDB, and involved polls and interviews with representatives of European businesses (transport and logistical companies, exporters) to measure their potential interest in using land trans-Eurasian routes from China to the EU, and their willingness to invest in the development of these routes (IIASA, 2018).

The results of the polls and interviews bring us to the conclusion that willingness of potential EU investors to participate in infrastructural projects along the PRC-EU axis depends not only on such projects' profitability and payback periods, but also on economic stability and transparency of decision-making in the countries where they are to be implemented.

Figures 1 and 2 show the extent of interest displayed by EU organisations, private companies, and investors in participating in transport/infrastructure projects along the PRC-EU axis, with a breakdown by three geographic regions (China, EU, and transit countries, such as Kazakhstan, Russia, Belarus, etc.) and by two time ranges (mid-term [until 2025] and long-term [until 2040]).

European investors are generally interested in BRI infrastructural/transport projects. Conversely, transit countries (including Russia, Kazakhstan, and Belarus) are apparently much less enthusiastic about such projects (see Figures 1 and 2). Unsurprisingly, they perceive the EU as the most comfortable operating area.

In the opinion of representatives of the companies that took part in the survey, over the longer term, general investment risks tend to increase (and willingness to invest tends to diminish) in all geographical regions. There is a considerable decline in long-term interest shown by European investors in participating in BRI projects in the PRC and transit countries. EU company representatives explain this by the considerable uncertainty with respect to political and economic stability in those countries.

Potential European investors note that to make BRI projects more attractive over the mid and long term, it is necessary for Chinese direct investors to become involved in such projects. In the opinion of survey participants, direct investments by companies from the PRC (rather than credits extended by Chinese banks) may increase the investment appeal of BRI projects, signalling emergence of a favourable and stable investment environment in the target area.

Willingness of European investors to invest in the European part of BRI transport corridors is largely determined by the efficient work of government institutions in the PRC. For example, investors may view investments in Polish railway infrastructure positively if they are sure that Chinese government institutions will remain stable and efficient. On the other hand, EU companies are prepared to share commercial and political risks associated with the existing Chinese investment projects.

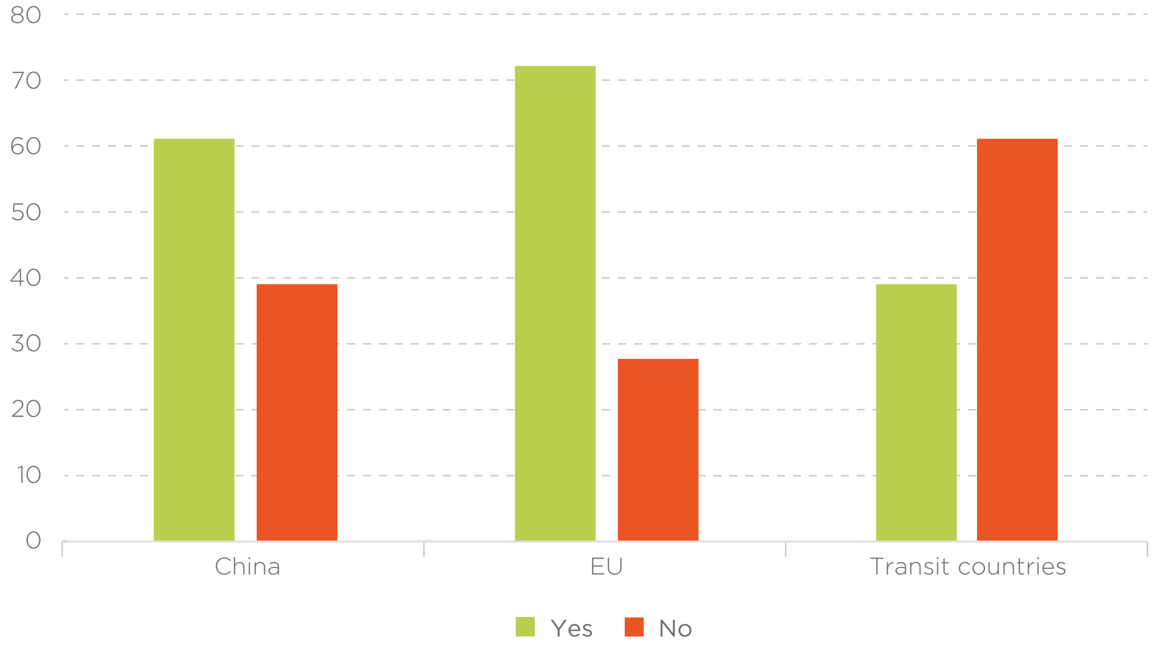


Figure 1
Willingness to Invest in Projects within the BRI Framework until 2025, %

Source:
IIASA (2018)

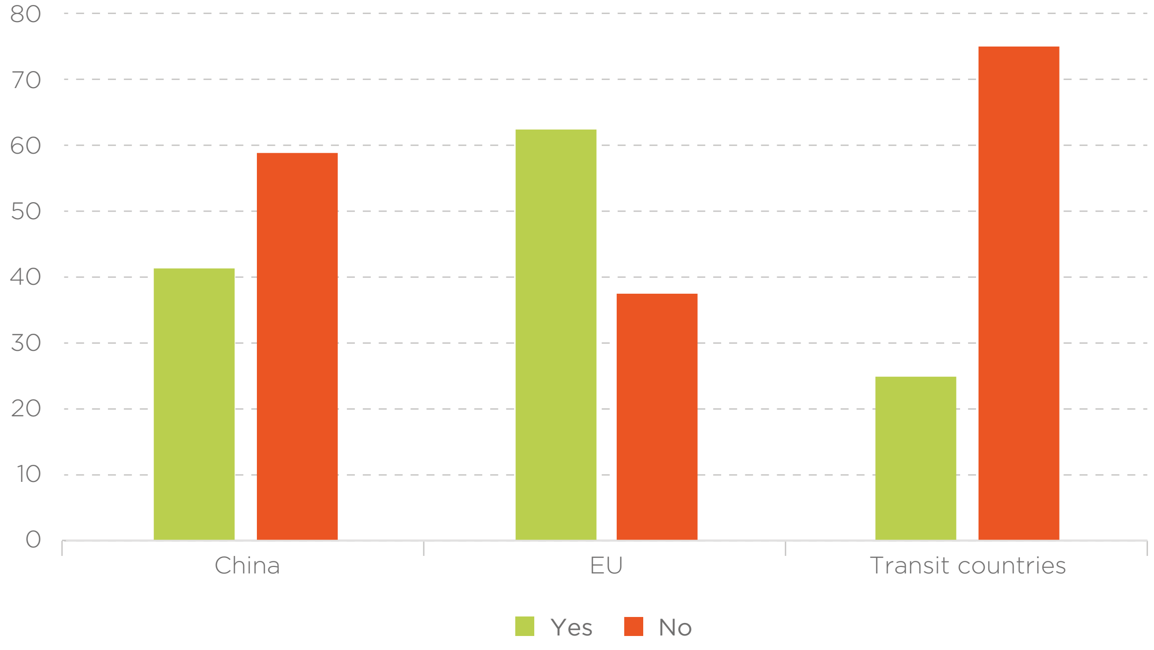


Figure 2
Willingness to Invest in Projects within the BRI Framework until 2040, %

Source:
IIASA (2018)

Our analysis shows that willingness to invest in infrastructural projects in China, the EU, or transit countries in connection with the BRI is determined primarily by the following factors:

— quality of transport and logistical infrastructure in the recipient country;

— efficiency of government institutions in the recipient country;

— transport and logistical costs.

Figure 3 presents information on the impact that certain factors have on investment prospects. Apparently, European investors believe that risks emerging in transit countries are higher than those that exist in the EU or in China. In particular, they mention such factors as difference in track gauges (see previous section) and instability of freight rates in transit countries. Freight rate policy is listed as an important factor specifically in reference to the PRC and to EAEU member states, as European companies generally perceive that policy as associated with uncertainty.

Interestingly, European companies have shown a rather low degree of awareness of the advantages associated with the use of trans-Eurasian land transport corridors (delivery times, number of active transport modalities, door-to-door delivery capability, delivery costs) and of the development status of transport corridors, available routes (primarily railway routes), and state of repair of transport and logistical infrastructure along the China-EAEU-EU axis.

Figure 4 presents the opinions voiced by European companies with respect to the cost and duration of cargo deliveries by standard 20-foot containers from China to Western Europe using various types of transport (air, maritime, and railway transport). An analysis of the respondents' assessments has revealed a considerable gap in the extent of awareness between experts specialising in organisation of China-EU freight shipping (such as railway terminal operators) and experts in other areas (seaport operators, consignors, etc.). Potential stakeholders who do not have relevant work experience perceive land transit shipping along the China-EU route as expensive and relatively slow (duration: 20–30 days; cost: approximately $10–15,000). Accordingly, they believe it inexpedient to consider expansion of railway freight traffic as an investment target, on the grounds that railway transport is allegedly more costly than maritime transport, while delivery times are roughly similar. Clearly, this is far from reality (see EDB Centre for Integration Studies, 2018).

This means it is necessary to actively promote the use of trans-Eurasian railway transport along the PRC-EAEU-EU axis. That will help to draw the attention of European consignors to land routes from Europe to China, boost freight traffic from the EU to the PRC (including new commodity groups), and, accordingly, reduce the number

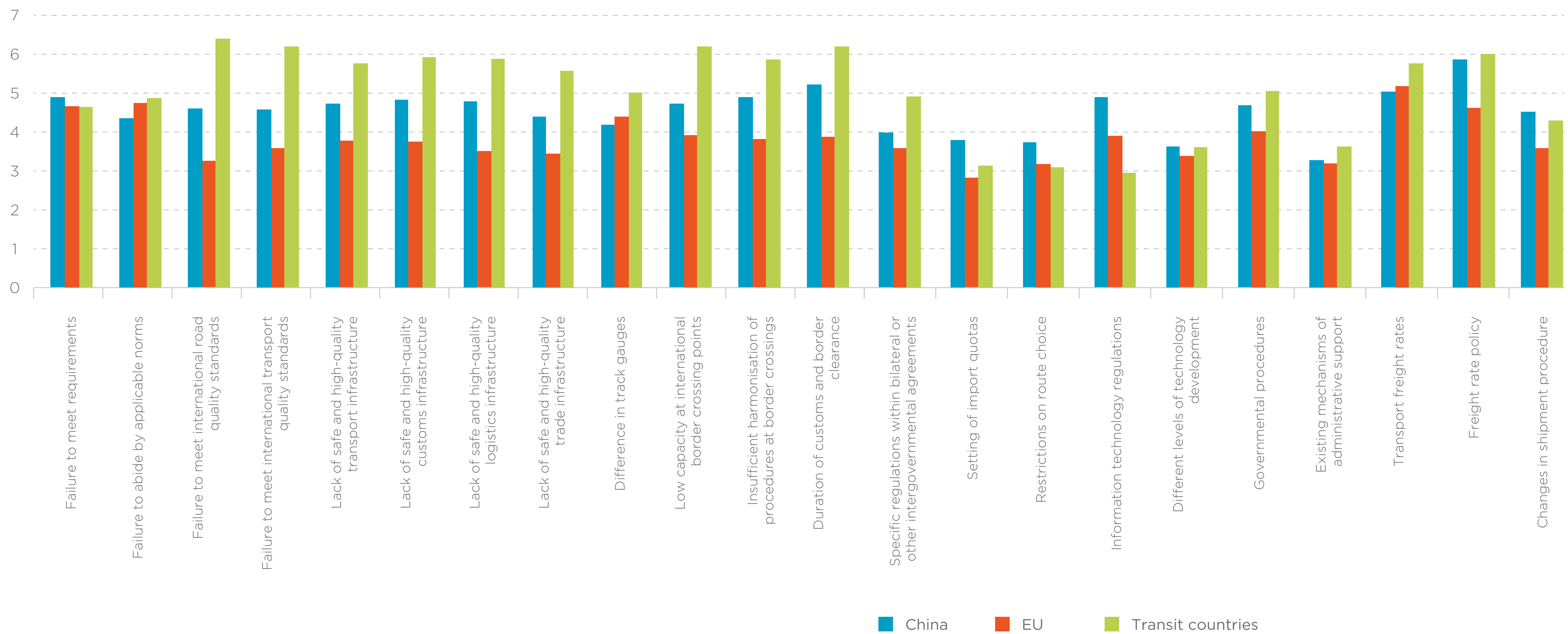
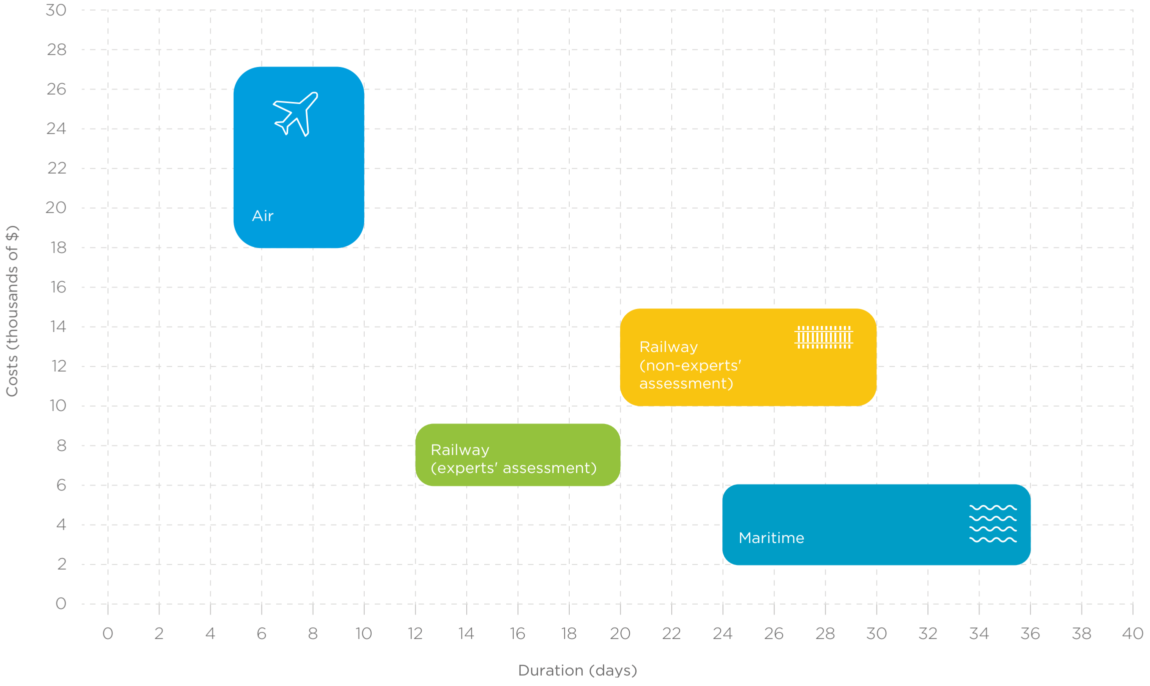


Figure 3
Assessment of Logistical and Transport Factors in China, the EU, and Transit Countries (1 — the factor is insignificant, 7 — the factor is extremely significant)

Source: IIASA (2018)

Figure 4
Estimated Cost and Duration of Freight Transport by Standard 20-Foot Containers from China to Western Europe

Source:
IIASA (2018)



of empty return containers. As a result, the efficiency of trans-Eurasian transit should increase, and costs should go down.

During the polls and interviews, representatives of European companies listed the following factors that could considerably increase the investment appeal of transport and logistical projects along the China-EAEU-EU axis:

- joint investments by countries along the China-EAEU-EU axis in physical infrastructure projects and elimination of non-tariff barriers (common and/or mutually acceptable technologies, standards, development strategies, etc.);
- more efficient international coordination of land transport corridors and related projects, including coordination of investment policies pursued by countries involved;
- growth of transit potential through development of new business models and joint use of rolling stock owned by various operators. Development and implementation of joint integration projects (extra-long trains, increased train lengths);
- stability and sustainability of freight rate systems, proposals related to their possible improvement;
- increasing railway utilisation ratios in the West-East direction;
- boosting the investment appeal of BRI projects by popularizing and marketing land freight routes along the China-EAEU-EU axis. Increasing the awareness of advantages and prospects of land transcontinental transit.

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ATTACHMENT

No.	Route Index	Regularity (Frequency)	Point of Departure	Time of Departure	Transit Time, days	Route	Border Crossing Point	Country of Destination	Transit Countries
1	X8001	1 per week	Zhengzhou North	13:52	~ 15 days	Zhengzhou–Hamburg	Alashankou	Germany	Kazakhstan, Russia, Belarus, Poland, Germany
2	X8003	1 per week	Zhengzhou North	8:04					
3	X8005	1 per week	Zhengzhou North	1:59					
4	X8069	1 per week	Zhengzhou North	4:00			Khorgos		
5	X8202/3	2 per week	Yutian	18:40	~ 15 days	Zhengzhou (Wuhan)–Hamburg	Erenhot	Germany	Mongolia, Russia, Belarus, Poland, Germany
6	X8014/3	1 per week	Chongqing	10:57	~ 15 days	Chongqing–Duisburg	Alashankou/Khorgos	Germany	Kazakhstan, Russia, Belarus, Poland, Germany
7	X8020/19	2 per week	Chongqing	12:49			Alashankou		
8	X8076/5	every other day	Chongqing	10:30			Khorgos		
9	X8084/3	daily	Chongqing	7:01			Alashankou		
10	X8434	3 per week	Chongqing	18:58			Erenhot		Mongolia, Russia, Belarus, Poland, Germany
11	X8412/1	2 per week	Chongqing	17:34	~ 10 days	Chongqing–Cherkessk	Manchuria	Russia	Russia
12	X8016/5	1 per week	Chengdu North	23:15	~ 12–15 days	Chengdu–Łódź/ Nuremberg/Tilburg	Alashankou	Poland/Germany/ Netherlands	Kazakhstan, Russia, Belarus, Poland, Germany, Netherlands
13	X8056/5	1 per week	Chengdu North	14:40					
14	X8086/5	daily	Chengdu North	22:40					
15	X8090/89	daily	Chengdu North	12:26					
16	X8078/7	every other day	Chengdu North	7:52			Khorgos		
17	X8062/1	1 per week	Chengdu North	11:41					
18	X8064/3	1 per week	Chengdu North	11:31					
19	X8406/5	2 per week	Jiashan	11:34	~ 12–15 days	Wuhan–Minsk/Hamburg	Manchuria	Belarus/Russia/Germany	Russia, Belarus, Poland, Germany
20	X8017/8/7	2 per week	Jiashan	5:38	~ 15 days	Wuhan–Pardubice/Łódź/ Hamburg/Duisburg	Alashankou	Czech Republic/Poland/ Germany	Kazakhstan, Russia, Belarus, Poland, Czech Republic, Germany
21	X8011/2/1	1 per week	Jiashan	22:29			Alashankou		
22	X8035/6/5	1 per week	Jiashan	13:40			Alashankou/Khorgos		
23	X8024	1 per week	Hefei East	18:10	~ 18 days	Yiwu–Madrid	Alashankou	Spain	Kazakhstan, Russia, Belarus, Poland, Germany, France, Spain
24	X8074/3	1 per week	Kiaosi/Yiwu	20:44	~ 12 days	Yiwu–Minsk	Manchuria	Belarus	Russia, Belarus
25	X8088/7	1 per week	Kiaosi/Yiwu	12:23	~ 18 days	Yiwu–Istanbul	Khorgos	Turkey	Kazakhstan, Azerbaijan, Armenia, Georgia, Turkey
26	X8066/5	1 per week	Hefei East	17:45	~ 15 days	Hefei–Hamburg	Alashankou	Germany	Kazakhstan, Russia, Belarus, Poland, Germany
27	X8402/1	3 per week	Suzhou West	2:00	~ 12 days	Suzhou–Warsaw	Manchuria	Poland	Russia, Belarus, Poland
28	X8410/09	1 per week	Suzhou West	2:40	~ 12 days	Suzhou–Warsaw	Erenhot	Poland	Mongolia, Russia, Belarus, Poland
29	X8082/1	1 per week	Yuntai	11:36	~ 18 days	Lianyungang–Istanbul	Alashankou	Turkey	Kazakhstan, Azerbaijan, Armenia, Georgia, Turkey
30	X8057	every other day	Shenyang East	3:35	~ 13 days	Shenyang–Hamburg	Manchuria	Germany	Russia, Belarus, Poland, Germany
31	X8027	2 per week	Changchun North	11:18	~ 13 days	Changchun–Schwarzheide (Dresden)	Manchuria	Germany	Russia, Belarus, Poland, Germany

Table A1
Weekly China-Europe Container Trains Schedule (since January 2018)

Source:
China Railways Container Transport Co. Ltd. (CRCT)
http://www.crct.com/index.php?m=content&c=index&a=lists&catid=22

No.	Route Index	Regularity (Frequency)	Point of Departure	Time of Departure	Transit Time, days	Route	Border Crossing Point	Country of Destination	Transit Countries
32	X8209/10	1 per week	Shenyang East	23:12	~ 12 days	Shenyang–Moscow	Erenhot	Russia	Mongolia, Russia
33	X8059/60/59	daily	Shenyang	9:30	~ 13 days	Shenyang–Hamburg	Manchuria	Germany	Russia, Belarus, Poland, Germany
34	X8428/7	2 per month	Changsha	11:30	~ 15 days	Changsha–Hamburg	Alashankou	Germany	(Kazakhstan/Mongolia), Russia, Belarus, Poland, Germany
35	X8422/1	2 per month	Guizhou	21:20			Erenhot		
36	X8426/5	3 per week	Shilong	6:30	~ 12 days	Guangzhou–Moscow	Manchuria	Russia	Russia
37	X8302/1	2 per week	Tianjin	17:40	~ 11 days	Tianjin–Moscow	Manchuria	Russia	Russia
38	X8303	1 per week	Chifeng	22:38	~ 10 days	Chifeng–Chelyabinsk/ Kleshchikha	Manchuria	Russia	Russia
39	X8098/7	1 per week	Xiamen (Fujian)	9:55	~ 16 days	Xiamen–Hamburg	Alashankou	Germany	Kazakhstan, Russia, Belarus, Poland, Germany
40	X8208/7	1 per week	Xiamen (Fujian)	11:20	~ 13 days	Xiamen–Moscow	Erenhot	Russia	Mongolia, Russia
41	X8072/1	1 per week	Xuzhou North	23:35	~ 5 days	Nantong–Mazar–i–Sharif	Khorgos	Afghanistan	Kazakhstan, Afghanistan
42	X8031	3 per week	Harbin South	10:36	~ 10–15 days	Harbin–Moscow, Warsaw, Hamburg	Manchuria	Russia/Poland/ Germany	Russia, Belarus, Poland, Germany
43	X8205	1 per week	Jining (Nei Mongol)	21:58	~ 5 days	Jining–Moscow	Erenhot	Russia	Mongolia, Russia
44	X8492/1	1 per week	Jiaozhou (Shandong)	2:16	~ 5 days	Jiaozhou–Hanoi	Pingxiang/Dong Dang	Vietnam	Vietnam
45	X8002	1 per week	Alashankou	20:24	~ 18 days	Hamburg–Zhengzhou	Alashankou	Germany	Kazakhstan, Russia, Belarus, Poland, Germany
46	X8008	1 per week	Alashankou	21:58					
47	X8040/39	4 per week	Alashankou	20:24	~ 18 days	Duisburg–Chongqing	Alashankou	Germany	Kazakhstan, Russia, Belarus, Poland, Germany
48	X8050/49	1 per week	Alashankou	9:30			Khorgos		
49	X8306/5	2 per week	Erenhot	15:49			Erenhot		
50	X8042	2 per week	Alashankou	20:24	~ 18 days	Łódź/Nuremberg/ Tilburg–Chengdu	Alashankou	Poland, Germany, Netherlands	Kazakhstan, Russia, Belarus, Poland, Germany, Netherlands
51	X8092/1	daily	Alashankou	5:16			Alashankou		
52	X8308/7	1 per week	Khorgos	9:30			Khorgos		
53	X8054/3	1 per week	Alashankou	21:58	~ 20 days	Madrid–Yiwu	Alashankou	Spain	Kazakhstan, Russia, Belarus, Poland, Germany, France, Spain
54	X8044/3	2 per week	Alashankou	21:58	~ 18 days	Hamburg–Wuhan	Alashankou	Germany	Kazakhstan, Russia, Belarus, Poland, Germany
55	X8408/7	1 per week	Manchuria	22:53	~ 15 days	Brest–Suzhou	Manchuria	Belarus	Russia, Belarus
56	X8058	1 per week	Manchuria	23:50	~ 15 days	Brest–Shenyang	Manchuria	Belarus	Russia, Belarus
57	X8030/29	2 per week	Manchuria	22:02	~ 15 days	Tomsk–Wuhan	Manchuria	Russia	Russia
58	X8204/1	1 per week	Erenhot	15:49	~ 18 days	Hamburg–Zhengzhou	Erenhot	Germany	Mongolia, Russia, Belarus, Poland, Germany
59	X8028	2 per week	Manchuria	0:34	~ 15–18 days	Schwarzheide–Changchun (Tomsk–Harbin)	Manchuria	Germany, Russia	Russia, Belarus, Poland, Germany
60	X8034/3	2 per week	Manchuria	22:02	~ 16 days	Tomsk–Chongqing	Manchuria	Russia	Russia
61	X8206	1 per week	Erenhot	17:49	~ 10 days	Vorsino–Jining	Erenhot	Russia	Russia, Mongolia