INTERNATIONAL UNION
OF RAILWAYS

STUDY
Eurasian rail corridors

What opportunities for freight stakeholders?

Content

Paris, October 2017
ISBN 978-2-7461-2653-4

STUDY - Eurasian rail corridors: what opportunities for freight stakeholders?

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This brochure is a publication of the
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Background

Given the continuing global and regional economic development, cargo traffic flows between Asia and Europe have steadily increased in the last two decades and are expected to rise still further. Ocean shipping accounts for more than 90% of these services.

Rail transport on the Asia-Europe route is growing fast but its share remains limited. Disadvantages in border crossings, reliability, infrastructure and other factors are still impeding the growth here, while falling sea freight rates aggravate the competition.

Nevertheless, business initiatives to improve the competitiveness and quality of rail transport are becoming more numerous on the Northern Eurasian rail routes and, more recently, on the Southern routes, too. China, Iran and Turkey are investing particularly heavily and promoting the Southern infrastructure links to Europe along the former Silk Road trading routes in a development that would seem to indicate a wish to promote alternative routes for future business. At the same time, Europe is investing in its cargo rail by creating common standards for the interoperability of networks in the nine RFCs[1] and the Trans-European Transport Networks.

As the worldwide railway organisation, UIC is particularly committed to supporting the successful implementation of international rail freight services linking Asia to Europe. Indeed, that is why the ICOMOD[2] study was commissioned back in 2011 to evaluate the possible potential of these services. Now, six years on, the development of intercontinental rail freight corridors is increasingly becoming a reality. Every week sees the public announcement of new initiatives and logistics services linking Asia to Europe and vice versa.

ICOMOD
Intercontinental Combined Traffic

1. (Rail Freight Corridors as defined in Regulation 913/2010)
2. International Combined Traffic, UIC Study commissioned to Roland Berger

Study objectives

In continuation of UIC's earlier initiatives and to follow up on ICOMOD, this study aims to assess the viability of the Eurasian rail freight routes, including the Southern routes, and the interconnection of these corridors with the European RFCs. The study has three main objectives:

Provide

an overview of the traffic volumes, market players, infrastructure and performance of the rail routes, plus forecast their development and potential until 2027.

Assess

the key success factors, best practices and impeding factors for the initiatives.

Recommend

how stakeholders can improve or reset their business activities and market the new alternatives; and set up a migration plan for UIC to support its members.

Status of Eurasian rail cargo transport

Eurasian rail cargo transport has grown significantly in recent years. The number of operated trains rocketed from ~300 in 2014 to nearly 1,800 in 2016, while the transport volume grew from 25,000 TEU to 145,000 TEU (Figure 1). Despite this strong development, rail transport still has a low intermodal market share of ~1% in the trade between Asia and Europe. The bulk of freight is transported by ship (more than 90%).

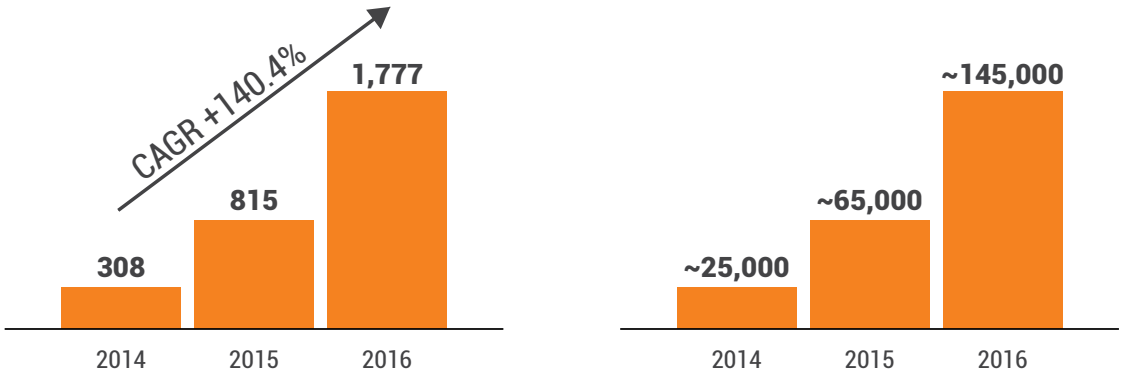


Figure 1: Development of rail freight transport between Asia and Europe from 2014 to 2016 # trains (left) and TEU (right)[3]

3. 2016: Roland Berger calculations based on interviews with key market players or stakeholders of the transport chain

Interviews with relevant stakeholders confirmed that :

However, the market development and competition from other transport modes have prevented rail transport from achieving a higher share of the market. Freight rates for container shipping by sea have fallen significantly since 2011, with the price of rail transport now 3 to 4 times higher than ocean shipping (the SCFI Shanghai–Europe ranged at around USD 900 per TEU in the first half of 2017). China's economic growth has cooled down, and overall trade between Asia and Europe stagnated in 2015 and 2016. Finally, there is still room for efficiency and quality gains in areas such as waiting times and processes for border crossings and customs, and in reliability and client information to increase the attractiveness of rail transport for logistics service providers.

Nevertheless, the countries along the Silk Road have invested significantly in the last few years in infrastructure and the promotion of Eurasian rail transport to facilitate competitive services and transport growth. China's "One Belt, One Road" (OBOR) initiative is a particularly strong driver of the development of existing and new Eurasian rail routes. China launched OBOR in 2013 to better integrate different parts of Asia, Europe and Russia, citing plans for a "Silk Road Economic Belt" and a "Maritime Silk Road of the 21st Century". Currently, OBOR supports rail cargo projects by financing activities on the existing Northern routes (e.g. subsidies for trains and new destinations) and making investments in railway infrastructure and terminals along the Southern routes.

4. Shanghai Containerized Freight Index

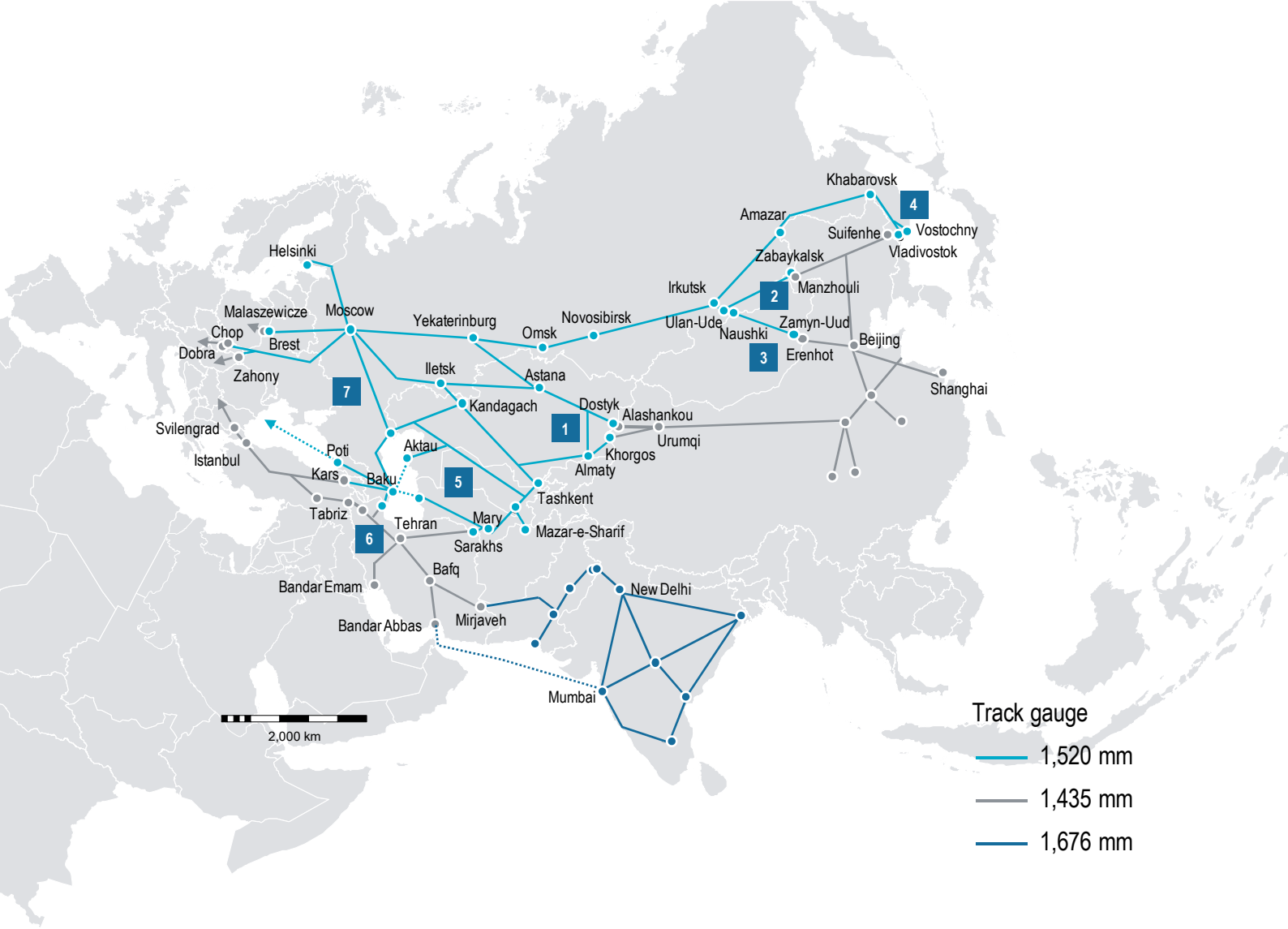
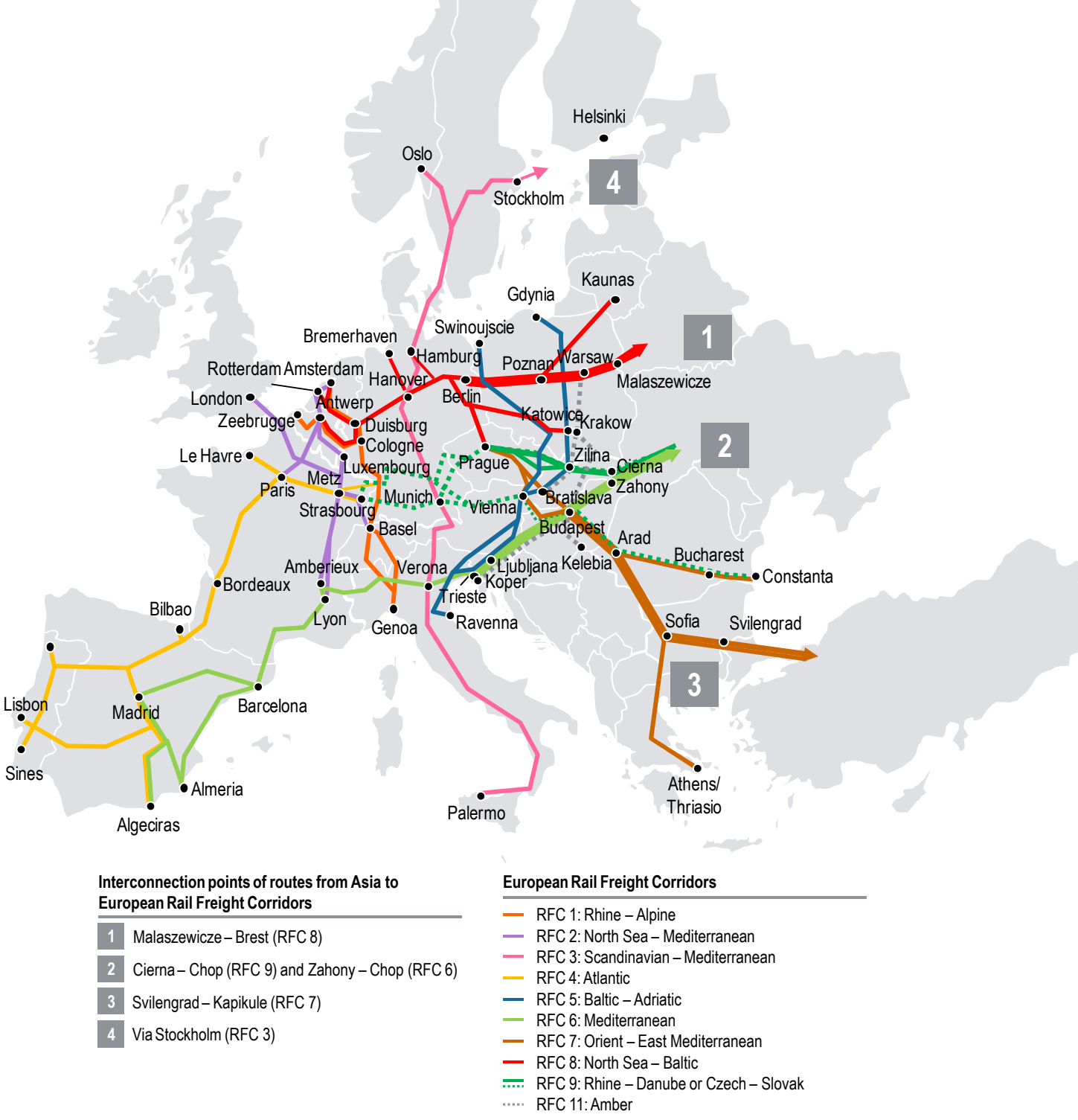


Figure 2: Main Eurasian routes with track gauge (schematic – conical projection to minimise visual distortion of distances, numbering based on route usage for Eurasian rail cargo transport)

The vast majority of container trains use the Northern routes via Russia and Kazakhstan (Figure 2) with well-established operations, high reliability and good infrastructure. The Kazakh routes (no. 1) with border crossing at Khorgos or Alashankou/Dostyk have a length of ~10,000 km and a transit time of ~16 days; the Trans-Siberian route (no. 2) via Manzhouli/ Zabaykalsk is 11,000 km in length with a transit time of ~17 days. These two routes are the fastest and offer sufficient capacity, while possible alternatives (such as no. 3) require improvement.

In addition to the Europe-Asia routes already in place in North Asia, new routes via Iran and Turkey are being developed for rail cargo (no. 5 – 7). For Eurasian rail cargo as referred to in this study, the Southern routes include the countries of Kazakhstan, Uzbekistan, Turkmenistan, Iran, Azerbaijan, Georgia and Turkey before reaching Bulgaria in the EU via Svilengrad/ Kapikule. The rail routes (including a shipment by ferry) have already been established but ongoing infrastructure projects have a number of gaps to close to enable a convenient service. The terminals along the Silk Road in particular show a number of deficiencies and require considerable investments in the future. Making the new routes a success will necessitate significant changes in operations, pricing, tariffs and customs.



Interconnection points of routes from Asia to European Rail Freight Corridors

1	Malaszewicze – Brest (RFC 8)
2	Cierna – Chop (RFC 9) and Zahony – Chop (RFC 6)
3	Svilengrad – Kapikule (RFC 7)
4	Via Stockholm (RFC 3)

European Rail Freight Corridors

- RFC 1: Rhine – Alpine
- RFC 2: North Sea – Mediterranean
- RFC 3: Scandinavian – Mediterranean
- RFC 4: Atlantic
- RFC 5: Baltic – Adriatic
- RFC 6: Mediterranean
- RFC 7: Orient – East Mediterranean
- RFC 8: North Sea – Baltic
- RFC 9: Rhine – Danube or Czech – Slovak
- RFC 11: Amber

Figure 3: Schematic map of Rail Freight Corridors in Europe – does not include all potential RFC connections, sections forming the focus of this study shown by bold lines[5]

Four RFCs (Figure 3) are directly relevant as gateways for Eurasian rail transport (RFC 6 – 9); RFC 3 is of no significance at the moment. The connecting point to the European Freight Corridors is in most cases the border-crossing terminal of Malaszewicze/Brest. This entry point to RFC 8 channels by far the highest proportion of Eurasian traffic, mainly because of its proximity to routings from Moscow and to Central Europe's distribution hubs in Duisburg and Hamburg. The interconnection points to RFC 9 and RFC 6 were used much more intensely in the past until the political situation in Ukraine led to a switch to Brest. The other entry points to the European Union play only a minor role.

5. Initiatives regarding RFC 10 exist, but no official implementation decision has been taken. For RFC 9, only the section from Cierna to Prague has been implemented, other routes are to be implemented by 2030. RFC 11 is to be launched in 2018

Potential of Eurasian rail cargo transport

The potential of Eurasian rail freight transport including the Silk Road has been evaluated based on 2016 data and forecast for 2027. The analysis encompasses 38 countries in Europe and Asia: the 28 countries of the European Union plus Japan, South Korea, China, Mongolia and Kazakhstan. South Asia (India, Pakistan, Bangladesh), Iran and Turkey are treated separately as long-term upside potential. Russia, Ukraine, Belarus, etc. are considered as transit countries.

The total traffic potential between the 28 European and five Asian countries is forecast to reach 25.6 m TEU in 2027 for sea, air and rail transport combined, compared to 11.1 m TEU in 2016. This implies a CAGR[6] of 8% between 2016 and 2027 for the overall TEU potential. The imbalance of westbound and eastbound traffic flows will decrease slightly to 59% westbound and 41% eastbound in 2027.

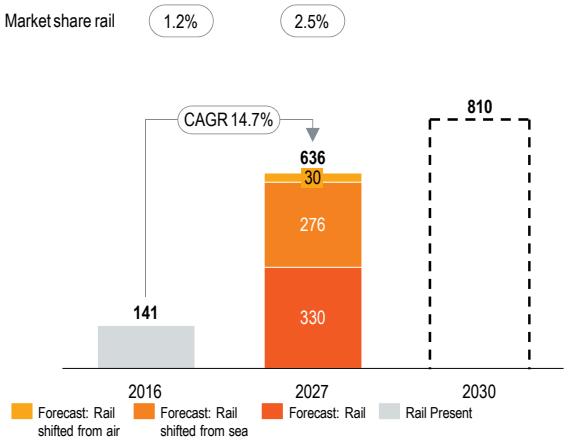


Figure 4: Rail potential in the base case forecast ['000 TEU][7]

For 2027, total rail potential of around 636,000 TEU is forecast, with a significant amount coming from a shift from sea transport (Figure 4), which equates to 21 trains per day in 2027 (assumption: 82 TEU per train). This total rail potential includes existing rail volumes increasing over time and a shift from sea to rail, including the growth in sea transport. A small potential shift from air freight is also considered likely. The extrapolated forecast for the period through 2030 shows a total rail cargo volume of approximately 810,000 TEU.

In addition to the base case forecast, two further scenarios have been developed with varying key assumptions.

742,000 TEU

The "best case" forecast shows 742,000 TEU in 2027 (CAGR 16.3%) based on a strong trade volume development and an increase in time-sensitive goods, stable subsidies, investments in infrastructure, an increase in sea freight rates and the approval of transport of hazardous goods by rail.

437,000 TEU

In the "worst case" scenario, 437,000 TEU are forecast for 2027 (CAGR 10.8%) based on the slow development of trade volumes, a decrease in time-sensitive goods, an end to subsidies from China, low sea freight rates, insufficient investments in infrastructure and no shift of goods from air.

6. Compound Annual Growth Rate
7. Rail shifted from air: Rough estimate based on shift factors of 5% from overall Asia-Europe air traffic

Trade volume distribution between Northern and Southern routes

The Southern routes' share of the traffic potential for 2027 is projected to reach 19,000 TEU, corresponding to 3% of Eurasian rail traffic (Figure 5). Bulgaria, Greece and Romania are the countries identified as preferred partners for Eurasian rail freight through the Southern routes. Other European countries are much closer to the established Northern route. Overall, the potential of Southern routes is seen more in multi-leg traffic to new regional markets than as a route for Eurasian transports. If other expected international traffic (e.g. Asia – Iran/Turkey, EU – Iran/Turkey, EU – Pakistan/India/Bangladesh) is accounted for in addition, the traffic on the Southern routes could reach 389,000 TEU by 2027.

The precondition for the development of this upside scenario is the existence of sufficient price competitiveness with sea transport, as the time advantage of rail decreases the closer the origin and destination countries are. Furthermore, issues of security and trans-border shipments, customs and bureaucracy need to be addressed. Higher infrastructure capacities are needed to make rail freight possible in greater quantities, which will require further investments on Southern routes. Economic growth and political stability in Iran and Turkey, as well as between India and Pakistan, are other inherent preconditions for the stable development of traffic.

Figure 5: Trade volume distribution between Northern and Southern routes 2027 ['000 TEU]

The evolution of RFC connections in Eurasian rail transport will depend on the success of future expansion plans and political decisions. RFC 8, with the entry point at Brest/Malaszewicze, will remain the main entry point to the European Union with an estimated share of more than 50%. The border-crossing terminals are in need of expansion in order to avoid becoming a bottleneck of Eurasian rail freight. RFC 6 and 9 are currently of limited use owing to the political uncertainty in Ukraine. If this conflict ends and the rail infrastructure is developed, the forecast foresees the potential for around one third of Eurasian rail transport to be routed via these RFCs.

The entry point through the Baltic region (also RFC 8) has not been used regularly to date, as the infrastructure is not ready, but a recent Chinese cargo transit agreement between Lithuanian railways and United Transport and Logistics Company (JSC UTLC) highlights the future potential of this route, which is estimated at 8% of the overall Eurasian rail freight. RFC 7 (via Romania and Bulgaria) is used for freight to/from Turkey and has the potential to serve Middle East transports in particular, with freight volumes from East Asia being quite small at present and expected to remain so in the future. If the Southern rail routes are implemented as planned, the share of this entry point is also likely to be 8%.

Gap analysis in Eurasian rail transport

Northern routes

Interviews with relevant stakeholders confirmed that the success factors for Eurasian rail freight have remained largely constant in recent years (Figure 6). The establishment of regular services has improved the fulfilment of the success factors – the focus in the coming years should lie on efficiency gains in operations as well as on broader service differentiation.

Past growth was based on major improvements in infrastructure, customs and procedures, routes and frequencies. Although rail is more reliable than sea freight, shippers need greater reliability and better information on arrival times. The strengthening of eastwards traffic volumes needs to be developed further through targeted marketing and an increase in multi-leg eastwards transportation.

Price competitiveness versus sea transport has deteriorated with low sea freight rates, and potential is seen in a stronger consolidation and better balance of operations. Moreover, rail freight should strive for efficiency gains in order to become independent of the subsidies that are granted at the moment. Given the increase in volumes, bottlenecks at key transfer points on the established routes are predicted. Aside from infrastructure development, the tailored coordination of traffic flows can increase system capacity.

Southern routes

On the **Southern routes**, the same success factors and expectations are highlighted as on the established Northern routes, yet there is an even bigger gap to be closed (Figure 7). Operators are generally open to Southern routes as long as they offer a competitive service level and price. That said, they currently face a number of challenges concerning transport time, reliability and operating costs due to numerous border crossings and changes in transport mode. Nevertheless, chances are seen to exploit new markets (e.g. Iran, Caucasus region) and to bypass capacity or political constraints on the Northern routes.

Parameter	Importance for rail link	Gap 2017	Changes since 2011 and comments for the Northern Routes
Transport time			> Speed gains of approx. two days since 2011 > Gaps seen mostly inside Europe (slow transportation, delays)
Reliability			> Rail now more reliable than sea > Especially shippers still see need for improvement and more information
Balanced quantities			> Continuously smaller eastwards transport volumes, changing only slowly > Alternatives like multi-leg returns make transport more complicated
Target goods			> Suitable goods are targeted and LCL offers were introduced > Still potential, e.g. in chemicals, temperature controlled goods and air freight
Price			> No pure price competition but more competition through low sea freight rates > Potential for more cost efficiency and less dependence on subsidies
Frequency, flexibility			> Frequency increased strongly in recent years > Many trains are still on request instead of regular trains
Target geographical coverage			> Network has increased in past years > Next step should be consolidation for more efficient geographical coverage
Availability			> Imbalance of traffic complicates return of platforms/containers
Customs			> Improvements in customs in recent years, partly seen as "problem solved" > More potential at Chinese border and through electronic documentation

Figure 6: Prioritisation and evaluation of success factors – Analysis of interviews[8]

Parameter	Importance for rail link	Gap 2017	Comments regarding Southern routes
Transport time			> Speed slower than Northern routes (e.g. 17-20 days China-Turkey) > Long distance, more border crossings/customs or mode changes
Reliability			> No established regular services yet > Trial services TRACECA (DHL 2016) with delays of more than 4 days each
Balanced quantities			> Smaller eastwards transport volumes are expected > Need to examine possibilities for multi-leg transportation
Target goods			> Target goods in European O/Ds for Southern routes (East Europe) and in new O/Ds (Turkey, Iran) need to be specified and seasonality considered
Price			> Even greater competition from sea freight through shorter distance and good accessibility of Middle East and East European countries > High network costs in Iran and Turkey
Frequency, flexibility			> Routes not established as regular services yet
Target geographical coverage			> Routes not established as regular services yet
Availability			> Routes not established as regular services yet
Customs			> Many transit countries are not part of a customs unit (Ukraine, Iran, Azerbaijan and Turkmenistan)

Figure 7: Evaluation of success factors for Southern routes – Analysis of interviews[9]

8. Legend: Greater filling of Harvey Balls indicates higher importance; greater filling of gap indicates higher gap, direction of arrow shows progress since 2011 (upwards = positive, downwards = negative). Gap depicts overall view of established routes (Northern routes), progress arrow may be flat/negative if expectations have risen at the same level as results.

9. Legend: Greater filling of Harvey Balls indicates higher importance; greater filling of gap indicates higher gap

Eurasian rail freight operators use the infrastructure of European Rail Freight Corridors (RFCs) when entering the EU. However, they do not necessarily use the dedicated RFC capacity, nor do they have to stay on RFC infrastructure throughout the whole of the trip in Europe. The insights generated in the interviews show that a large proportion of operators are not satisfied with the value added by the RFCs.

Procedures at border crossings stem partly from historic state contracts or rules that limit capacity and lead to longer employment of resources and challenge operations. Interviewees mentioned repeatedly that RFC development and harmonisation ends at European borders.
One step could be to facilitate exchange with infrastructure managers on the other side of the border about their respective railways' needs and expectations, e.g. by inviting them to attend RFC meetings. More intensive exchange could help get the needs of European railways and shippers included in the development of new infrastructure in neighbouring non-EU countries.

Within the RFCs, the players' expectations regarding price and service quality are often not met due to the many changes of locomotives and personnel that take place as a result of the limited interoperability. Little prioritisation of freight trains in the network leads to delays within Europe and infrastructure works are not sufficiently coordinated between countries. Generally, operators confirmed the limited acknowledgement of RFCs in the Eurasian rail freight "ecosystem" – they are only really known by the European railways that conduct operations in Europe.

Recommendations for Eurasian rail stakeholders

The focus of operators and railways should be on operational efficiency and on customer-friendly product development. Operators and railways need to address problems with European rail infrastructure more intensively and endeavour to improve customer services. Measures to improve operating efficiency should be the next step on established routes in order to reach long-term sustainable cost structures. Information on the status of trains should be improved, as should the adaptation of services and offers to customer needs. For operations in Europe, the expectations and needs of railway operators should be communicated and promoted more intensely. Especially the advantages and functions of the RFCs need to be promoted to a broader circle of actors in Eurasian railway transport.

In order to develop the potential of the Silk Road projects, it will be necessary to continuously enhance the infrastructure, processes and service quality along the Southern routes. Investments in infrastructure, cooperation with neighbouring states and the revision of customs and border crossing procedures are needed to close the gap and meet client requirements. Furthermore, raising awareness and consulting authorities on rail freight requirements is recommended, along with improved collaboration and communication with neighbouring railways and ferry services to allow for a smooth transfer.

Logistics companies need to offer additional value to their clients through easier handling of the full product spectrum. Rail acceptance should be fostered by offering rail as an alternative to clients, educating them about the benefits and steps that the client can take to maximise the potential offered by rail. Product development should also be enhanced by logistics companies. Knowledge of client needs could help them tailor products better, for instance by providing greater information and transparency, introducing faster connections or price/time differences for the routes. Finally, new target regions could be used as stepping stones toward Asia by developing products for markets along the Southern routes.

UIC is the worldwide organisation for the promotion of rail transport at a global level and collaborative development of the railway system. It brings together some 200 members on all 5 continents, among them rail operators, infrastructure managers, railway service providers, etc. UIC maintains close cooperation links with all actors in the rail transport domain right around the world, including manufacturers, railway associations, public authorities and stakeholders in other domains and sectors whose experiences may be beneficial to rail development. The UIC's main tasks include understanding the business needs of the rail community, developing programmes of innovation to identify solutions to those needs and preparing and publishing a series of documents known as IRS that facilitate the implementation of the innovative solutions.

Roland Berger, founded in 1967, is the only leading global consultancy of German heritage and European origin. With 2,400 employees working from 34 countries, it has successful operations in all major international markets. Its 50 offices are located in the key global business hubs. The consultancy is an independent partnership owned exclusively by 220 Partners. The Transportation Competence Centre of Roland Berger has supported many railway operators and infrastructure managers in their transformation.

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