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# Connecting Europe and Asia by rail



04-01-2018

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## 1 Foreword

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This study presents the success of the rail transport corridors linking Europe and Asia: In the last ten years it became a success story, and more and more routes linking Europe and Asia are establishing, and more and more transport is shifting from the sea to the rail.

Rail connections started in 2011 between China and Germany, but now cargo is moved also to the United Kingdom, Spain, France and other European Countries.

Transport by rail is faster than by sea and considering door to door delivery it can be more cost efficient compared with transport by sea and air.

Muscat, January 2019

Konstantinos Tzanakakis

## 2 Linking Europe and Asia -a success story

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### 2.1 Transport corridors linking Europe and Asia – the past

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Commercial traffic between Europe and Asia took place along the Silk Road from at least the 2nd millennium BCE. The Silk Road was not a specific way, but a general route used by traders to travel, much of it by land, between the two continents along the Eurasian Steppes through Central Asia. The 8,000-kilometre-long route was used to exchange goods, ideas and people primarily between China and India and the Mediterranean and helped create a single-world system of trade between the civilisations of Europe and Asia.



Figure 1: The ancient Silk Road

The Trans-Siberian Railway completed in 1916, established the **first rail connection** between Europe and Asia, from Moscow to Vladivostok. The line, at 9,200 kilometres, was until 2014 the longest rail line in the world<sup>1</sup>.

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<sup>1</sup> Now the longest route is that connecting China and Spain (see Section 2.2.2)



Figure 2: The Trans-Siberian Railway

## 2.2 Transport corridors linking Europe and Asia – current developments

[source: Wikipedia, [https://en.wikipedia.org/wiki/Eurasian\\_Land\\_Bridge](https://en.wikipedia.org/wiki/Eurasian_Land_Bridge)]

As of 2001 there was renewed interest in using the Trans-Siberian as a route across Asia to Europe.

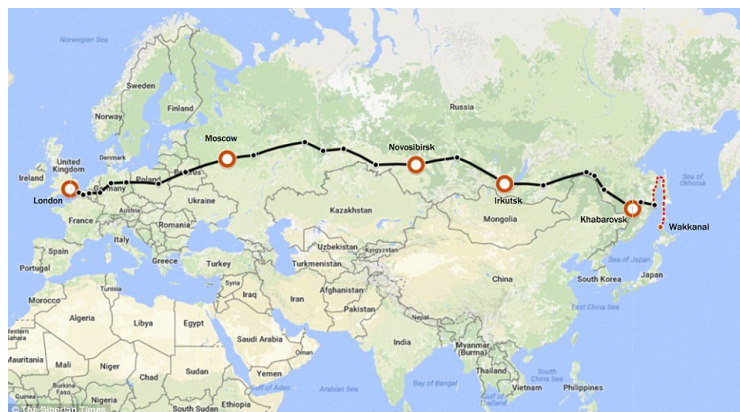


Figure 3: The Trans-Siberian as a route across Asia to Europe

### 2.2.1 The starting of the rail corridors linking Europe and Asia

In an effort to attract use of the Trans-Siberian route to transport goods from Japan, China, and Korea to Europe, in the mid-1990s Russia lowered tariffs on freight using the railway. As a result, freight volume over the rail line doubled in 1999 and 2000.

In February and March 2011, Japan's Ministry of Land, Infrastructure, Transport and Tourism sponsored a test of the route by shipping roof tiles to Europe via the Trans-

Siberian. The tiles were transported by ship from Hamada Port in South Japan<sup>2</sup> to Vladivostok, then by the railway to Moscow. The transit time was expected to be 30 days, in comparison with the 50 days on average it takes to ship cargo by ship from Hamada to ports in western Russia. If successful, the ministry would use the results of the test to encourage other Japanese companies to utilize the Trans-Siberian over the sea route.

In 2011, a daily direct container rail service began carrying car parts 11,000 km from Leipzig, Germany, to inland Shenyang, China, through Siberia in 23 days.

In 2013 a direct container, pallet, and general cargo rail service began, 10,000 km from Łódź, Poland, to inland Chengdu, China, through Siberia in 14 days, 3 times a week.

According to Russian statistics, the amount of international container shipments transiting annually through Russia over the Trans-Siberian has grown by a factor of 7 between 2009 and 2014, reaching 131,000 TEU in 2014.

Currently<sup>3</sup> China runs 5,000 cargo trains on New Silk Road to Europe, marking a milestone in Beijing's plan to revitalise the ancient Silk Road trade routes across Eurasia.

The shortest travel time for rail freight between China and Europe is ten days, providing an alternative shipping method that is cheaper than air freight and faster than shipping by sea.

Demand for China-Europe cargo train services have been growing largely thanks to China's Belt and Road initiative (see Section 3.2), which seeks to boost trade through massive investment in railroads, ports and other infrastructure linking Asia to Europe and Africa.

Zhong Cheng, vice general manager of the China Railway Container Transport Company<sup>4</sup> said: *"It took us 55 months to increase from one train to the 1,000<sup>th</sup>, eight and a half months to increase to the second 1,000<sup>th</sup> train, five and a half months to increase to the third 1,000<sup>th</sup> train and four and a half months to reach the fourth 1,000<sup>th</sup> train"*.

Since the first China-Europe container train departed from southwest China's Chongqing to Germany's Duisburg few years ago, there have been 52 routes opened between 32 Chinese cities and 32 cities across 12 European countries.

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<sup>2</sup> Shimane Prefecture

<sup>3</sup> September 2017

<sup>4</sup> <https://gbtimes.com/china-runs-5000-cargo-trains-on-new-silk-road-to-europe>



## 2.2.2 New rail corridors linking Europe and Asia

Now other countries in Europe are connecting to the Eurasian rail corridors:

### China to Spain



*Figure 4: Route of freight train to link China directly to Spain*

The first freight train to link China directly to Spain arrived in Madrid on 9/12/2014 after covering more than 13,000 km in a test run of a planned regular service. It is the longest railway route in the world, longer still than Russia's famous Trans-Siberian railway linking Moscow to Vladivostok.

The journey time was more than 10 days shorter than if the goods transported by the train had been shipped by sea, Spain's Public Works Ministry said.



## China to Great Britain



Figure 5: Route of link China to Britain

The first China to Britain freight train arrived in London on 18/1/2017 after a 12,000 km (7,500 mile) journey, marking a milestone in China's push to build commercial links across Europe and Asia. The train arrived in London after an 18-day journey from Yiwu, a wholesale market town in the eastern Chinese province of Zhejiang. It had passed through Kazakhstan, Russia, Belarus, Poland, Germany, Belgium and France, finally crossing under the English Channel into Britain. The consignment would have taken nearly twice as long to reach Britain by sea.



## China to France

Maersk Line<sup>5</sup> and Damco<sup>6</sup> deliver a block train solution for the Company “Decathlon”: On 28/10/2017, Maersk Line and Damco launched their first block train from China to Europe for the French sporting goods retailer Decathlon. On 16th November, the train arrived ahead of the schedule at Decathlon’s premises in Northern France, marking a milestone in cross-brand collaboration within Maersk for providing tailored transportation solutions for customers.

The train ran from Wuhan, China to Dourges, France and was fully booked by Decathlon, one of the world’s largest sporting goods retailers and a large ocean freight customer of Maersk Line and supply chain management customer of Damco.

The arrival of the block train in France saw the transit time for the 10,815-km journey reduced by exactly 20 days, compared to alternative ocean products. Carbon emissions were also reduced by an estimated 5.2 tons (compared with air freight of 79.5 tons), positioning the block train service as a more environmentally conscious alternative for the transportation of goods.

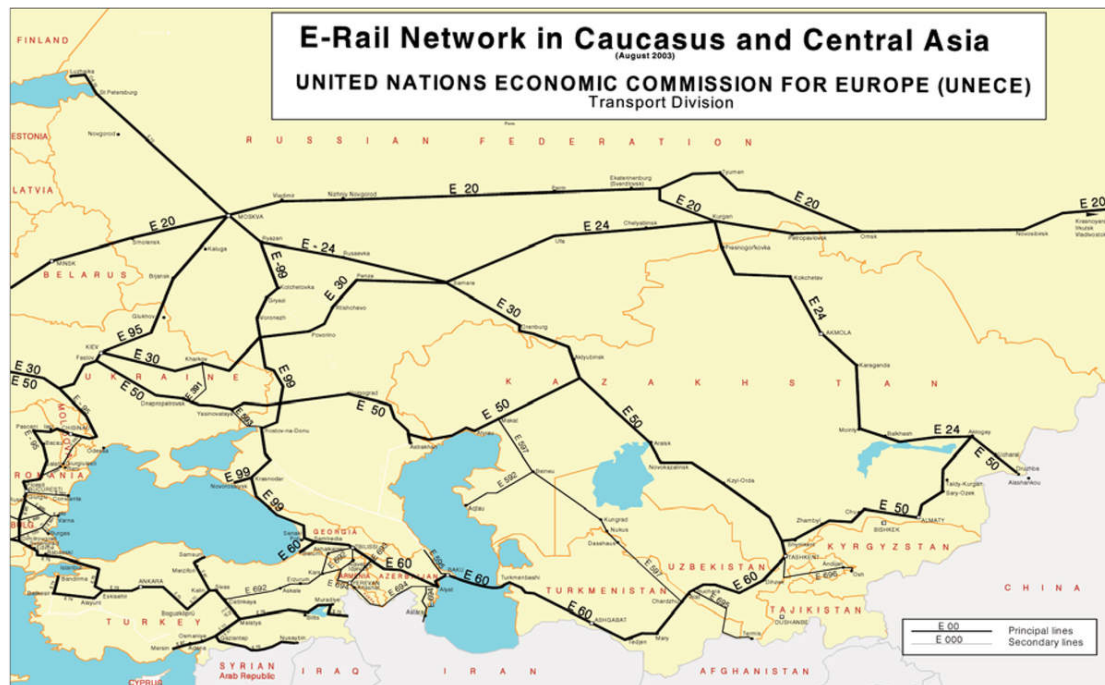
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<sup>5</sup> Maersk, is a Danish business conglomerate with activities in the transport and logistics and energy sectors. Maersk has been the largest container ship and supply vessel operator in the world since 1996.

<sup>6</sup> Damco is a global provider of freight forwarding and supply chain management services in over 100 countries

### 3 Rail Routes linking Europe and Asia

#### 3.1 Euro-Asian Transport Links (planned by United Nations)



(Source: <https://www.unece.org/trans/main/eatl.html>)

The Euro-Asian Transport Links (EATL) project started with Phase I (2002-07) as a joint undertaking between the United Nations Economic Commission for Europe (UNECE) and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). The EATL project has identified main Euro-Asian road and rail routes for priority development and cooperation. An Expert Group established under the project proved to be a useful cooperation platform for the coordinated development of coherent Euro-Asian inland transport links.

UNECE coordinated Phase II of the EATL project (2008-13). The Expert Group identified nine rail and nine road corridors that link the two continents.

Phase III of the EATL project (2013-17), coordinated by the UNECE, aims at making the EATL overland links operational. It is focused at both coordination and facilitation of financing of infrastructural projects, as well as facilitating and removing physical and administrative bottlenecks when crossing borders in overland transport between Europe and Asia.

Participating countries include Afghanistan, Armenia, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, China, Croatia, Cyprus, Finland, France, Georgia, Germany, Greece, Iran, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malta, Mongolia, Pakistan, Poland, Portugal, Republic of Moldova, Romania, Russian

Federation, Serbia, Spain, Tajikistan, The former Yugoslav Republic of Macedonia, Turkey, Turkmenistan, Ukraine, Uzbekistan.

### 3.2 The Belt and Road Initiative (China)

The Belt and Road Initiative (BRI) is the central pillar of China’s foreign policy and will likely continue to shape China’s international relations in the coming decades. Chinese leaders emphasize that the BRI is focused on developing connectivity through inclusive cooperation, rather than a strategy that is directed against another state or group of states.

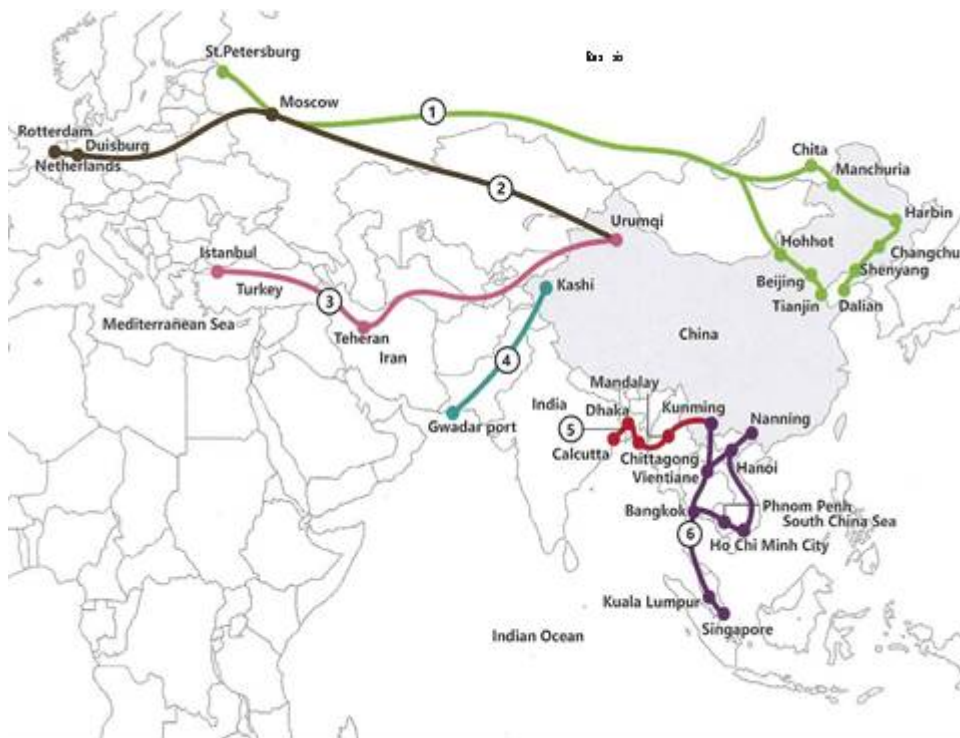


Figure 6: Belt and Road Initiative- Six Economic Corridors

- 1 China-Mongolia- Russia Economic Corridor
- 2 The New Eurasian Land Bridge
- 3 China-Central Asia-West Asia Economic Corridor (CCWAEC)
- 4 China-Pakistan Economic Corridor
- 5 Bangladesh- China -India-Myanmar Economic Corridor
- 6 China - Indochina Peninsula Economic Corridor

Next, the China-Central Asia-West Asia Economic Corridor (CCWAEC) and the China-Pakistan Economic Corridor, are presented.

### 3.2.1 The China-Central Asia-West Asia Economic Corridor (CCWAEC)

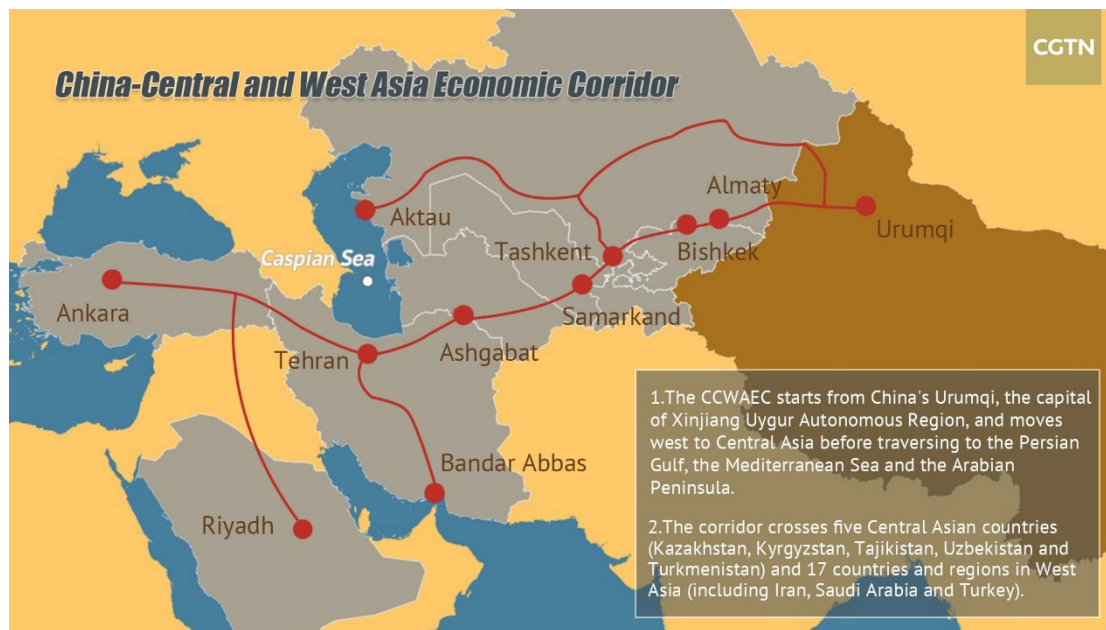


Figure 7: The China-Central Asia-West Asia Economic Corridor (CCWAEC)

The China-Central Asia-West Asia Economic Corridor (CCWAEC) links China and the Arabian Peninsula.

The corridor starts from China's City Urumqi (the capital of Xinjiang autonomous region) and crosses Central Asia before reaching the Persian Gulf, the Mediterranean Sea and the Arabian Peninsula. It crosses five Central Asian countries (Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan and Turkmenistan) and 17 countries and regions in West Asia (including Iran, Saudi Arab and Turkey). It is an important component of the Silk Road Economic Belt.

Central and West Asia are rich in resources, but many factors – backward infrastructure and lack of funds in particular – hinder local development. The CCWAEC will facilitate economic and trade cooperation and flow of capital to these regions, boosting local economic and social development.

### 3.2.2 China-Pakistan Economic Corridor

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Figure 8: The China-Pakistan Economic Corridor

The China-Pakistan Economic Corridor will link the Gwadar Port (in Pakistan) to Xinjiang autonomous region. There are currently a number of projects under construction (at a cost of US\$46 billion) which include a vast network of highways, railways, oil and natural gas pipelines and optic fibre networks.

### 3.3 The North-South Transport Corridor

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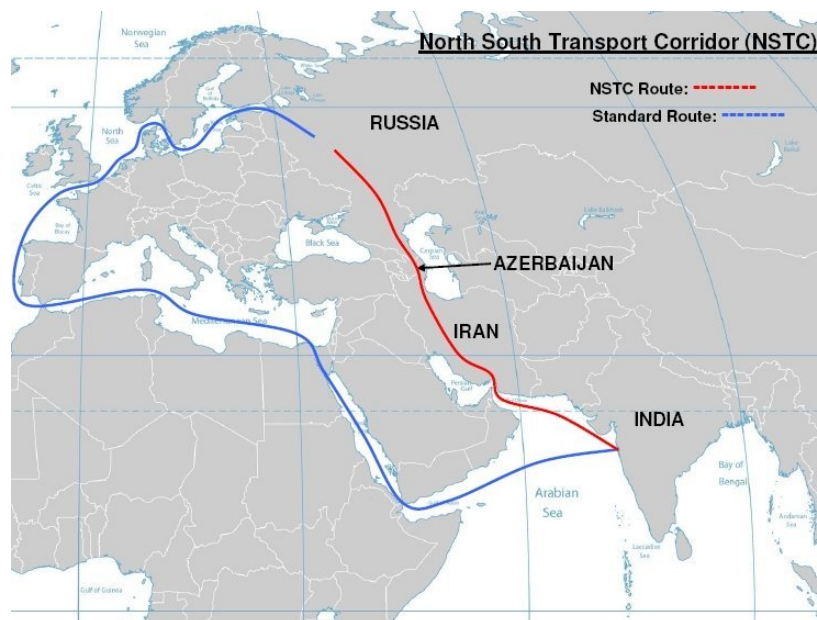


Figure 9: The North-South International Transport Corridor

In addition to the China-led New Silk Road (The Belt and Road Initiative, see Section 3.2), Eurasian players are boosting the development of the North-South International Transport Corridor which aims to connect South Asian countries with North and Western Europe.

An intergovernmental agreement on a North-South International Transport Corridor between Russia, Iran and India was signed in St. Petersburg during the second Euro-Asian Conference on Transport on 12 September 2000. In May 2002, the transport ministers of the participating countries signed a protocol on the corridor's official opening in St. Petersburg. On September 20, 2005 Azerbaijan has joined the North-South International Transport Corridor<sup>7</sup>.

Trilateral meeting among “Russian Railways”, “Azerbaijan Railways” and the “Railways of Islamic Republic of Iran” was held on 15/3/2016 regarding organization of cargo transportation in the framework of the International Transport Corridor “North-South” through the territory of Azerbaijan Republic and development of transit potential of border terminal on Astara (Azerbaijan). Operators of the transport corridor are determined as ADY Express, RAI and RZD Logistics.

Significant privileges of the North-South International Transport Corridor:

- Passes territories of only three countries (Iran / Azerbaijan / Russia)
- The shortest route between Bandar-Abbas and Moscow / St. Petersburg
- Simplified customs regulation
- No sea routes.

Next figure presents the cost of container on different parts of the North-South corridor, the distance and the trip duration.

Route	Price \$		Distance km	Duration days
	TEU	FEU		
CIF: Bandar Abbas - FOR: Moscow	1844	2929	4679	14
CIF: Bandar Abbas - DAF: Buslovskaya (Russian-Finnish border)	1986	3265	5792	16
CIF: Bandar Abbas - DAF: Krasnoe (Russian-Belarusian border)	1860	3013	4894	15
CIF: Bandar Abbas - DAF: Posin' (Russian-Latvian border)	1918	3130	5314	17
CIF: Bandar Abbas - DAF: Pechory-Pskovskie (Russian-Estonian border)	1945	3184	5502	18

Figure 10: Cost of container on different parts of the North-South corridor, the distance and the trip duration

### The North-South International Transport Corridor as the Suez Canal competitor

Its major advantage compared to other transport routes, most notably the Suez Canal, is that it will reduce the transportation distance at least by half, thereby cutting the transit time and cost. The North-South Transport Corridor is regarded as the Suez Canal competitor, adding that the Canal, which is connecting the European and the Asian economic zones, fails to meet the increasing needs of the growing cargo flow <sup>8</sup>.

According to some estimates, currently about 10 percent of the world seaborne trade passes through the Suez Canal. However, with the sanctions on Iran lifted this figure may increase dramatically, threatening to turn the Canal into a "bottleneck" for global

<sup>7</sup> [http://eng.rzd.ru/static/public/en/public/?STRUCTURE\\_ID=4318](http://eng.rzd.ru/static/public/en/public/?STRUCTURE_ID=4318)

<sup>8</sup> [https://www.rbth.com/opinion/2016/08/25/north-south-corridor-may-soon-replace-suez-canal\\_623855](https://www.rbth.com/opinion/2016/08/25/north-south-corridor-may-soon-replace-suez-canal_623855)



trade. In light of this the new North-South corridor could bear the Canal's growing burden.

### 3.4 The South-West International Transport Corridor

(Source: <http://southwest.today/#information>)



Figure 11: The route of the South-West International Transport Corridor

This corridor is passing through Iran, Azerbaijan, Georgia, Ukraine and Poland reduces time loss for the goods transportation between Europe and India.

According to estimates, the delivery of goods via this corridor is made within 12-15 days (distance of more than 7,000 kilometres), while the time spent on alternative routes is 35 – 37 days.

The protocol on the development of combination of different modes of transportation via International Transport Corridor South-West between heads of railways, maritime and ports of Azerbaijan, Iran, Georgia and Ukraine was signed in Baku on 12 January 2016.

Now an intensive policy is being pursued to develop the transport of dry and container cargo along the route and uniform tariffs and uniform documents have been developed for the convenience of clients.

For the further development of the route, work has been done and continues to improve infrastructure, which will create a competitive transport product and attract large volumes of cargo to the transport corridor.

Next figure presents the various route segments, the distance and the trip duration.

<b>Route</b>	<b>Distance</b> (km)	<b>Duration</b> (days)
Slavkov - Ilichevsk	1364	2
Ilichevsk - Batumi	1050	3
Batumi - Baku - Astara	982	3
Astara - Bandar Abbas	1915	4
<b>Total</b>	<b>5311</b>	<b>12</b>

Figure 12: The various route segments, the distance and the trip duration

Next, we present the prices for the transportation of goods on the South-West International Transport Corridor (India-Iran-Azerbaijan-Georgia-Ukraine-Poland)<sup>9</sup>:

#### **Tehran (Iran) - Chernomorsk (Ukraine)**

- 40' container (FEU) (laden) – **3139 USD**
- 20' container (TEU) (laden) – **2367 USD**
- 40' container (FEU) (empty) – **1881 USD**
- 20' container (TEU) (empty) – **1379 USD**

#### **Tehran (Iran) - Slawkow (Poland)**

- 40' container (FEU) (laden) – **3858 USD**
- 20' container (TEU) (laden) – **2843 USD**
- 40' container (FEU) (empty) – **2538 USD**
- 20' container (TEU) (empty) – **1829 USD**

#### **Mumbai (India) - Slawkow (Poland)**

- 40' container (FEU) (laden) – **5186 USD**
- 20' container (TEU) (laden) – **3467 USD**
- 40' container (FEU) (empty) – **3673 USD**
- 20' container (TEU) (empty) – **2346 USD**

<sup>9</sup> <http://southwest.today/#durationandprice>

## 4 The Ashgabat agreement

(Source: [https://en.wikipedia.org/wiki/Ashgabat\\_agreement](https://en.wikipedia.org/wiki/Ashgabat_agreement))



Figure 13: Iran and the Ashgabat Agreement

The Ashgabat agreement is a multimodal transport agreement between Oman, Iran, Turkmenistan, Uzbekistan, Kazakhstan and Pakistan for creating an international transport and transit corridor facilitating transportation of goods between Central Asia and the Persian Gulf. In October 2016, Pakistan had formally joined the Ashgabat Agreement.

Indian government on March 23, 2016 has requested approval for acceding to the agreement. India would become party to the Agreement upon consent of the founding members.

The objective of this agreement is to enhance connectivity within Eurasian region and synchronize it with other transport corridors within that region including the International North–South Transport Corridor (INSTC) (see Section 3.2.2).

For enhanced connectivity, the Ashgabat agreement will also synchronize with the International North–South Transport Corridor encompassing ship, rail including Trans-Caspian railway, and road route for moving freight between India, Russia, Iran, Europe and Central Asia. The route primarily involves moving freight from India, Iran, Azerbaijan and Russia via ship, rail and road.

This agreement will also influence the Turkmenistan-Afghanistan-Tajikistan (TAT) rail line from 2013, Afghanistan-Turkmenistan-Azerbaijan-Georgia-Turkey transportation corridor in 2014, Iran-Turkmenistan-Kazakhstan railroad and TRACECA (Transport

Corridor Europe-Caucasus-Asia) comprising the European Union (EU) and 14 Eastern European, South Caucasus and Central Asian states.

## 5 The trade between the GCC and Europe / Asia

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### 5.1 Trade between GCC and Europe

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(source: <http://ec.europa.eu/trade/policy/countries-and-regions/regions/gulf-region/>)

The six-member countries of the Gulf Cooperation Council (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE) represent an important region from a trade point of view and were the European Union's (EU) fourth largest export market in 2016.

Trade picture:

- EU-GCC total trade in goods in 2016 amounted to €138.6 billion. In 2016, EU exports to the GCC amounted to €100.8 billion. In the meantime, EU imports from the GCC accounted for only €37.7 billion, generating a significant trade surplus for the EU.
- EU-GCC trade has been steadily growing between 2006 and 2016: total trade rose by 53% in ten years, with a peak in 2013 – corresponding to the peak of oil prices.
- In 2016 EU exports to Gulf Cooperation Council countries were diverse but focused on industrial products (91.4%) such as power generation plants, railway locomotives and aircrafts as well as electrical machinery and mechanical appliances. Machinery and transport equipment (€49.4 billion, 49,0%) and chemicals (€1.6 billion, 11.5%) were the main categories of products exported in 2016.
- EU imports from Gulf Cooperation Council countries are mainly mineral fuels and mining products (€24,9billion, 65,9%) and chemicals (€4,6 billion, 12,3%).
- The EU was the first trading partner for the GCC in 2015 accounting for 16,6% of its total trade, followed by China (14.9%), India (9.4%) and Japan (8.6%).
- Bilateral trade in Services has also been increasing and amounted to €47.8 billion in 2014 compared to €36.5 billion in 2010. EU services exports are roughly twice as much (€32.0 billion) as those of the GCC (€15.8 billion).

### 5.2 Trade between GCC and Asia

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(Source: *Situating the GCC in China's Transforming Roles in Asia*, By Tim Niblock (Emeritus Professor of Middle East Politics - Institute of Arab and Islamic Studies - University of Exeter – UK, Feb 16, 2016)

Next, some facts are presented:

- (1) The balance of the GCC's external trade has changed fundamentally over the past decade. China and India have been the major beneficiaries of the shift.

The significance of the change can be best understood within the context of the Gulf region’s long-term economic and political connections.

- (2) For the two centuries preceding 2013, the majority of Gulf trade was with Western countries. Trade with Japan became important from the 1970s onwards, so much so, that Japan became the second largest trading partner for the Gulf region from the late 1970s until 2011. In 2013, for the first time, China became the largest trading partner of the Gulf region (taking all eight Gulf countries together). Trade with the European Union (EU) was pushed into second position, with India taking the third position.
- (3) Figures for 2014 show China pulling even further ahead, with China’s total standing at \$255 billion, and the European Union’s at \$232 billion. Trade with the European Union (EU) was pushed into second position, with India taking the third position.
- (4) By 2020, the largest share of GCC exports is expected to go to China, at around US\$160bn. China will also dominate the import market, providing about US\$135bn of goods to the Gulf, nearly double the value in 2013. China’s increasing share of GCC exports matches its economic rise, with growth tripling since 2001 to reach 12% in 2013, and now providing 14% of GCC imports.

**Table 1: Growth of Gulf Trade with Major Partners, 1990-2013**

	1990	2000	2005	2008	2009	2012	2013
China	1.3	11.8	44.9	121.4	93.4	203.5	224.4
India	4.4	6.6	21.4	119.3	87.9	186.5	183.9
Japan	33.5	52.0	103.8	176.1	103.7	181.3	171.6
South Korea	6.1	25.6	53.4	109.7	71.9	142.4	136.1
EU	59.9	66.7	142.5	212.0	156.0	207.4	216.2
US	19.1	33.9	66.0	124.8	71.2	143.7	137.2

Source: International Monetary Fund, *Direction of Trade Statistics*, 1990-2013. Calculated by the author.

## 6 Economic aspects for the Eurasian links

(source: [5])

Rail is the most economic option for the Eurasian links: Considering capital and freight costs Rail is the most economic option.

Example: freight & capital cost for High Value Goods<sup>10</sup> Chengdu-Berlin door-door (Figure 14):

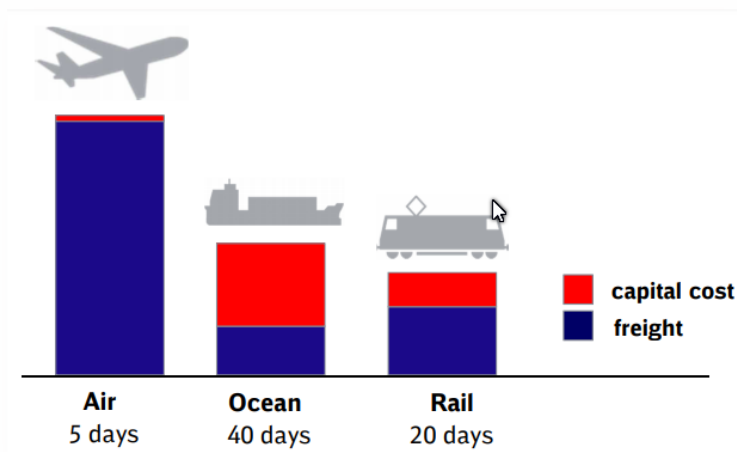


Figure 14: Freight & capital cost for High Value Goods between Chengdu-Berlin (door-door)

- Rail is the most economic option among the 3 transport modes, if freight and capital cost are considered.
- Rail is superior to ocean. Whether rail or air should be used depends on time-cost preferences.

**Example: Door-to-door transport of Notebooks Central China - the Netherlands:**

	Sea	Rail	Sea-Air	Air
<b>Time Door to door</b>	<b>38 days</b>	<b>22 days</b>	<b>24 days</b>	<b>4 days</b>
<b>USD/notebook (freight only)</b>	<b>1.9</b>	<b>3.8</b>	<b>9</b>	<b>18</b>

<sup>10</sup> USD/Container; 7% capital cost; 1 Container = 10,000kg, 2.0 Mio USD value of goods

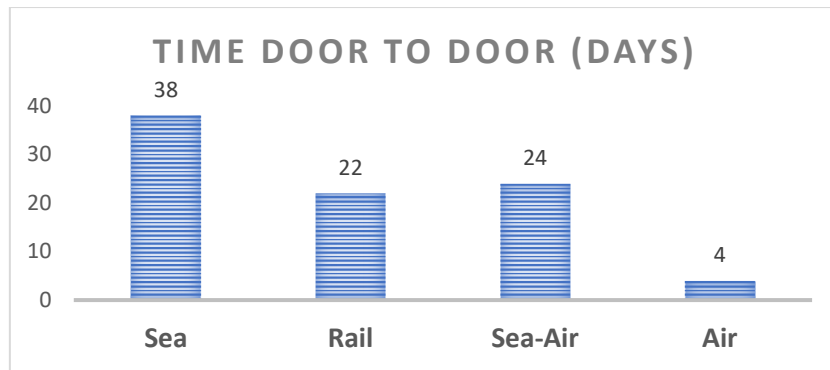


Figure 15: Duration of door-to-door transport of Notebooks from Central China to the Netherlands [5]

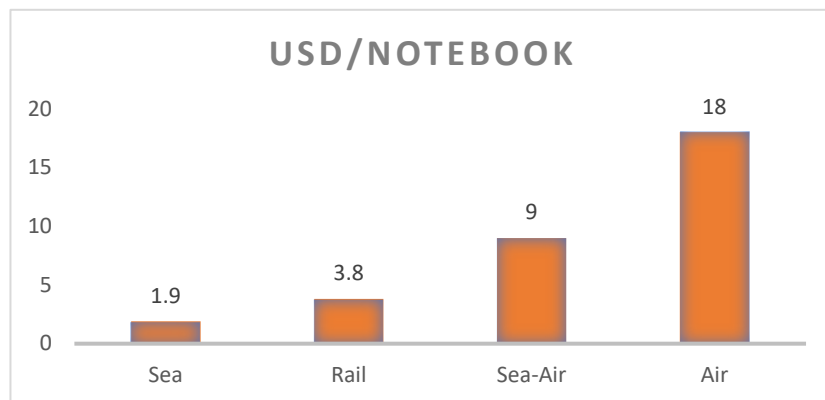


Figure 16: Cost for door-to-door transport of Notebooks from Central China to the Netherlands [5]





## 7 Distance and time analysis on common maritime routes

(Source: [4])

A standard container ship speed is about 25 knots while at “slow steaming”, container ships travel at 20-22 knots. Recently, speeds have been further reduced with the introduction of “extra slow steaming”, i.e. ships operating at speeds of 17-19 knots or less.

Next figures show the time schedule in days and distance in nautical miles (nm) of the most common maritime routes.

<b>Shanghai – Rotterdam</b>	Distance: 10,490 nm Duration: 43.71 days	
<b>Shanghai – Istanbul</b>	Distance: 8,003 nm Duration: 33.35 days	
<b>Bandar Abbas – Hamburg</b>	Distance: 6,368 nm Duration: 26.53 days	
<b>Vostochny – St Petersburg</b>	Distance: 12,520 nm Duration: 52.17 days	

<p><b>Shanghai – Bandar Abbas</b></p>	<p>Distance: 5,581 nm Duration: 23.25 days</p>	
<p><b>Shanghai – Novorossiysk</b></p>	<p>Distance: 8,454 nm Duration: 35.23 days</p>	

## 8 References

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