The Central Corridor route, a new era in global logistics.

Exploring the status and possibilities of the new Central Corridor Route between Europe and China.

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Abstract

As global economy changes, trade routes are changing as well. During the last 10 years, China has been busy reviving the old silk route via a new rail route going from the west of China all the way to Europe. This route is called the Central Corridor Route and is an ambitious project which has seen rapid development in the last 4 years. Despite its ambition, there is still doubt if the Central Corridor Route really has that much potential.

Since the beginning of the routes development, the pace of research has steadily increased over the last 4 years, and past research is becoming quickly outdated. This research wants to find an up to date answer if the route can really be a viable alternative for traditional methods of transport between Europe and China.

To answer this question, we first examined past literature about the route. Followed by the review, we conducted semi structured interviews with stakeholders regarding the Central Corridor Route. We have interviewed carriers, shippers and terminals involved in the use of the CCR. The data provided by the interviews was structured using a CAQDAS program called Atlas.Ti.

The interviews gave an updated view on important recent developments contributing to the popularity of the route that could not have been found 2 years ago. Also, the strengths and weaknesses of the route were assessed by the respondents, where it seems to be that some of the more immature problems of the route have disappeared. Also, the influence of European and Chinese government and policy was investigated. Lastly the barriers of shifting from one transport mode to another were investigated.

It turned out that the Central Corridor Route is indeed developing at a very fast rate as a lot of the earlier researched strengths and weaknesses seem to have changed. Important developments such as sea carriers that are clustering and industry in China that is moving westward have resulted in shippers and carriers searching for alternatives. When compared to other transport modes, the main strength of the route lies within the combination of a medium price and fast transit time, but also other benefits of rail transport are found. Its weaknesses mainly have to do with custom procedures and capacity problems. Surprisingly, this research found that most problems of the route are found in Europe and not along the route through Russia, China and Kazakhstan as earlier research described. This is where we found that government in Europe and China do have a big influence in the success of the route. Europe seems to have an outdated system and policy for rail transport, not seeing the possibilities it could offer to its countries. While due to Chinas heavy promotion of rail transport, it is subsidizing its own inefficient system.

The route still has a long way to go before becoming a stable and mature way of transport. At this moment, it is still under development but in the past 4 years it has shown great progression. With the ongoing economic developments, of which some have not been previously researched, the route will fill a much-needed niche for organizations looking for alternative transportation methods. We have made several recommendations for future research, such as similar research within 2 years to see the progression of the route. Further research could address the impact of the Chinese subsidies on the total costs for transport, quantifying the trade imbalance and the future impact on European logistics. Furthermore, we would recommend the European policy makers pay more attention to the CCR and embrace its possibilities rather than seeing it only as a potential threat.
Acknowledgements

For this research, I have made use of the time and effort of multiple respondents. Thanks to them I have gained sufficient information to analyze and build strong conclusions. Therefore, I would like to thank all respondents for their openness, effort and information I have received. The Interviews were a pleasure to be a part of.

Furthermore, I also want to thank my mentor and supervisor; Prof. Dr. Semeijn, who helped me during my research to find the right methods and structure for my thesis. It was a pleasure to consult Prof. Dr. Semeijn since he shared his interest and enthusiasm for my research, which provided me with the motivation required to complete this study.
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1. Introduction

As global logistics seem to have settled with sea-transport as its dominant mode, a new transport mode is being prepared for long distance transport in China. A change is imminent. The new Central Corridor Route will change global logistics as we know it.

Increased export and import volumes urge China to search for new transportation methods to fit its needs. Currently, around 99% of the import and export volumes going to and from China are transported by ocean in which the route through the Suez Canal is one of the most dominant choices. However, China’s national economy is changing, the coastal areas have an increased income and welfare, forcing production plants further inland, making it more interesting to find alternative transportation solutions. (Caporale, Sova, & Sova, 2015). With its rising economy, China seeks to establish its historical position as a dominant world power trough rebuilding the ancient silk route.

Within the alternative transportation modes like Air, Road or combined transport, China has advocated a Rail-connection between China and Europe. There are 3 alternatives within rail transportation between China and Europe; the Trans-Siberia route, the Central Corridor route and the TRACECA route. The idea of railway transport between Asia and Europe is not new, the Trans-Siberian railway was constructed during the 19th century and has ever since played an important role to connect Europe with Russia and Asia. (Zahurul Islam, Zunder, & Jackson, 2013). However, the Central Corridor Route, which crosses the Kazakhstan territory from its Western border with Russia to the Eastern border with China, is the newest and most promising connection. China is investing heavily in further developing the route. (Ribbink, Allard C. R. Van, & Semeijn, 2005; Rodemann & Templar, 2014; Tong, Wen, Fan, & Kummer, 2010a; Zahurul Islam et al., 2013).

Past research has investigated the potential of this new EU-Asia route (Rodemann & Templar, 2014; Zahurul Islam et al., 2013). However, the development of the new route is progressing so fast, that past studies are quickly outdated. As Tong et al. (2010a) (Tong, Wen, Fan, & Kummer, 2010b), recommended, it is valuable to validate past research in the future. Most of the existing research use literature only to theoretically examine the potential of the route. This study however uses interviews with actual organizations involved with the CCR, giving a more in-depth view. Furthermore, existing research focused on rail transportation between Europe and China in general. None of them studied the Central Corridor Route in specific. It is therefore of importance to see how actual organizations are using the new route for their daily distribution, so we can assess what is to be expected of this new route. The key question this research will focus on is:

Will the Central Corridor Route be a viable alternative?

This study will give new insight into the possibilities of the CCR connection and relationships between economic developments, government policy and the use of the CCR. Since such research has not been possible before, since the CCR was not ready yet, this research will contribute an expansion to the already existing literature. The research will inspect the route in a broad perspective, searching for relationships between variables such as motives, policy and economy. It will also have practical implications since it will define which strengths and weaknesses are of most importance for the potential users of the route. Ribbink et al. (2005) have researched that transit-times and costs have a great influence on transportation choice. They have found that European policy can be of great influence in achieving the desired levels of transit-time and costs. We will see if this is also the case for the CCR. All in all, this research will give the reader a good view on what the Central Corridor Route is truly about, and what we can expect from it in the future.
Research Questions

To give an answer to the main research question, 5 research questions have been formed. These questions will guide the literature review to seek for relevant theory.

1. How are companies selecting the way of transport and which transport selection criteria are important in EU-China transportation?

2. Do Chinese developments of its economy play a role in the popularity of the CCR?

3. What are the current strengths and weaknesses of the CCR?

4. How does EU and Chinese policy and governance influence the choice of modality for transport to and from China for organizations?

5. What makes a company choose for a modal-shift/new modality to use for its transportation? What are the motives and barriers of choice?
2. Literature review

In this Chapter, we will review the existing literature. We will use the most recent sources we can find to have a state of art review of past research.

2.1 Transport selection in China – Europe transportation

Within supply chain management, the selection of transportation-mode is crucial for its success. Transport-selection has been a popular research-topic for the last decades. According to Meixell and Norbis (2008), attribute selection is a very important part of the transportation selection process.

Transportation-mode selection in general
Managers typically consider multiple attributes when selecting a transportation-mode, often focusing on reliability, transit-time and costs as the primary criteria (Semeijn, 1995). Sources such as Coulter et al. (1989), Gibson et al. (1993), Murphy and Farris (1993), and Evers et al. (1996) report that logistics managers use a variety of attributes to select carriers, including rate, reliability, transit time, flexibility, customer service, claims handling, equipment availability, service frequency, rate changes, loss and damage, and financial stability (Meixell & Norbis, 2012). The order of importance of these criteria differs from case to case although a common way of thinking can be found. Often research is done in a certain setting or sector, where it is found that one of the selection criteria can be the most important. Earlier research has shown that the importance of attributes does change over time as demands are changing (Premeaux, 2002). The setting of the research case such as international or national transport result in different attributes to be important. For example (McGinnis, 1990) has found that reliability is very important in the US during the early 90’s. According to (Meixell & Norbis, 2012), security is a major concern for logistics managers who have responsibility for inbound and outbound shipments to and from both domestic and international locations. There are multiple attributes to consider when selecting a transportation-mode. A lot of research has been dedicated to the process of transport selection. The study’s vary widely in methodology, geographical limitations, type of carrier and type of industry. (Loetveit Pedersen & Gray, 1998). (Loetveit Pedersen & Gray, 1998) have compared multiple researches to attribute selection and have concluded that an investigation of the criteria employed by shippers in the selection of transport should include the factors: timing; price; security; and service. This categorization will be used in this literature review.

Attribute 1: Timing.
Timing consists of 3 basic factors: Transit-time, reliability and frequency. (Loetveit Pedersen & Gray, 1998). The transit time is defined as the total time that elapses from when the consignor makes the goods available for dispatch until the carrier delivers the goods to the consignee (Scott, 1985). Next to transit-time, reliability is also part of the timing category as mentioned in (Loetveit Pedersen & Gray, 1998). As introduced at the head of this review, reliability seems to be an important selection criteria. This can be expected since unreliable transportation can result in production and thus economic losses. (Shinghal & Fowkes, 2002), (Mohamad, Mansor, Ahmad, Wan Azizun Wan, & Wali, 2016). At last frequency also belongs to the timing category.
Frequency for transport is meant as how many times a ship, train or trucking service can be offered within a certain period. According the research of (Shinghal & Fowkes, 2002), frequency can be of most importance for an organization to select the transport mode. Considering economies of scale and transport frequencies in the design stage of the supply chain is crucial and failing to do so can lead to substantially higher costs than optimal. (Baumgartner, Fuetterer, & Thonemann, 2012).
**Attribute 2: Price-factors**

In the review of several attribute-selection researches, Meixell and Norbis (2008) found out that price used to be viewed as the most important selection attribute. However from the 1980’s to the early 90’s research has shown that price is absolutely not the most important attribute in all cases, but more and more value service as more or just as important. (McGinnis, 1990). For example Semeijn (1995) has found that reliability and transit-time were seen as more important than costs by both shippers and carriers. In a broader perspective on supply chain as a whole, Ho, Xu, and Dey (2010) found that the most the most popular criterion used for evaluating the performance of suppliers is quality, followed by delivery, price or cost, and so on. According to Ho et al. (2010) this proves that the traditional single criterion approach based on lowest cost is not supportive and robust enough in contemporary supply management. The traditional cost-based approach cannot guarantee that the selected supplier is optimal because the customer-oriented criteria (quality, delivery, flexibility, and so on) were not considered. It is also to be expected that price of transportation is more important if the worth of the transport goods is lower. After all, when low in value, the possible high transportation costs will be a considerable part of the total cost-price of the product.

**Attribute 3: Security**

Security within the transportation attributes is meant as the prevention of theft and damage during the transportation process (Meixell & Norbis, 2012). A key decision that relates to cargo security is the selection of the transportation mode and carrier to move the firm’s inbound and outbound freight (Meixell & Norbis, 2012). For international shipments, the attention that a carrier pays to security practices is also an important criterion, as discussed in Voss et al. (2006). Voss, Page, Keller, and Ozment (2006) have found that since terrorist attacks on September 2011, the security attribute has been viewed as more important. The events on 9-11, gave logistic managers the opportunity to estimate the impact of security issues on their transportation operations. Since then security has become an important global factor to consider when selecting a transportation-mode.

**Attribute 4: Service**

Loetveit Pedersen and Gray (1998) have found that service-attributes include; the response-time to problems, the ability to handle special requirements and the ability to handle urgency. The services offered by the carrier are very important to the relationship between the shipper and the carrier. As Premeaux (2002) has researched, the value of service is more important than the value of cost-reduction within the motor-carrier sector. Another relatively new aspect of service are information-services. As Loetveit Pedersen and Gray (1998); (Premeaux, 2002) discovered, the importance of information services is growing. At the early 90’s this attribute was not been given that much attention as it is now. The need for information to contribute to optimizing processes and adapting systems within firms has never been so important as it is nowadays.

**Attribute 5: Sustainability**

Loetveit Pedersen and Gray (1998) did not view sustainability in their review of attributes. Probably because environmental awareness and sustainability is a relative new phenomenon which has really come to attention since the mid 2000’s. Facanha and Horvath (2005) have conducted a research about the use of third party logistic providers, and have found that there is a big potential in gaining environmental friendly improvements within worldwide logistics. It is because of the growing attention to environmental aspects, that sustainability will be a selection criteria growing in importance in the near-future.
Rushton states, that transport modal choice is influenced by different factors such as operational factors, transport mode characteristics, consignment factors and cost and service requirements. See figure 3. Operational factors such as politics, economy, developments play an important role.

2.2 Developments

To understand which transport selection factors are important within a certain transportation setting, we first must determine the context in which transportation is taking place. In this research, we focus on transportation between Europe and China. In present time, the economy of China has been developed so far, that China has become the biggest exporting country in the global economy. Europe is China’s biggest trading partner, while China is Europe’s second trading partner. (Tong et al., 2010a). We can conclude so far, that there is a large volume of transport between both. As Tong et al. (2010a) described in their research, there is an imbalance between exports and imports from and to China. For all transport modes, the export from China to Europe is bigger than the export from Europe to China. This creates a problem known as ‘empty backhaul’. The transport between Europe and China is mainly executed by sea. Around 90% of all global transportation is carried out by sea-transportation. Logically, around 40% of world’s sea fleet belongs to Chinese organizations. In the current setting, where sea transport plays a big role and the volumes Chinese economy still growing, the supply chain between Europe and China is facing several upcoming problems. According to Tong et al. (2010a), capacity limits, security issues (in the middle-east) and empty backhaul due to the imbalance in global trade forces China to seek for new transport solutions. These problems have a big influence on the current transportation selection.

Capacity problems at China’s ports

The capacity limits within the transportation to China have mainly to do with the congestion of the ports used by sea transporters. As well as the major problem of providing appropriate port capacity in the right location and at the right time, the ports also face: a shortage of skilled labor; inadequate water depth of about 10m instead of the 15m required to accommodate fully loaded large container vessels; constraints in accessing the hinterland due to impoverished road, rail and waterway services; congestion in the port storage areas; unnecessary delays due to inefficient and slow customs and quarantine procedures and inefficient port services such as pilotage. (Cullinane & Wang, 2006b). Construction works and congestion is a daily cause of major delay in freight transportation at the ports of china (Zhang & Figliozzi, 2010). These congestion problems decrease the reliability and timing of the transport. Of course, it can be expected that these congestion problems will cause organizations to search for alternative possibilities to transport their goods without delay.

Industry moving

Since the 1980’s the coastal regions of China have seen a huge economic growth. International organizations founded their production plants in the coastal areas. (Sonobe, Hu, & Otsuka, 2006). However, as welfare rose and wages became higher in the coastal regions, more and more organizations choose to further explore the relatively cheap west part of China. (Sonobe et al., 2006). Asian manufacturing plants are moving to the west to lower labor cost. Rodemann and Templar (2014). The infrastructure and economy in the western part of China is not as developed as in the coastal areas. This causes transportation problems such as congestion. According to Zhang and Figliozzi (2010) congestion and higher logistic costs will increasingly affect companies that move westward to tap into cheaper and more abundant sources of labor. Assembly or manufacturing companies located in the coastal area have lower logistics costs. This congestion also has its effect on timing factors which makes it likely to search for alternative faster transport routes.
Empty backhauls

The backhaul problem is a well-known problem in the world of transportation. Empty-backhaul is described as an imbalance in transport flows between locations, which means that transport flows are mainly in one (or more) dominant direction(s) (Demirel, Ommeren, & Rietveld, 2010). Shippers will have a difficult time finding enough cargo for the return trip. According Demirel et al. (2010), there is a large imbalance in trade flows between China and the US, where the traffic going to US is 4 times bigger than traffic going back to China. As Zhang and Figliozi (2010) describe in their research for imbalances in China’s trade, the export of China exceeds the imports. This imbalance is caused by the fact that large multinational companies choose China for their manufacturing plants. Also, China is known for large bulk exports such as steel and coal. Empty backhaul can also occur due to inefficient organization. Rodemann and Templar (2014).

China’s internal transport

Freight transportation between Europe and China is not limited by the borders of both nations. After a freight reaches the border of China, it still needs to be transported further inland. For this research, it is important to know how China’s domestic freight transport is organized. While 90% of the freight transport from and to China occurs by sea-transport, its domestic transport is far different. In the table below coming from the national bureau of statistics, you will see that rail-transport dominates the transportation modal split and it is expected that the role of rail-freight in China will continue to grow (Feng, Liu, Liu, Zhang, & Zhou, 2015).


Advancing economy

Changes in economy have been of great influence on the CCR. In the beginning of China’s economic growth in the mid 80’s, production was focused on low-labor, low-schooled products. Nowadays, this is no longer true. With the economic growth and increased welfare, China’s production has changed. Now producing high-tech products like laptops, printers, installations etc. China’s goods are more than just cheap-consumer-goods. This change of products to be transported, also changes the transportation demands Rodemann and Templar (2014). The high price/kg ratio of products and the short life cycles, for example in the electronics industry, cause high price erosion and support the selection of transport based on speed, as proportional transport costs remain small even when using expensive transportation modes. (Punakivi & Hinkka, 2006). This offers new chances for rail transport since transit-time can be reduced compared to sea-transport.
2.3 Strengths and weaknesses of the Central Corridor Route

Modalities comparison

Before inspecting the rail routes from Europe to China, we will first briefly investigate a comparison between the long-distance modalities, rail, water and air transport. When comparing different modes of transport or modalities, we can divide the modalities based on cost and transit time. In the figure below, you can see that rail provides a shorter transit time at a price that is competitive compared to air and road transport.

Figure 2: Modalities divided based on Costs and Time. Source: (Rodemann & Templar, 2014)

<table>
<thead>
<tr>
<th>Transportation mode</th>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine (sea freight)</td>
<td>Low costs</td>
<td>Long transit time</td>
</tr>
<tr>
<td></td>
<td>Availability</td>
<td>Not flexible</td>
</tr>
<tr>
<td></td>
<td>Large volumes</td>
<td>Surcharges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delay</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Damage</td>
</tr>
<tr>
<td>Air</td>
<td>Short transit time</td>
<td>High transport costs</td>
</tr>
<tr>
<td></td>
<td>Safe</td>
<td>Limited heavy loads</td>
</tr>
<tr>
<td></td>
<td>Reliable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexible</td>
<td></td>
</tr>
<tr>
<td>Rail</td>
<td>Medium transit time</td>
<td>High transport costs</td>
</tr>
<tr>
<td></td>
<td>Safe</td>
<td>Regulation and administration</td>
</tr>
<tr>
<td></td>
<td>Reliable</td>
<td>Gauge-differences</td>
</tr>
</tbody>
</table>

Table 1: Transportation mode comparison. Source: (Tong et al., 2010a) modified by: Author

Each transport mode has its pros and cons, according to (Tong et al., 2010a), price and timing factors are the most important selection criteria. When viewed from this perspective, rail transport has a unique position of being in the middle range of pricing and transit time. Other modalities, quicker or cheaper, seem to be better in terms of timing or costs, but never both at the same time. As mentioned before, at this moment, the biggest part of all transports to China and back are going via maritime transport. While this is the cheapest and carries the largest volume.

Rail transport comparison

The rail freight transport via rail between China and Europe is not a subject which has been thoroughly investigated. In this part of the literature review we will use most recent studies to this theme to find an answer to what the current strength and weaknesses are for the CCR. According to Dewan Md Zahurul, Zunder, Jackson, Nesterova, and Burgess (2013), land transport increases economic development through lead-time reduction and cost-savings for all countries connected (in-transit countries). Currently there are 3 rail-routes between Europe and China; the
Trans-Siberian route, the TRACECA route and the Central Corridor route. (Dewan Md Zahurul et al., 2013). We will explain these 2 options briefly before we focus on the Central Corridor Route.

Figure 3: World map rail routes. Source: (Deutlinger, 2017), modified by: Author.

<table>
<thead>
<tr>
<th>OD: Utrecht-Berlin</th>
<th>Trans Siberia Via Mantschouli - Moscow</th>
<th>All Water Via Lianyungan - Rotterdam</th>
<th>Trans Asian Via Dostyk and Moscow</th>
<th>TRACECA Via Dostyk - Aktau - Baku - Poti</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travelling distance (km)</td>
<td>13,062</td>
<td>24,060</td>
<td>7,773</td>
<td>14,385</td>
</tr>
<tr>
<td>Transport costs (€/Container)</td>
<td>3,903</td>
<td>7,520</td>
<td>2,559</td>
<td>6,773</td>
</tr>
<tr>
<td>Total transport time (Day)</td>
<td>26</td>
<td>38</td>
<td>20</td>
<td>38</td>
</tr>
<tr>
<td>Transport time</td>
<td>19</td>
<td>33</td>
<td>12</td>
<td>22</td>
</tr>
<tr>
<td>Transit time</td>
<td>7</td>
<td>5</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>No. of custom and transshipment points</td>
<td>0/2</td>
<td>1/2</td>
<td>0/2</td>
<td>4/6</td>
</tr>
</tbody>
</table>

Table 2: Analysis overview of competing routes for the corridor West Europe-Coastal China, source: (T. van Rooijen & R. Jackson, 2012)
Trans-Siberian Route
The Trans-Siberian Route is the oldest of the 3 existing routes. Displayed as the northern corridor in figure 2. Built in 1891, the Trans-Siberian route was the first train-route to cover more than 11000 kms. Initially build to expand Russian influence in East-Asia. (Sahi, 2015). The route is an important life-line for the Russian Economy and internal transport but also used by European countries to get their imports and exports from Asia. Sahi (2015) states that Scandinavian countries such as Finland still use the route today to transport imports from Japan. The Trans-Siberian route has a transit time of 26 days according to (T. van Rooijen & R. Jackson, 2012).

TRACECA Route
The TRACECA route is another alternative rail route. It is not just one route as can be seen in Appendix 1. TRACECA is a project to involve countries around the Black Sea and Caspian Sea to cooperate in transport between west and east. There are several route choices within the TRACECA route making use of rail, road and water transport. Although TRACECA is an international project, the route is plagued by national oriented projects and inadequate information sharing between the involved countries. (Dewan Md Zahurul et al., 2013) Next to that, due to the different modalities involved, the costs for this route are the highest among the routes to China. (T. van Rooijen & R. Jackson, 2012). The TRACECA route has a much higher transit time of 38 days and with 6733 euro transport costs per container, it is the most expensive rail route to China yet. (T. van Rooijen & R. Jackson, 2012).

Central Corridor Route:
In this research, we will focus on the Central Corridor Route. The CCR runs from Europe, through Russia, Kazakhstan to China and consists of roughly 750 km of railway track. (Dewan Md Zahurul et al., 2013). The initiative for further developing the already existing infrastructure came from the Chinese government which was interested in creating an inland connection with Europe. Since development of this rail connection is relative young, there is almost no research with up to date information about it. A good example is the research of Dewan Md Zahurul et al. (2013), which states that the CCR connection has a total transit time of 20 days from Europe to China. Or (Rodemann & Templar, 2014) which states the transit time is 20-25 days (see table). It is unknown if these transit times have changed.

Weaknesses:
In the existing literature, a couple of weaknesses or challenges to the CCR can be identified which can be divided in technical, climate, security difficulties or difficulties that have something to do with the procedures. Dewan Md Zahurul et al. (2013) have found that there are several technical difficulties on the Central Corridor Route. They describe different gauges, different electrification and signaling systems, infrastructure and rolling stock condition as the main problems for the route. Also some parts of the route would be single-track which decreases flexibility and frequency. (Rodemann & Templar, 2014). Due to infrastructure difficulties, it is required to change locomotives and rolling stock frequently with consequences to transit-time. Unfortunately, this research was conducted in 2013 and therefore in the literature it cannot be confirmed that these problems still play a major role within the success of the CCR. It can be assumed that now, 3 years later, investments in the route have improved the route on technical aspects. As Dewan Md Zahurul et al. (2013) have stated, by the time their research was finished, they acknowledged that China, Kazakhstan and Russian government intend to solve the technical difficulties with heavy investments. Large infrastructure projects are still ongoing today to improve the capacity of the rail-network in Europe, Asia and all countries in-between. (T. van Rooijen & R. Jackson, 2012). China has created the OBOR project (One Belt One Road). In this project multiple organizations and governments participate in further developing the CCR. (Yu, 2016). A good example is the Korgos terminal on the border of Kazakhstan. This inland
terminal was finished in March 2016 and serves as the central terminal for all trains coming from China to Europe and vice versa. Within this terminal, installations have been built to quickly swap the goods from one wagon to another. This is necessary to overcome the different gauge width. In 2016, this terminal had processed around 50,000 TEU. In 2017 its forecast lies around 300,000 TEU. Another example is the creation of one of the inland terminals in China which has been opened last year in Chongqing, combining rail transports from several directions in China to Kazakhstan. (NOS, 2016; WIRE, 2016).

Next to technical difficulties, there are also some struggles with climates along the route. According to Rodemann and Templar (2014), the temperature during the transport via the CCR can vary between -40 and +30 degrees Celsius during the transport. This is a problem that needs to be solved when transporting goods that is temperature-sensitive like electronics and food. Also, security seems to be a weakness of the route. Damage and theft of cargo was according to Dewan Md Zahurul et al. (2013) one of the main reasons why transport via the CCR was not attractive enough. Thanks to the absence of track and trace systems and track security, there is a high risk of cargo-theft and damage. Finally, according to Dewan Md Zahurul et al. (2013) there are a lot of policy-related issues within the CCR. Administrative procedures and unclear interpretation of related laws and regulations have been found to be one of the most important causes of delay on the CCR.

**Strengths:**
It seems that the route is still plagued with different weaknesses and difficulties to overcome. However, the CCR offers a much shorter transit-time compared to sea-transport which is the most used transportation mode. Especially now, where companies are moving to the eastern regions of China, transit-time is increasing when using sea-transport. According to Rodemann and Templar (2014), rail-transport is not the fastest but also not the slowest modality. With a much lower price than by road or air, its transit-time/cost ratio is much more in balance compared to other modalities. The transit time cost ratio is the most important enabler of the CCR, making it especially attractive for high value goods.

### 2.4 Government policy

We describe government policy as a statement of intend, from where decisions are made into governance. Governance and policy are very close related since governance is the way in which the policy is implemented. Governance refers, therefore, to all processes of governing, whether undertaken by a government, market or network, whether over a family, tribe, formal or informal organization, or territory and whether through laws norms power or language. (Manwaring, 2014).

Policy and governance can be of influence on the choice of modality by organizations. But this influence is limited to a certain extend. As Ribbink et al. (2005) have discovered, policy does not always change the way organizations prefer a modality. It has been found that a change of policy in the form of tax-mutation would not result in a change of modality choice in Europe. This is because other selection-factors as discussed in chapter 1 of this review, appear to be more important. If these selection-factors are not met, policy will not change the choice of modality. Selection factors such as transit-time and capacity are mentioned to be of greater influence. However, rail is of course realized by policy and governance since the largest part of the rail-infrastructure is state-owned and infrastructure projects are largely funded by national and European government.
European rail policy
In Europe, a uniform railway policy has been made for all member nations. The ERA (European Railway Agency) and ETA (European Transport Agency) are professional organizations dedicated to exchange information and ideas that will form future transportation policy amongst European member states. (Nash, 2004). For many years, rail freight transport has seen a decline of market share and an increasing need of subsidy. Therefore in 1989 the European Commission for Transport initiated a big change of policy that stimulated privatization, increase of performance and separation between rail transport and rail infrastructure ownership. This resulted in the Directive 91/440 which made a definite policy for railway governance. After this Directive, several railway packages have been introduced. Each one changing legislation and governance to stimulate further privatization, increase of competition and performance.

White Paper 2011
For transportation in general, the European Commission introduced the White Paper 2011. In this paper, the goals for future transportation (public and freight) are both described. It gives an idea of the European transport policy on the long term. For rail-transport this paper sketches a positive scenario; ‘30% of road freight over 300 km should shift to other modes such as rail or waterborne transport by 2030, and more than 50% by 2050, facilitated by efficient and green freight corridors. To meet this goal will also require appropriate infrastructure to be developed.’ (European-Commission, 2011). With this policy goal in mind, it can be stated that future legislation will try to promote rail transport as much as possible. Considering water transport is limited to certain countries, rail transport will have to be promoted heavily to achieve the goal of the European Commission. As stated by Islam, Ricci, and Nelldal (2016), if the initiatives mentioned in the white paper (such as increasing train length, harmonize ERMTS etc.) are carried out, the railway capacity could increase significantly. However, as the Community of European Railway and Infrastructure Companies (CER) conclude in their 10-year review in 2013, the results of the European policy are not as expected and rather disappointing. The modal share of rail has decreased from 18.5% in 2000 to 16.2% in 2010. According to CER underinvestment in infrastructure is one of the biggest causes why capacity of rail is limited and has consequences on punctuality. The White Paper 2011 only has implications for the European rail-network. But will still play an important role since the European network is also a critical part of the CCR. Furthermore, the white-paper suggests to further investigate international and continental transportation possibilities. However, nothing is mentioned about rail transport to China. Since the CCR has seen its major development in the past years, chances are that the white paper was simply too old for the CCR to be included.

Corridor Policy
Another important development in rail-freight policy in Europe is the Regulation (EU) No 913/2010 concerning a European Rail Network for Competitive Freight (Rail Freight Regulation). In this Regulation, the rail network is divided into sub-sections named ‘corridors’. See appendix 2. The goal of the regulation is to promote cooperation between countries clustered in corridors. Especially in infrastructure and safety-related topics, these corridors will help achieving uniformity among its members. According to Dewan Md Zahurul et al. (2013) these corridors are a good initiative but too slow in development, an increase of pace is needed to make this policy successful.
Chinese Policy:
The Chinese policy on transport has never been so clear as it is now. China knows a long history in trading and transport. The Silk-road that existed for hundreds of years until its stagnation in the 17th century has been renewed. Xi Jinping introduced a new transportation policy with 2 main pillars. The Silk Road Economic Belt and Maritime Silk Road of the Twenty-First Century, new versions of the ancient Silk-road. These two initiatives were eventually combined into the ‘One Belt, One Road’ initiative (OBOR) with China as its Hub. (Yu, 2016).

The OBOR project serves as a cooperation between all projects inter-related with the Silk-Road route. It is one of the flagship projects of the Chinese Government and is heavily promoted. (Yu, 2016). China sees the OBOR project as its way to reclaim the nations historical powerful global position. With OBOR, China wants to serve several economic goals. The first goal is to improve infrastructure and improve Cross-border transportation. The second goal of the OBOR initiative is to expand further growth of Chinese organizations across the world. As Yu (2016) name it the ‘going-out’ strategy, China wishes to further develop infrastructure across borders to stimulate export from China. The third and last goal is to boost economic development in the Western region of China, were as discussed before economy has lagged and wages are low. The Chinese Government is striving to make the OBOR project a success. The road to success is full of uncertainties though, since China depends on the same enthusiasm of all nations involved.

The success of the OBOR policy not only lies within the hand of the Chinese ambition, but also relies on cooperation and ability from other involved nations. Since not all countries involved are undergoing a fast-economic development as China does, the Chinese government of Xi Jinping came up with an idea to stimulate these countries in participating into the OBOR project. This idea, became known as the AIIB, which stands for the ‘Asian Infrastructure Investment Bank.’ With the AIIB, China changed its policy to a globally driven policy. The AIIB main purpose is to promote the OBOR strategy, were the CCR plays an important part. With the help of the AIIB, China can help countries to modernize their infrastructure and improve cross-border transport. This will pay off since economic integration and bilateral trade with neighboring countries will be possible. (Yu, 2016). Infrastructure is a major political enabler of the CCR (Rodemann & Templar, 2014). China holds a 26% voting share due to its contribution of $29.78 billion and is the largest shareholder. This means China has great influence on the projects that are supported by the AIIB. Furthermore, China has around $3.5 trillion foreign exchanges that support various projects across the globe, making China a favorable country for all not-so developed nations. With the AIIB as its backbone, the CCR route will be able to improve fast. Capital is now available for countries like Kazakhstan to rapidly improve infrastructure. It is expected that with the founding of the AIIB, the pace of improvement of the CCR will step up. (Shepard, 2017).

As Rodemann and Templar (2014) found several political inhibitors of rail-freight between Russia and Asia, there are still many political obstacles on the CCR road to success. Poor cooperation and finance within the land bridge development are the main inhibitor of its success. The AIIB founded in 2015 and the foundation of the OBOR project in 2013 aim to solve that. It cannot be predicted if China will succeed, we can only conclude that there is a high chance of success since both initiatives are already booming and alive in many countries. However, political tensions between involved countries and war present a disadvantage concerning customer attractiveness, but also hamper trade and network development in general.
2.5 Modal shift motives

A lot of research has been done to transportation attributes and their value to shippers/carriers. Research to the actual motives and barriers to adopt a new transportation route in the first place is rather limited. Since most of the China-Eu traffic is using maritime transport, an increase of use of the CCR will be an example of modal shift. We will review the literature that study motives and barriers for modal shift.

Modal shift

Modal shift is meant as changing the modality used for transport. For example, this could be the shift from all road transport to rail-road combined transport. Or as in the context of the CCR, Maritime-road transport to Road-Rail transport. In their research for Modal Shift and supply-chain performance, Eng-Larsson et al. (2012) have made a framework to uncover the motives of choosing a new modality. In their literature review, they conclude that there is a strong relation between modal shift and transportation quality (reliability, transit time, security etc.). As we have discovered there are lots of attributes considered, when choosing a way of transportation. It can be stated, that the same attributes will play a role in shifting from one modality to another. It is therefore logical that modalities which meet these requirements closest, will eventually win the choice (Quality). (Elbert & Seikowsky, 2017). Contextual factors such as external pressure, logistic strategy, product characteristics, flow volumes and flow geography also have an influence on choosing for a modal shift. "The handbook of logistics & distribution management, 4th ed" 2010). As discussed, there are a lot of contextual factors around the China transport that force companies to look for other transportation modalities. (Eng-Larsson et al., 2012).

Holguín-Veras, Xu, de Jong, and Maurer (2011) conclude that the choice of transportation mode is the result of an interaction between shippers and carriers. It states that in competitive markets, carriers and shippers are likely to cooperate in the selection of transportation mode. Supply chain integration between carriers and shippers provide new opportunities towards mode choice and modal shift. (Meixell & Norbis, 2008). In the literature research of (Eng-Larsson et al., 2012), switching to an intermodal road-rail solution is potentially interesting, but difficult to implement as it may jeopardize logistics performance. Especially longer transit times, lower precision in delivery time and lower flexibility are obstacles for implementation.

Carriers and logistic service providers

We use the definition of businessdictionary.com for forwarders; where a forwarder is described as a firm specializing in arranging storage and shipping of merchandise on behalf of its shippers. A logistic service provider provides similar services as a forwarder; A company that provides management over the flow of goods and materials between points of origin to end-use destination. The provider will often handle shipping, inventory, warehousing, packaging and security functions for shipments. ("What is logistics provider? definition and meaning,” 2017).

Shippers often let logistic service providers choose the best way of transporting goods from one place to another. Therefore, forwarders and logistic service providers play a crucial role in process of choosing a modality since they have a broad network necessary for distribution. Truschkin, Elbert, and Günter (2014) concluded, that the knowhow of inter-organizational network (alliance capability), affects the decision to choose for a modal shift. Since organizing a modal-shift can be a complex process with many different organizations involved, organizing a good network with trustable alliances is a barrier for choosing a new modality such as the CCR, especially for smaller organizations which often do not have such networks (Truschkin et al., 2014). Next to the network barrier, there is also a behavioral barrier that could prevent a modal shift from happening. In their research for the influence of behavioral biases on the willingness of forwarders to modal shift from road to road-rail freight, Elbert and Seikowsky (2017) concluded that the biasing effects induce a rather negatively perception and rigidness to modal shift from road transport to intermodal road–
rail transport as the barriers are rather leveraged and the facilitators frequently mitigated. In other words, the negative assumption of modal shift to rail can play an important barrier choosing for implementing a modal shift to rail. It has been researched that some logistic service providers as shippers are hesitating to use the central corridor route because of lack of experience. (T. van Rooijen & R. Jackson, 2012). As Elbert and Seikowsky (2017) conclude, policy (see chapter 3) could play a role in overcoming these biases.

2.6 Propositions

Based on the literature review, we have made a proposition statement as an answer on the 5 research questions.

1. **How are companies selecting the way of transport and which transport selection criteria are important in EU-China transportation?**

Within EU-China transportation it will differ from case to case which transport selection criteria are most important. The context in which an organization operates and the developments within these contexts have a great influence on the selection criteria for transportation.

2. **Do Chinese developments of its economy play a role in the popularity of the CCR?**

Developments as high investment in infrastructure, China’s production changing and moving to the west, have a positive effect on the popularity of the CCR.

3. **What are the current strengths and weaknesses of the CCR?**

The CCR must compete with 3 other rail routes to China. The CCR has technical, climate-related, security related and policy related challenges to overcome. Yet it’s transit time, seems to be all worth it.

4. **How does EU and Chinese policy and governance influence the choice of modality for transport to and from China for organizations?**

The European policy has ambitions for railway transport. It seems that European policy is not focused on EU-China rail freight. The Chinese policy behind the CCR has a coordinating role and will be very important for its future success.

5. **What makes a company choose for a modal-shift/ new modality to use for its transportation? What are the motives and barriers of choice?**

The motives to organize a modal shift are strongly related to the selection attributes. Contextual factors are reasons to choose a modal shift. Longer transit times and lower flexibility are barriers when shifting to a road-rail solution.
**Research model:**
The research model illustrated below predicts the relations between different variables. This research will focus on the relation between different variables and how these relations form CCR as a viable transport alternative. The research model is a result of the literature review.
3. Research method

The research question this research tries to answer is: Will the Central Corridor Route be a viable alternative for traditional transport methods between Europe and China? In addition to the main question, 5 more sub questions have been formed.

3.1 Research design

We have started our research with a literature review of more than 45 sources. After researching the available literature, research questions were modified and propositions were formed. This research is focused on examining and exploring the status and future possibilities of the Central Corridor Route. Referring to our research question and sub questions in chapter 1, our research tries to answer what, why and how questions. According to Yin (2014) there are multiple research strategies available for exploratory research answering what, how and why questions; experiments, survey, archival analysis and case study. For the what questions, survey research would be suitable, but because we also want to answer how and why questions, this was not the best option. Experiments require a controlled situation, this was not possible or suitable for this research. Lastly an archival analysis was not possible since the CCR is too new to find archival data. Due to the in-depth and explorative nature of these questions, we have chosen to do an exploratory case study. A case study explores a research topic or phenomenon within its context or within a number of real-life contexts. (Yin, 2014). According to Yin (2014), when researching how and why questions, case study is a good research strategy.

Multiple cases were selected using the following criteria;
1. The company must be directly involved with using the CCR.
2. Company type: Shippers, Carriers, and terminals which have used/are using/intending to use the CCR as a transport mode.
3. Experienced or inexperienced with usage of the CCR.

We have used as much cases and interviews as we needed to reach data saturation. Full data saturation is practically not possible. We have used the guidelines developed by Saunders, ("Research methods for business students, 5th ed," 2009)

3.2 Data collection

The cases in this multiple-case study can be divided into 3 groups, based on the role of the organization within the China – Europe transport context. These groups are: Shippers, Carriers and Rail-terminals. In this research, we have used 2 units of analysis; the individual organization and the 3 groups these organizations can be divided in.

We have used semi-structured interviews to collect the required data. As Saunders, Lewis, and Thornhill (2012) describe, in a study where it is necessary to understand reasons for the decisions that research participants have taken and to know their opinions, a semi-structured is a good method. With a semi-structured interview, it was possible to explore the respondent’s specific context and perceptions. In each case, we have interviewed respondents who were (partly) responsible for logistics and or purchasing and had specific experience with the usage of the CCR.

We have used an interview protocol by (Rodemann & Templar, 2014) to form the base of our interview. We have modified this protocol in a way that it collected the data to answer our specific research questions. In some of our interviews, we were provided with extra information such as brochures, presentations, magazines and reports. We have used this information to supplement our interview findings. In this way, we used multiple sources of data (data- triangulation).
All interviews have been made anonymous due to company sensitive data given by the respondents. Interviews were recorded when possible/allowed and later written in a literal transcript. (See appendix 9 for a list of interviews.)

3.3 Operationalization
For operationalization, we have used several themes, divided by the sub questions of the research. (see chapter 1). These sub questions form the structure of the interviews. The interview questions are aimed at testing the propositions formed at the end of the literature research. Next to proposition testing, the interview questions give possibility to gather additional useful information not captured by one of the research questions.

3.4 Data analysis
In this research, we have used coding to structure the gathered answers and information by the interviews. we have used the guidelines given by (Saldaña, 2009) for coding. Saldaña (2009) states that coding is heuristic (from the Greek, meaning "to discover") an exploratory problem-solving technique without specific formulas to follow: “Coding is only the initial step toward an even more rigorous and evocative analysis and interpretation for a report. Coding is not just labeling, it is linking "It leads you from the data to the idea, and from the idea to all the data pertaining to that idea". (Saldaña, 2009). We have used the scheme illustrated in appendix 3, coming from Saldaña (2009). Our coding method was a process of back and forth between coding and recoding until eventually it was possible to set up categories. In Appendix Nr. 4 you will find the coding log, which we have written during the process of coding.

To make coding of multiple interviews more convenient, we have used a CAQDAS program called Atlast.Ti. Saldaña (2009) states that if a student's dissertation project or independent research studies will require multiple participant interviews or extended fieldwork and extensive field note-taking, then CAQDAS becomes a vital and indispensable tool for the enterprise. We have used structural coding to structure the qualitative data in themes related to the research questions. We also labeled the specifications of the respondents into document codes. This is the earliest stage of the precoding process. Structural coding applies in a content-based or conceptual phrase representing a topic of inquiry to a segment of data that relates to a specific research question used to frame the interview (Saldaña, 2009). For example, we bundled all data related to research question 2; Do Chinese developments of its economy play a role in the popularity of the CCR? in the category; Developments. After coding the first 3 interviews, a refining of the category could be made and 3 codes were created belonging to this category such as: Developments – Sea transport problems. Later, sub codes could be added depending on the need for further refining the codes.

After coding all the interview transcripts, we reviewed all codes and belonging quotations to see if quotations were at the right codes, if codes could be changed, renamed or divided into sub codes. For a complete code list see appendix 5. In this process, the network tool provided by Atlas.ti was very convenient to visually move quotations from one code to another, see appendix 6. At the end of the coding process we also created relations between codes based on actual quotations. The codes were reviewed and quotations have been read again.

For further analysis, we have used pattern matching. The CAQDAS program made it possible to oversee possible patterns without costing too much time. According to Yin (2014), pattern matching is a desirable technique for case study analysis, especially to compare empirically based patterns with a predicted one. After close examination, we could identify patterns of similarity, frequency and difference. We have compared patterns of different cases with each other, and in this way theoretical replication was formed. This contributes to the internal validity.
3.5 Methodological issues

Reliability:
Reliability refers to whether data collection techniques and analytic procedures would produce consistent findings if they were replicated by a different researcher (Saunders et al., 2012). Reliability in this research is assured by documenting the case study procedure as also the analytical procedures (coding). Next to that interview transcripts were audio taped and written in literal words and saved into the coding database.

Construct validity:
Construct validity is concerned with the extent to which your research measures actually measure what you intend them to assess (Saunders et al., 2012). During the data collection, we have used multiple sources to form a chain of evidence. The interview questions were formed to test propositions that have been made after extensive literature research. The questions of the interviews were formed in a way that does not lead the correspondent to answer into a certain direction. Also, a coding program was used to prevent certain quotations to be more highlighted than other quotes.

Internal validity:
Internal validity is established when your research demonstrates a causal relationship between two variables (Saunders et al., 2012). The internal validity is ensured thanks to a comprehensive literature review. Also thanks to the usage of a CAQDAS program, relationships between variables can be found with different forms of pattern matching like similarity, co-occurrence, contradiction etc. Also, multiple sources of data have been used, such as the interview data but also secondary data such as reports.

External validity:
The external validity is concerned with the question if a study’s research findings be generalized to other relevant settings or groups? (Saunders et al., 2012). External validity is limited because this research is focused on a specific phenomenon and context. It could be possible to partly use the same research method on the usage of other transportation routes, but we should note that the questions of this research are written specifically for the context of the CCR.
4. Results

In this chapter, the data gathered by interviews as described in Methodology is analyzed. We will use the 5 research questions to provide structure to the data results. Conclusions will be made separately in the chapter conclusions.

This chapter provide insights into:
- Which selection factors are important.
- The most important developments that influence the use of the CCR
- The strengths and weaknesses of the CCR
- The influence of policy on the success of the CCR
- The motives for organizations to shift to rail transport within EU - China context.
- Future recommendations of respondents.

4.1 Selection factors

The first section of the interview is themed with the selection factors. The interviewees had possibility to respond in a free way since the interviews have open questions (semi-structured). A total of 67 factors were mentioned during the interviews. Since a lot of the answers were similar to each other, we grouped them into 8 different selection factors based on what they were saying. This resulted in the following diagram;

![Selection factors for China - Europe transport](image)

Figure 5: Selection factors for China – Europe Transport

**Timing**

Timing was mentioned the most, with a total of 23 responses categorized to this selection factor. 8 of the quotations grouped to timing were mentioning the rail transport fills a gap between the short transit times of air freight and the long transit of maritime transport. 5 of the quotations mentioned the reduction of stock in transit as the main reason why timing is so important for them. TER8 (2017) mentioned ‘The main requirement we are noticing is speed. The transit time by rail is the perfect middle between the 50+ days of sea transport and 4 days by air transport’ and shipper SHI5 (2017) pointed out; ‘Transit time is most important for us as food producer, since rail has to compete with air freight’. The interviewed shippers which produced electronics had special supply chain departments which used stock in transit as a KPI for their SC-performance. The better balanced the stock in transit vs the transportation costs were, the better the KPI score. One of the interviewed shippers stated; ‘Our transit time is expressed internally to a budget of stock/worth in transit. As Supply chain
department, we have to work with a limit of stock in transit and we have to make sure we stay under this limit.’ (SHI6, 2017). Also, all the carriers gave Timing as their Nr. 1 motivation to choose for CCR. ‘Our customers are using the CCR because it is faster than sea transport and cheaper than airfreight’ (CAR3, 2017).

Price
Pricing or costs of transportation were mentioned 16 times during the interviews. Several carriers used pricing in combination with timing as an important argument to choose for the CCR. CAR3 (2017) mentions that ‘All in all, the strength is the combination of transit time and price’. Yet also at this factor, comparisons are made between rail and other modalities. Furthermore we see that of all interviewed shippers (electronic and food manufacturing industries), price is definitely their most important selection factor. SHI12 (2017) states that ‘Price is the most important factor because it makes a big part of our total costs of product’. At the same time carriers are saying that price is not always expressed in direct costs, but also indirect costs, as CAR3 (2017) explains; ‘let’s say a container is worth 100.000 euros. With the 6 weeks transit time of sea transport, this will bring the costs to finance 6x100.000 euros, with rail this will bring the costs to finance 2 x 100.000 euros. So, at the end, you will save the costs of what it takes to finance 400.000 euros in transit.’.

Reliability
Reliability was mentioned 8 times during the interview questions about selection factors. Although meanings of liability can differ, most of the interviewees use examples to explain their meanings. SHI5 (2017) explains that ‘Also reliability is important. I separate liability into 2 kinds; first is Leadtime liability, if we cannot guarantee lead time, costs will be higher. Second is liability of the conditions in which our goods are transported. We are quite enthusiastic about the liability in the Reefer containers we use.’ Lead time reliability were also mentioned in other interviews, as CAR1 (2017) explains; ‘they wanted to be 100% sure that delivery would be on the planned date.’. Another shipper which produces electronics explains that product to market time is the key factor why reliability is so important to them. ‘If our products arrive to late, damage can be very high, brochures are made and costs are made, so if our products don’t arrive, these are wasted costs.’(SHI6, 2017).

Service
The selection factor service was mentioned 7 times during the interviews. Above all, track and trace related quotes where mentioned most frequently (5 times). SHI12 (2017) explains; ‘track and trace is very important for our internal customers (distribution centers across the world). It is very important for them when products are coming into their facility’. Also problem intervention related to track and trace service is mentioned ‘Track and trace is thereby of big importance since we have to know why (possible) problems are occurring’(CAR1, 2017). Next to track and trace, the ability to solve problems when they occur and the ability to solve custom issues on site are mentioned.

Security
Since most of the interviewed shippers carried high value goods, they related security as another important factor for selecting a transportation mode, as one of the shippers says; ‘Since we transport high value goods, we are likely to experience theft on the route. This has happened a couple of times already’(SHI6, 2017) Security is not always related to theft, but also to the more general meaning of a ‘safe trip’ as stated by (TER7, 2017). For example one of the carriers mentioned ‘Another requirement is that customers like pharmacy companies want to transport their goods in certain conditions such as temperature range’(CAR11, 2017)
**Intervention and control**

Beside the already formulated selection factors in the literature review. A new one appears, the possibility to intervene and being in control of the transport. One of the terminals explains ‘*Also control is very important, since the trains are running through several stops, are gps monitored and also serviced when needed, companies that are using it are happy to be in control of the transport*’ (TER8, 2017). This could be added to service or reliability, but since it was mentioned so explicitly more than 5 times, we decided to separate this from service.

**Capacity**

Although mentioned only 3 times, some of the shippers mentioned that capacity was their second most important selection factor.

**Sustainability**

Only mentioned once, sustainability is the least mentioned selection factor in the interviews. Only one carrier states ‘*Carbon footprint: The carbon footprint gets more and more attention*’ (CAR2, 2017). Nothing related to sustainability was mentioned in all the interviews.

### 4.2 Developments

When asking which developments play an important role in selecting a new way for transportation, 26 quotes were gathered describing several different developments that play a role in the selection process. (G stands for number of quotations belonging to the code).

**Sea transport problems**

By far the most mentioned development which influenced the popularity of the CCR was sea transport problems. With a total of 15 quotations, a subcategorization has been made to explain in detail what sea transport problems are.

The first one is clustering of sea carriers. One of the electronic manufacturers mentioned; ‘*One of the most important developments is the formation of carrier clusters, there are less carriers then before, the carriers that remain are working together and this causes the price for transport to go up. What worries us the most is that a lot of these carriers are not in a very good financial position*’ (SH12,
2017). Similar quotes coming from carriers and other shippers are describing the same phenomenon. Also frequency is associated with the clustering of sea transport as TER7 (2017) mentioned; ‘Capacity on the deep sea lines is limited. The new alliances on sea carriers are reducing capacity and that causes the rates to go up’. The influence of the clustering on prices are also mentioned; ‘The prices of sea-freight have gone up last year. The price of a container by rail was 3.8 times higher than a container by sea in 2016. For this year rail is only 2.5 times more expensive then sea freight.’(SHI12, 2017). Another part of the problems with sea transport carriers is the fact that booking time appears not to be sufficient. TER7 (2017) says ‘Booking time is increased enormously. So, sea transport is not as attractive as it used to be’. Similar quotes are coming from carriers; ‘When you book in April, your container will depart in May. This cause a huge delay in transport’. (CAR1, 2017). The long booking time has consequences for the companies that use this transport mode, they are indicating that their customers are not willing to wait for so long until delivery. ‘as far as we have noticed, companies no longer want to wait 50 days or more to get their goods from a to b’. (TER8, 2017)

Finally, the slow steaming development was also mentioned as part of the sea transport problems. As the name says, slow steaming increases transit time. As one of the carrier explicitly mentions ‘Slow Steaming plays a big role in the popularity of the CCR.’(CAR3, 2017)

Westward production
The movement of manufacturers to the west of China was mentioned with a total of 7 quotes in the category developments. One of the shippers we interviewed said; ‘More and more of our production has been moved to Chongqing, our printer division has also been moved to Chongqing. Our production is moving more to the Western parts of China.’ (SHI6, 2017). This is mentioned multiple times. The consequences of this westward production for the use of the CCR are also mentioned; ‘Since more and more producers are moving their production to the West of China, this makes rail more attractive.’(TER7, 2017), just like TER9 (2017); ‘I think the most important factor in the success of the CCR will be the fact that east regions of China are more attractive nowadays then before. Wages are still low, governments are more cooperating, so it makes it an ideal investment climate for new factories to build.’.

Welfare increase China
The increase of welfare according to our interviewees influences the popularity of the CCR. Chinese demand for European products create possibilities for the CCR to use as CAR10 (2017) states; ‘Chinese welfare is growing, so is the question for European products.’ Also, other carriers are mentioning the same; ‘This means they are demanding foreign products such as cheese, wine etc. This creates chances for all transports going back to China.’(CAR1, 2017).
4.3 Strengths and weaknesses

In this the results regarding strengths and weaknesses will be explained.

4.3.1 Strengths

During the interviews, a total of 46 quotations have been counted that mention strengths of the CCR. We have used similarity pattern matching to group the quotations into 7 strengths/codes. We will start with the most mentioned strengths and go further in descending order.

**Timing:**
Timing was the most mentioned strength of the Central Corridor Route, it was mentioned 14 times, which is 30% of all strength quotations. Most of the respondents mentioned timing as meaning of transit time, ‘The main strength is transit time.’ (TER8, 2017), ‘The transit time is one of the most important strengths compared to other modalities’ (CAR2, 2017). The relation between timing and pricing is also mentioned 4 times, as SHI12 (2017) mentions; ‘Transit time: The transit time is a tradeoff between costs and time. We have a special department that monitors all stock in transit. This is very important for us. It is not however transit time that matters most. There should be a good balance between price and transit time. The price of ocean freight is still much lower than train and therefore more attractive.’. Some of the shippers also mention a relationship between time pressure and volume, which they describe as a strength of the CCR; ‘The strength of the CCR lies within its speed as well. When you need to transport large volumes within a short period of time, rail offers a payable solution which is more attractive than air-freight. You could call this semi-adhoc freight, which we need to transport much faster than sea freight but not as fast as air freight.’ (SHI12, 2017). Respondents make comparisons with other modalities as well, some of the shippers describe the timing strength of the CCR the main reason why they switched using rail instead of air or maritime transport. SHI5 (2017) explains; ‘Transit time is most important for us, since rail has to compete with air freight.’. Carriers mention the same comparison; ‘The transit time is one of the most important strengths compared to other modalities’ (CAR2, 2017). Next to transit time, also the booking time is mentioned as a strength of rail transport; ‘We do super heavy trains, 3000t of 900 meters. Booking time is a couple of days.’ (TER7, 2017).

**Flexibility:**
Flexibility was mentioned 9 times during the interviews. Having different interpretations, for most of the respondents, flexibility had to do with geographical aspects of the Central Corridor Route. One of the carriers said; ‘The rail transport offers more flexible solutions than sea transport. Within rail transport it is possible to transport to specific places without using loading and unloading stages.’ (CAR2, 2017), another carrier described; ‘Therefore Rail offers them a good solution since they can almost directly put their products on the trains from their factory sites.’ (CAR1, 2017). Also, flexibility was expressed through a different aspect of timing, called frequency. One of the carriers
described; ‘frequency is a very important strength of rail transport. Thanks to the frequency being much higher than sea transport, our customers are able to smooth out supplies in the supply chain.’ (CAR10, 2017), which states that frequency enables them to optimize further supply chain processes. A shipper mentioned, why frequency is that important to them; ‘The most important strength of the CCR is the frequency of the trains driving from departure to arrival destinations. We need at least 3 departures each week to guarantee delivery to our customers.’ (SHI12, 2017). Although flexibility has a relation with timing, frequency is important due to the flexibility it offers for the users of the route.

Control:
The word ‘in control’ was mentioned frequently during the interviews. One of the carriers said; ‘The CCR gives our customers a better feeling of control.’ (CAR3, 2017), and another carrier mentioned; ‘Next to that our customers feel more in control of their transport via the CCR’ (CAR11, 2017). This feeling of control, was often compared with the feeling of control over maritime transport, where it was mentioned that as soon as cargo enters the ship, you must wait 50 days before you can check it, do something with it or even exactly know the condition of the cargo. Control was defined as the possibility to intervene during transport. One of the carriers said; ‘rail offers a possibility to check cargo, repair containers during transport, track and trace service is thereby a crucial element’ as ‘CAR11 (2017) states; Track and trace is thereby of big importance since we have to know why (possible) problems are occurring, were containers are standing and how we can find a solution as soon as possible.’ The GPS possibilities enable the users to intervene when necessary; When necessary, rail offers a possibility to check cargo, repair containers during transport. Thanks to GPS the cargo is easy to control and to monitor. Our customers appreciate it when they can see where their cargo is.(CAR11, 2017)

Reliability:
About reliability, all the respondents were very positive. It was mentioned 5 times explicitly as one of the strengths of the CCR. Respondents stated that the reliability was very good, CAR10 (2017) stated; ‘After a couple of tests they are convinced that rail transport is really reliable. lead-times are stable and they do not have to worry about organizing it.’ This stability and reliability was also mentioned by shippers as SHI12 (2017) said; ‘Reliability is very good, we have never had any disappointment with trains arriving too late. Trains run really punctual’.

Price:
Price is one of the more contradictory strengths found during the interviews. On one side, there is the argument that price of trains is still too expensive. The other side mentions that price is better than air freight and therefore a strength of the CCR. A comparison between modes is often made as TER8 (2017) states; ‘Also the price is very attractive. Just to give an estimation, if sea transport cost 1 euro, than train transport will cost you 3-4 euros, and air transport will cost you around 8-10.’, SHI5 (2017) states; ‘Also the costs of rail are much lower than for air freight’. Pricing is also mentioned as weakness, which will be explained later in the result chapter.

Less grounded strengths:
Apart from the above-mentioned strengths, which were mentioned more than 5 times during the interviews, also other strengths were mentioned. Some of them were mentioned as strength or as weakness by different respondents.
Infrastructure is one of them, seeing it as a strength it was mentioned by CAR1 (2017) ‘Many people think that infrastructure differences such as gauge width is a difficult problem to overcome. This is however absolutely not the case. The different gauge widths are absolutely not a problem anymore.’, or CAR11 (2017); ‘As soon as we have passed Brest, we are within 5 days in China.’ What should be noted is that the respondents which say infrastructure is a strength, are users of the CCR with a long experience.
Last but not least, also customs were mentioned as strength by a couple of respondents, most of all with a long history of CCR usage. CAR11 (2017)’ On the contrary of the belief of many, when traveling through Russia, Kazakhstan and China, there are no problems, as unlikely as it may seem, these countries know less difficulties for rail transport as Europe, no customs, no regulation’, and SHI6 (2017) which states that custom procedures have improved over time; Other factors are for example customs and the documentation required for border passing. In the start this was very difficult on the border between Russia and Kazakhstan, but luckily they have simplified this to the point where you only need one set of papers to pass.

4.3.2 Weaknesses

Figure 8: Weaknesses

66 quotations have been made regarding weaknesses during the interviews. Weaknesses is divided into 7 different weaknesses codes. Just like the strength, we will address each weakness, starting with the most grounded ones.

**Customs:**
Custom related quotes were mentioned 11 times. One of the shippers’ states that; ‘But it largely depends on the terminal that handles the goods in China. The customs of the goods need to be regulated in a proper way. Since we transport food, this can be a problem.’ (SHI5, 2017). During the interviews it was mentioned that having multiple kinds of products in one train can be a problem with customs. CAR2 (2017) mentioned; ‘Since for all different kinds of cargo you will need different types of procedures and documents’. This respondent also mentions that local network can be helpful in arranging custom procedures; ‘In our case we have local people helping us out when documents are not filled in correctly’. Another part of the custom problem, seems not to be document related, but related to government policy. CAR2 (2017) states that; ‘Fresh foods, like fruits, vegetables, milk or meat are not allowed to pass through Russia’. The limits to product that are allowed to be transported through the route are due to political sanctions between EU and Russia, as one of the respondents states; ‘The sanctions are a real restricting factor of the success of the CCR.’ (CAR1, 2017), see also appendix 7. The problem with custom procedures also influences transit time as one of the terminal respondents explains; ‘As explained above the European bottleneck in Brest is one of the most important since this is dangerous for threatening the main strength of the CCR; transit-time.’ (TER8, 2017).

**Imbalance:**
Another frequently mentioned weakness is the imbalance of cargo flows between EU and China. As one of the respondents recalls; ‘There is also a large trade imbalance from 3 to 1 between west and eastbound transport.’ (TER8, 2017). This imbalance has several consequences, such as; ‘Because there is less east bound traffic, we end up with a lot of empty reefers in Europe. We have to come up with solutions to get these reefers back to China, but at the end we will pay this empty backhaul.’ (SHI6, 2017). The imbalance seems to be caused because more cargo is going from China to Europe than from Europe to China. Many respondents are afraid that the imbalance could cause severe problems...
for future success of the CCR; ‘As long as there is an imbalance of trade between Europe and China, the railway transport to and from China will strongly depend on the current subsidies of China.’ (CAR1, 2017) and similar quotes from TER9 (2017) ‘The imbalance on the long distances of the China EU traffic, will almost destroy the success of it.’ Some of the respondents, do see possibilities how the imbalance could be solved; ‘If the imbalance would be solved, the CCR would not have to rely on subsidizing. That’s why we should use the potential of the east European countries to enable them to send products back to China, I can see there is great interest from them in that.’ (CAR3, 2017).

Infrastructure:
Although in a less frequent way infrastructure was also mentioned as a strength of the CCR, it was mentioned 11 times as a weakness. Especially the European infrastructure and border crossing was mentioned the most. As TER8 (2017) states; ‘Unfortunately at these border crossings, especially in Europe there is a growing capacity problem. The most popular destination of the China trains is Brest. Brest is running short on capacity, causing delay in traffic.’ CAR11 (2017) explains it more detailed; ‘One of the biggest weaknesses is Brest, the main entry to European rail. At this point during travel, goods are transferred to new wagons, documents have to be checked etc. Due to the combination of both cargo reloading and documentation control, there is a lot of congestion and delay at this point.’ It seems that for most of our respondents, Europe is seen as the biggest bottleneck for the route; as CAR3 (2017) explains ‘We put 20% of our effort in 80% of the total travel distance of the CCR. This means from China to Europe we do not experience any problems what so ever. But when we enter Europe, problems start to rise. Language barriers, differences in national regulations, other unions. In Until Europe we can travel 1000km’s a day, but when we enter Europe it all comes to a hold. Our bottleneck is Europe.’. Other respondents mention an increase of 4 days thanks to congestion at these border crossings. Mainly these problems must do with lack of capacity. Also at the 2 loading points in China there are problems; ‘But now Chinese government wants to use their station in Dostyc above Kohrgos. This causes long political conflicts.’ (TER8, 2017). Some respondents are looking for alternatives for Brest, via Litouwen.

40ft. only
Multiple respondents mention the incapability of Chinese terminals and logistic service providers to deal with other container sizes than 40ft. As one of the carriers tells; ‘In addition, China ports and terminals are not used to other container sizes then 40ft. So it is hard for us to organize a transport of a 20 or 45ft container.’ (CAR11, 2017). The consequences are more costs for anybody who tries to transport other container sizes than 40ft. ‘With the equipment of China nowadays, you will need 2 wagons or use smaller containers.’ (CAR1, 2017). Also, some of the respondents tell that China might be missing out on a lot of small cargo in smaller containers, which they could use to compensate the empty backhauls.

Inefficiency:
The inefficiency on the route is the following weakness, discovered during the interviews. Respondents give blame to the competition that can be found between the several cities in China. The cities tend to compete and run trains to the same places in Europe as their fellow Chinese cities are also doing. The consequence is that some of these train run with empty wagons. This is explained by one of the experienced carriers; ‘There are several trains driving from China to Europe and back. These trains are operated by booking agencies in China. Since China knows a communist regime, the booking agencies are state owned. Each province in China has its own booking agency. Unfortunately, the several booking agencies are working all but together. Each booking agency runs their own trains and this is absolutely not efficient. To solve empty backhaul problems, it would be far more efficient to combine the several trains together.’ (CAR1, 2017). The same is mentioned by other carriers as well. It is also mentioned several times that users find it difficult to organize the complete transport from door to door. As SHI6 (2017) mentions; ‘It is difficult to bind all existing parties together. You
will need somebody that can organize the end to end transport for you and connect all the stakeholders together’.

Other weaknesses:
The other less mentioned weaknesses are pricing. As discussed in strengths, there are also some respondents who referred to pricing as a weakness for the CCR. All of them related this to prices of other transport modes. ‘The most important disadvantages the rail transport has is the relative higher price.’ (SHI12, 2017). Others said if the price would be lower, they would transport much more via the rail route. Other less mentioned weaknesses were the difficulties of positioning empty equipment like containers, the restrictions for rail transport of dangerous goods in China and the use of expensive backup locomotives.

4.3.3 Policy and Governance
In this chapter, the policy and governance results are explained. After analyzing the data, we divided the data into the following categories;

Figure 8: Policy

As you can see in the figure above, we gathered the results of the interviews into different themes. 4 of these themes indicate if the quote is telling EU or Chinese government policy is either supporting the CCR or not. We will start with European support first.

European policy:
For this theme, we can see that there are a lot more quotes supporting the statement that European policy is not helping the CCR. With 24 quotes against 1. There were a lot of long reactions to European policy. In general, most of these reactions stated that European government is not aware of the potential the CCR could bring for Europe. As some respondents answered; ‘I do not think Europe is aware of the new China Europe connection. In my experience, the European government sees a lot of dangers, but not the opportunities’ (SHI6, 2017), ‘No Europe is not aware of the developments, and especially not the potential it would bring’ (CAR10, 2017). Some respondents mentioned that Europe is lagging with old ideas that are not up to date anymore. ‘I think the people in Europe who are busy managing the corridor policy are living in the past. What they are trying to achieve with the corridor policy should have been achieved 20 years ago.’ (CAR3, 2017). Also, some criticize the regulations Europe try to make, making it difficult for them to operate. ‘In China we have a quote for that: America is the innovator, China is the imitator and Europe is the regulator. China has been busy with the new silk route, and suddenly after years of development, Europe has woken up. Europe thinks they can regulate this traffic, but they are too late, the trains are already running’ (CAR3, 2017). Another topic within the nonsupport of European Government was the trade embargos between Europe and Russia because of the political tensions between them. Respondents explain that the sanctions are limiting the potential of the CCR, and if they would be declined, the
CCR would boom and the empty backhaul problem would be solved. As respondents tell; ‘Europe misses their chance to export more to China, as long as they limit their possibilities of transport.’ (CAR2, 2017) and ‘There are embargos between EU and Russia. This should be solved in the future, I do expect this will be solved. If the embargo is stopped, I could name 20 products we could export to China just in the Netherlands.’ (CAR3, 2017). One of the respondents gave a list of all product types that are forbidden to enter Russia due to sanctions. See appendix 7.

Chinese Policy:
On the contrary of European Policy, the respondents replied that Chinese policy is really supporting the success of the CCR. With 18 quotes against 2.
The strongest argument for this support lies within the subsidies Chinese Government is giving to all the trains that are running now. As one of the carriers explains; ‘Yes the Chinese policy does influence the use of the CCR greatly because of the fact that the railway transport via the CCR is largely subsidized by the Chinese Government’ (CAR1, 2017) Without these subsidies, the respondents replied, the success of the CCR would not be possible. ‘Chinese policy is of big influence on the success of the CCR’ (CAR10, 2017). These subsidies seem to be necessary because of the large trade imbalance. As multiple respondents state that these subsidies are compensating the inefficiencies and empty backhaul. ‘There are a lot of inefficiencies which during transport over the CCR. The Chinese government compensates these inefficiencies via subsidies.’ (CAR2, 2017).
Furthermore, multiple respondents give examples of Chinese government promoting the CCR in their best possible ways. As one of the shippers said; ‘we can indirectly see that the Chinese government is really concerned about starting those new trains and they are willing to put in a lot of effort’ (SHI5, 2017).

4.4 Modal shift
In this chapter, we focus on the results regarding ‘modal shift’. Within this subject, we investigated the motives our respondents had to shift to rail transport, the barriers they experienced doing so and if reputation played a role in the whole process.

4.4.1 Modal shift motives

![Figure 9: Modal shift motives](image)

In total 30 quotes could be grouped into the category motives. With transit time and costs as the main motives for most of the respondents.

Transit time:
Transit time is one of the key motives that was mentioned during the interview. Respondents often made comparisons with other transport modalities, mainly sea transport. They replied that the transit time of sea transport is still increasing. Respondents say they are running out of options since they cannot finance too large amounts of stock in transit. As one of the carriers says; ‘Most of these customers are motivated by the transit time of rail. Since sea freight knows a still growing transit
time, rail freight is getting more and more attractive’ (CAR10, 2017). All respondents who stated that transit time was their main motivation to switch to rail, used sea transport before.

**Costs:**

Also, costs were mentioned by multiple respondents as their main motive for switching to rail transport. It must be noted that most of them used air transport before. Some respondents mentioned that they have used air transport before, since there was no other alternative for sea transport. As one of the respondents said; ‘What we are seeing is that most of the companies using the CCR did not transport their goods by sea at first, but by air transport. Since there were no better alternatives for the very long transit time of 50+ days by sea, they were forced to use the very fast but expensive air transport. Most of these companies do not need a transit time of 4 days.’ (TER8, 2017). Some respondents state that; ‘Even is the subsidizing of freight costs would stop, our customers of air freight would stay with rail since it is still a lot cheaper.’ (CAR10, 2017).

**Risk spreading:**

One of still frequently mentioned themes was the avoidance of risks in transport procurement. As one of the respondents stated; ‘The CCR gave us the possibility to transport a part of our products by rail instead of air and ocean’ (SHI6, 2017). Sea transport was mentioned as a transport mode with big risks, not during the transport itself, but in procurement in general. The consequences of a big carrier that went bankrupt is one of the motivations of one of the respondents; ‘In 2015 we have seen Hanjin close, which caused us a lot of problems because containers with our products were still on their ships. So we are searching to spread the risks of transport, selecting multiple carriers.’ (SHI12, 2017). This was also mentioned by several other respondents, stating; ‘further more spreading risks over several modalities is a distinct choice for most users.’ (TER9, 2017).

**Other motives:**

Several other motives have been mentioned such as the fact that geographical location of their factories is determining which transport mode is best. Since they moved their production facilities to the west, rail is now much more attractive. Furthermore, the service level of rail and track and trace possibilities were mentioned.

### 4.4.2 Modal shift barriers

![Figure 10: Modal shift barriers](image)

In total 22 quotations were gathered that had something to do with barriers the respondents experienced in the modal shift to rail transport. We divided the quotations into 3 themes.
Network:
One of the barriers that users of the CCR experienced when they switched to rail transport had to do with building a network required for organizing the transports. Multiple respondents state having a good network is very important for being able to organize the transport via rail efficiently. As one of the respondents state that; ‘you will need a strong network to organize a good modal shift’ (CAR1, 2017). Creating the required network is described as difficult for some of the respondents. As one of the respondents tells; ‘It is difficult to bind all existing parties together.’ (SHI6, 2017). The same respondent also states that ‘You will need somebody that can organize the end to end transport for you and connect all the stakeholders together’. Multiple respondents state that they are using a network of local people and own staff on location to make sure all links in the supply chain are working together, as one of the shippers explains; ‘Currently we use our own China Supply Chain Manager to solve these issues’ (SHI5, 2017). Some carriers say that organizing a network is either possible via a good logistic service provider or via your own organization if it is big enough; ‘We see that especially bigger companies are interested in the CCR. This is because they have such big volumes, it is possible to organize a network worldwide. They use agencies and their own staff in China to make sure the trains keep running as planned.’ (CAR11, 2017).

Change logistics
Another barrier respondents have explained is the effort it takes to change logistic procedures in all the supply chain. Some respondents explained that switching from one transport mode to another is not just changing the way of transport on its own. It also requires changing the speed of production, ware house logistics and other supply chain disciplines. As one of the shippers explains; ‘One of the “barriers” we had to overcome were different loading and unloading schedules. Normally with sea freight, we have approximately 3 days’ time to load all containers before transport. But since rail freight is very punctual, we did not have this margin anymore. This required a different kind of planning at our production facilities’ (SHI12, 2017). Respondents tell that this barriers, which could be overcome also caused supply chain departments to doubt; ‘As soon as we started with our first train, our planning department was doubting if it would work.’ (CAR1, 2017). This doubt could lead to refusal of switching to another transport mode; ‘refuse to use other modalities simply because they are not used to them’ (CAR1, 2017). After finally switching to rail transport, multiple respondents tell that it takes a long time before trains are part of normal operating procedures; ‘took very long before the new transport mode rail has reached a normal mode instead of a project mode. There were always difficulties to solve.’ (SHI6, 2017)

Customs:
One of the less mentioned barriers experienced in switching to rail as transport mode had to do with customs. 2 respondents told that customs were viewed as a barrier for switching to rail.

4.4.3 Reputation of rail transport
The reputation of rail transport also played a role in modal shifts. In total 8 quotations about negative reputation of rail transport were gathered versus 3 positive reputation quotations. The negative reputation mainly had to do with companies being unexperienced with rail transport and expecting it to be complex to organize. As one of the respondents state; ‘People often think that railway transport is complex and difficult to organize.’ (CAR1, 2017). Also some respondents described that rail transport has the image of being old fashioned; ‘Rail transport has the image of being old fashioned with steam locomotives.’ (CAR11, 2017). On the other side of the reputation spectrum, 3 respondents answered that they either did not have any view on rail transport at all before they started, or that the image of rail transport seems to be rather positive due to the low environmental impact; ‘Rail has a positive image (co2 emissions).’ (TER7, 2017)
4.5 Future expectations and recommendations

We asked the respondents to give their expectations of the future of the CCR and to make recommendations in further improving it.

4.5.1 Respondent’s recommendations

In total 50 quotations were gathered that described recommendations for improving the CCR.

Policy:
The most recommendations were made about politics and governance. There are 3 main themes in these quotations; European policy, Chinese policy and cooperation between EU, China and Russia. For European policy, the respondents had multiple ideas, improving policy and governance. Most of these ideas were about solving political tensions between EU and Russia. As one of the carriers states; “Europe should think about declining their sanction regime towards Russia to stimulate further economic growth and possibilities to transport to China” (CAR1, 2017). Also, national problems should be solved according one of the respondents; ‘Political problems which make operational problems. Brest is not functioning because Poland and Russia are not cooperating.’ (TER7, 2017). Also, the European policy towards China is criticized, stating that Europe should be focused on strengthening relationships with Chinese government and companies. Europe should definitely play a bigger role in their cooperation with the China Europe line. ‘European politicians should show up more often on projects related to the CCR. We should try to get as much goodwill as possible from Chinese investors.’ (CAR10, 2017). The cooperation between the Eu and Russia and China should also be improved; ‘I think the most important issues to solve are the efficiency improvements. China Europe and Russia should combine forces to eliminate these problems’ (SHI5, 2017). Also the Chinese should improve their policy according to some of the respondents; ‘One of the bottlenecks is the lack of proper infrastructure, the Chinese government should invest in this, to solve it.’ (CAR2, 2017)

Geo-politics:
Multiple respondents explain that the geo political relation between Europe and Russia should be improved. They describe that the tension between the two, causes the CCR to be limited in success. As one of the carriers explains; ‘As soon as the political problems such as economic sanctions between Europe and Russia are gone, the rail transport between Europe and China will boom.’ (CAR1, 2017). Another respondents describes; ‘As discussed the most inhibiting factors at this moment are the congestion in Brest and the political tensions between Europe and Russia’ (TER8, 2017).
Imbalance:
One of the other improvements that should be focused on is declining the trade imbalance between China and Europe. As multiple respondents state that this is one of the biggest problems of the route since it causes a lot of empty backhaul. ‘If the imbalance would be solved, the CCR would not have to rely on subsidizing. That’s why we should use the potential of the east European countries to enable them to send products back to China, I can see there is great interest from them in that.’(CAR3, 2017).

Lack of innovation:
Also, multiple respondents find the innovation in the railway sector and the CCR project lagging. As one of the respondents state; ‘If the railway sector will not be more innovative, they will always be limited.’(TER9, 2017). According to respondents, innovation could be simple things such as making terminals suitable for different container sizes; ‘Also the possibility to transport other platforms as 40ft would be very attractive. China seems to be more focused on 40ft.’(SHI6, 2017).

Efficiency:
Some of the more experienced respondents state that the CCR could be improved in terms of efficiency. One of the respondents’ states: ‘I think a lot of people and organizations are inventing the same wheel. There should be an organization which bundles agents, ideas and initiatives. I absolutely do not see any cooperation between parties to solve the problems everybody has. There is no joint cooperation. ’ (TER9, 2017). Similar quotations have been made by other respondents; ‘Next to that we see an increasing competition between several provinces in China. They are competing against each other and try to be more attractive than the other. Of course, this is very beneficial for the price, but it also costs a lot of efficiency for the east bound trains. Why not combine trains together? (see Kohrgos).’(TER8, 2017).

Infrastructure and interconnectivity:
Multiple respondents state that interconnecting the CCR with other countries could be beneficial for all users as the frequency of trains would increase. As one of the respondents’ state; ‘Another big chance would be if we can connect the new route to other regions like Turkey, Iran, and middle eastern countries. It would open up new markets for us in Europe’(SHI6, 2017). And ‘If we can improve the interconnectivity of all countries near the CCR, the CCR will be a greatly used route in the future.’(CAR3, 2017). Respondents also mention that infrastructure should be improved. Especially the entry point of Europe, Brest, is mentioned.

4.5.2 Respondent’s expectations
We gathered 23 quotations about expectations for the future of the CCR. All of them were positive. No respondent mentioned any negative expectation for the future. Some respondents however thought that the CCR would have a great future for certain categories of products such as high value goods or goods with expiration dates. But not all goods would be interesting for the CCR; ‘I do think this is a great alternative already. Especially for products with an expiration date or high value goods. I do not think it will be suitable for all commodities.’(SHI6, 2017). It seems that multiple respondents think that the CCR is most attractive for companies using air freight now, since this is so expensive. Other respondents told that the ambition of the CCR is big, but not impossible; ‘The Chinese government wants to drive 5000 trains by 2020, currently we already have 2300 trains a year between China and Europe. Although it is ambitious I do believe that it is possible.’(CAR10, 2017). Also, the consequences of European logistics were mentioned several times; ‘In West Europe hinterland developments are very expensive. In East Europe this is completely different. Thus I think that if they see the chances as I mentioned, it could absolutely change our existing network.’(TER9, 2017). In general, all respondents expect that the CCR will grow and be successful on the long term. Also, the respondents tell, that they expect that if Western European countries fail to act in time, the logistics in Europe might shift from West to East in the future.
In the figure below you will find the revised conceptual model, that is formed after combining all the results and patterns described above. This figure is a simplified version of the model that was generated with help of the CAQDAS program. See appendix 10.

![Figure 11: Revised conceptual model](image)

Figure 11: Revised conceptual model
5. Discussion and conclusions

5.1 Discussion

The Central Corridor Route is a rail transportation route between Europe and China. Since the route is relatively new, not many researchers have had the chance to investigate the route. The main goal of this research is to answer if the Central Corridor Route will be a viable alternative to current transport routes. To answer this question, 5 research questions were made inspecting transport selection methods, developments, strength and weaknesses of the route, the influence of policy on the route and the motives of executing a modal shift. It seems that the Central Corridor Route is becoming a popular transport mode. It is already becoming an often-used transport mode between Europe and China.

Due to economic developments such as the westward move of factory production and welfare increase in China, transport selection is changing, as earlier research also describes. It was found that problems with sea transport play a major role in the popularity of the Central Corridor Route, something earlier researchers such as Rodemann and Templar (2014) did not find. Uncertainties in this most used transportation mode led respondents to search for alternatives. Port congestion described by Cullinane and Wang (2006a) did not seem to be a problem. Referring to research question 5 we can conclude that there are certain developments that have a positive influence on the popularity of the Central Corridor Route, one of these developments are the relatively new problems with sea transport. We can also support the theory of "The handbook of logistics & distribution management, 4th ed" 2010), where developments are part of operational factors which influence modal choice and modal shift.

The organizations which we interviewed were mainly focused on timing and price during their transport mode selection. It was found that the selection factors have a strong relationship with the strengths of the route. Timing and pricing of the Central Corridor Route appears to be its main strengths. As Tong et al. (2010a) also concluded, it was found that timing and price are constantly compared. Furthermore, selection factors such as liability and service were important for some of the respondents. We can see that developments have an influence on which selection factors are important. Since transport destinations are moving more westward, transit time with sea transport increases and organizations start to look for alternative transport modes. We can conclude that the selection factors do differ from case to case as stated in research question 1 but for most of the organizations using the CCR, transit time and costs played the most important role. Developments had a large influence on which selection factors where important.

The route fills in a gap for most of the organizations in terms of costs vs. timing score, since air transport is faster but more expensive and sea transport is slower but cheaper, as also stated by Rodemann and Templar (2014). Additional strengths that users of the CCR noticed after choosing to test it, is that the CCR enables users to be more in control of the transport. This seems to be very important for its users, since this control can bring them benefits in terms of supply chain efficiency, security and information. Weaknesses we found in the literature research such as security issues were not apparent anymore, as the route seems to be more mature on these aspects nowadays. However, the Central Corridor Route still has its perks as we found that custom procedures are still fuzzy and unclear. Since customs take a lot of time, this is a direct threat to its main strength; transit-time. Surprisingly, problems related to infrastructure and capacity were not located in the ‘less-developed’ countries like Kazakhstan as described by Dewan Md Zahurul et al. (2013). We found, that these problems mainly occur in Europe instead. This must do with the lack of infrastructural capacity and national barriers such as language, regulations, customs etc. As one of the respondents stated; ’We put 20% of our effort in 80% of the total travel distance of the CCR. This means from
China to Europe we do not experience any problems what so ever. But when we enter Europe, problems start to rise.’ (CAR3, 2017). Furthermore, it was found that the route is still plagued by the trading imbalance between Europe and China. This was also concluded by (Rodemann & Templar, 2014) But now 3 years later, transport volumes have grown and this imbalance is becoming one of the most restricting factors for the Central Corridor Route. As volume from China seems to grow, but transport from Europe is lagging.

This is where the relationship with government policy in Europe and China comes into play. We found that there is a direct relationship between several weaknesses of the route and the policy of European and Chinese government. European government policy was criticized by almost all our respondents, stating it was not supporting the success of the route, seeing only threats instead of potential opportunities. Islam et al. (2016) stated that EU policy initiatives were positive but too slow in development. But we see that European rail policy is not up to date as it seems to think within European context only, not overseeing the bigger picture of global logistics. The trading imbalance for example is partly a result of the relationship between EU and Russia, were trading embargoes are limiting the possibilities for European shippers to transport their goods such as food through Russia. According to our respondents, solving these embargoes could solve the trade imbalance for most part. Although the corridor policy of the European Union seems to be ambitious, it is rather remarkable that despite all the efforts, transit time is the longest on the shortest part of the route. So far, the success of the Central Corridor route in Europe seem to be a privately organized thing, were hinterland terminals and logistic service providers succeed in doing so without the support of Europe. The Chinese government is using the OBOR project as one of its flagships towards a new position in world economy (Yu, 2016). However, we found that despite its funding and promoting, Chinese government also has its problems. The CCR depends largely on Chinese subsidies, funding the losses caused by inefficiencies such as empty backhaul due to the trading imbalance. On the other hand, Chinese government policy seems to promote competition between Chinese cities to organize their own trains to the same destinations. This results in inefficiencies such as 2 half loaded trains going from 2 places in China to the same location in Europe. Beside inefficiencies, the Chinese Government still has a lot to learn as it seems to be that they are only oriented at one size containers (40ft). This limits the possibilities of the CCR since more container sizes are used globally. We can conclude that government in Europe and China policy can make or break the further success of the CCR. It has a large impact on its (future) success.

The users of the CCR which we interviewed used air or sea transport before. Earlier research states that goods such as high value electronics and adhoc deliveries are mainly transported by air. (Tong et al., 2010a). We do not doubt that this is true, but we discovered that rail transportation between Europe and China offers new possibilities. Two producers of electronics which we interviewed switched to rail transport instead of air. Their main motives were cost savings, since air transport is the most expensive way of transport. Organizations that used sea transport before, were motivated by the much shorter transit time of rail. Also, risk-spreading by dividing transport over multiple modalities was mentioned, especially by the respondents which have used sea transport before. This motive has not been described by earlier research. Although the respondents were very motivated to use the CCR as an alternative transport, the lack of network and change of logistics were barriers they had to overcome. Therefore, we can support the statement made by Truschkin et al. (2014) that a modal shift requires a decent network. The reputation of rail transport did not play a role.
5.2 Conclusion
All in all, we can conclude that the Central Corridor Route has really developed itself in the last 3 years. The different variables that we have described in our conceptual model, not only have a certain relationship with the viability of the CCR, but also relate to each other. Developments play an important role in the motives for organizing a modal shift. In a time were sea transport is plagued by problems and uncertainties and organizations have few other options such as air transport, the rail connection comes as a welcome alternative. Within this modal shift, it are the selection criteria that result in the choice for the CCR. Timing and pricing are the most important. Thanks to its strengths, it is very appealing. With its medium transit time and medium price, it might just fix its position as a new way of transport. We see that policy plays an important role in the future of the CCR. It has a great influence on its strengths and weaknesses. Nowadays largely dependent on Chinese subsidies, it will be a challenge for all stakeholders to let the CCR stand on its own. When succeeded, the Central Corridor Route, might change the logistics in Europe as we know it today. As for now, the Central Corridor Route already is a viable alternative for its first users. Depending on developments and support by government policy it will grow to a mature form of transportation between Europe and China.

6. Limitations and recommendations

6.1 Limitations

Reproducibility:
This research has used multiple cases of organizations already using the route. The study has shown that the route is developing at a rapid rate. The development of the route is so fast, that even recent studies of the past 3 years are already out of date on some parts of their conclusions and findings. It is therefore likely that later research will find new information on the development of the route. We have made use of 11 organizations that are interviewed in a semi structured way. This takes a lot of time and it is likely that an interview can never by 100% reproduced when undertaken by a different interviewer. We used Atlas.ti, to code and reorganize all information received in the interviews. As described by (Saldaña, 2009), coding is an individual process that will never be exactly the same when undertaken by somebody else. Doing the coding process via a program like Atlas enables reviewers to see how coding was done and which quotations have led to certain codes. In this way, the reproducibility of the research will be increased although the influence of one’s individual perspective on quotations shall always be of importance.

Sample size:
The sample size of 11 interviews is not representing the total population of organizations using the Central Corridor Route. This is also very difficult to determine and achieve since the amount of organizations and variety of organizations using the CCR is continually changing. The number of interviews in combination with the experience of most respondents, led to sufficient information for analyzing the CCR since the goal of this research was also explorative.

Interview limitations:
Due to the limit of time and resources, it was not possible to interview more stakeholders. We preferred doing personal interviews and seeing the respondent in person instead of interviews by phone. This takes more time since all interviewees were located across the Netherlands, Belgium and Germany. We also wanted to interview some politicians about the Central Corridor Route. Unfortunately, due to very busy agenda’s this was too difficult to plan.
6.2 Future research

Future research can be aimed at several research topics. We would recommend aiming future research on a variety of topics:

- Quantitative comparison of strengths and weaknesses: do a quantitative study where many shippers and carriers are questioned about the strengths and weaknesses of the Central Corridor route, to assess our findings.
- Qualitative experiment of subsidy part in total costs: We would also like to encourage to execute a research addressing the subsidy compensation in relation to the total costs of transport within the CCR usage. This would give more insights in the dependence on subsidies of the CCR and how to overcome this dependency.
- European government policy: It was found in this research that European government policy was lagging, not up to date and internally oriented. We would advise to undertake more research, interviewing several government bodies through Europe to find out about governments perspective on eastern connections to Asia and its role in the future.
- Trade imbalance: The trade imbalance was mentioned as one of the biggest weaknesses of the Central Corridor Route. It has been linked to several causes such as export and import volumes, political sanctions and technical limitations. Since the impact of this trade imbalance is so big on the success of the CCR, we would like to see future research, examining this trade imbalance. It would contribute to academic and practical knowledge on what are the main causes of this trading imbalance and how to solve it.
- Future impact of the CCR on European logistics and capacity: We expect that if the CCR succeeds to grow in the future, it might change the logistical landscape in Europe forever. It would be interesting to investigate the impact of such growth and find out how European logistics can prepare itself.

6.3 Practical recommendations

We have seen that the CCR is a new way of transport with a lot of potential. Unfortunately, due to mainly political problems and governance of both Europe, Russia and China, the success so far is still limited. We would like to advise Chinese officials to rethink their subsidy policy and spend more time/money on solving inefficiencies instead of compensating the results of these inefficiencies. Investing in research to discover inefficiencies and improve them empirically could be a good investment.

Also, we would like to make a recommendation towards European policy makers to embrace the possibilities of the Central Corridor Route by strengthening relationships with China and Russia. Updating the European transport policy to a more global oriented policy is recommended. Western countries such as the Netherlands, should reconsider their chances of being a transit country in the future. They should welcome possibilities to collaborate with the Central Corridor Route. The Central Corridor Route should not be viewed as a threat to the Dutch harbors, but as an opportunity to expand logistic possibilities. The development of the Central Corridor Route and its possible consequences for European logistics certainly should not be underestimated.
References


Appendix 1: China – Europe routes

Source: (Dewan Md Zahurul et al., 2013) (T. van Rooijen & R. Jackson, 2012)
Figure 13: Connection between Europe and China over road bridges.
Appendix 2. Rail Freight Corridors

Source: ("Rail Freight Corridors (RFCs) - RailNetEurope (RNE)," 2017).
Appendix 3. Coding scheme

Source: (Saldaña, 2009)
## Appendix 4 Research logbook - coding

<table>
<thead>
<tr>
<th>Date</th>
<th>Action</th>
</tr>
</thead>
</table>
| 15-6-2017  | Separated the paragraph developments to a new separate chapter called: Chinese economy developments  
And added a research question: Do Chinese developments of its economy play a role in the popularity of the CCR?  
*note: this change has been conducted after interviews were finished, therefore the interview protocol could not be changed. |
| 25-6-2017  | After reading (Saldaña, 2009) I have found our way of coding and set up a coding plan. I will initiate coding with the structural coding method which means we will code all pieces of qualitative data to various themes and questions. After that I will invivo code the specific texts into detail. Eventually I will try to reduce the number of Invivo codes to a minimum. The plan is that with this minimized number of codes and structural codes, we can proceed pattern matching.  
Anonymized all interviews  
Categorized first big structural coding categories such as respondent characteristics. |
| 5-7-2017   | Today the coding of the first interview has been carried out. I have made several structural and attribute codes which indicate if the correspondent is a shipper, carrier our terminal. Also, other correspondent characteristics such as experience with the CCR are made.  
I have used the 4 research questions to group certain codes together. Hopefully this will give better insights when analyzing the codes used. |
| 7-7-2017   | Today I have consulted professor Semeijn guiding our research about the methods of coding. I already intend to use attribute and invivo coding for most of the interviews. But during the first cycle of coding, we noticed that in the category: selection-criteria; I placed over 60 invivo codes per interview. This resulted in a very large list of invivo codes which then could be reduced to main codes. But since I already described the most important selection criteria in our literature review, our professor advised us to use list codes instead for these questions. In this way, the coding takes less time and is still as accurate. I have also added this to the research method. |
| 8-7-2017   | After watching several video tutorials provided by Atlas.Ti, we decided that the coding system should be at least in some form be prescribed in excel. In this way, we could have an overview of the structures in different sections of the interview and the different categories that would emerge. After following some tutorials |
on the internet, I came up with a first general coding scheme for the interviews.

Later we found that updating this excel sheet will take a lot of time and therefore it could better be monitored in the code manager of Atlas.ti.

I have made several categories like SELECTION CRITERIA, in which I have enlisted codes such as SELECTION CRITERIA – Timing, SELECTION CRITERIA – Security. In the same way, we also predefined the category DEVELOPMENTS, and made a code such as DEVELOPMENTS Congestion, based on what I have found in the literature review. For other INVIVO codes which I cannot group yet, I made a code DEVELOPMENTS – Other. This will later be reviewed and split up into different appropriate codes.

I also tested the function co-occurrence table. I found out how they function, and tested the existing codes.

<table>
<thead>
<tr>
<th>Date</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td>9-7-2017</td>
<td>Today I have done the first cycle coding of 1 interview. I have worked in this order:</td>
</tr>
<tr>
<td></td>
<td>1. Invivo coding per question and per interview section</td>
</tr>
<tr>
<td></td>
<td>2. Group the Invivo codes together into new codes</td>
</tr>
<tr>
<td></td>
<td>3. Make a category</td>
</tr>
<tr>
<td>16-7-2017</td>
<td>Today all interviews are coded. I will now review the codes and see if I can reduce the number of codes. Also, I will try to link codes together so we can build a relation model. Unfortunately, our computer crashed and I had to restore a lot of data, this took 2 days.</td>
</tr>
<tr>
<td>21-7-2017</td>
<td>After the coding of all interviews has been carried out. I ended up with a lot of codes having more than 30 quotations in it. I have taken a closer look at these groups to see if we can divide these codes into sub codes. I used the network editor to read all quotations under a certain code. Grouped certain quotations with a common team together, added new sub codes, and attached the grouped quotations to the belonging sub code. For example, I have seen that the code MODALSHIFT-Barriers holds too many quotations. After close examination, we have found certain similarities in the quotations. We have made new sub codes and started to divide the certain codes to the belonging sub codes.</td>
</tr>
<tr>
<td></td>
<td>The making of sub codes was not always an easy job. Since many of the quotations are related to each other, I found it very difficult to come up with a logical sub division. I used the network tool of Atlas TI to group quotations into concept groups. This was a dynamic process of grouping and regrouping until a good division was found.</td>
</tr>
<tr>
<td></td>
<td>Today I also called Atlas.Ti to ask how attributes like gender, age, job or experience with the CCR can be best organised for analysis. It turned out that making document groups is the easiest way doing this. Document groups enable us to do co-occurrence analysis of the data in respect of certain attributes of the interviewees.</td>
</tr>
<tr>
<td></td>
<td>Changed the Strengths sub codes from STRENGTHS – Intervention and</td>
</tr>
</tbody>
</table>
STRENGTHS – Information to STRENGTHS – Control – Intervention and STRENGTHS – Control – Information. Since there is a strong relationship between feeling in control and both sub codes.

Divided STRENGTHS in: control, easy customs, flexibility, frequency, good infra, pricing, reliability, timing

After evaluating WEAKNESSES, I divided it into: 40ft only, congestion east EU, customs, efficiency, facilities, imbalance, other, pricing, product limitations due to policy. I can see direct relationships with policy codes, so we have made a memo about this for later.

I have split up the code MODALSHIFT – Repu in positive and negative reputation.

24-7-2017 I consulted Professor Semeijn to discuss several topics. After a brief telco, we made the following decisions:
- remove the chapter summaries in the literature review
- Describe methodology after the literature review
- use the propositions as a guideline for describing the results
# Appendix 5: Code list

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<th>Groups</th>
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52
Appendix 6: Network tool Atlas

1183 Rail offers a possibility to check cargo, repair containers during transport.

3:22 The CCR gives our customers a better feeling of control.

1182 Next to that our customers feel more in control of their transport via the CCR.

145 Possibilities to intervene during transport

144 When necessary, rail offers a possibility to check cargo, repair containers during transport. Thanks to GPS the cargo is easy to control and to monitor. Our customers appreciate it when they can see where their cargo is.

195 However, we want to assure customers that we have the possibilities to provide service levels comparable with road transport, via rail transport. Track and trace is thereby of big importance since we have to know why (possible) problems are occurring, were containers are standing and how we can find a solution as soon as possible.

1185 Our customers appreciate it when they can see where their cargo is.

148 Track and Trace

STRENGTHS - Control

STRENGTHS - Control - Intervention

STRENGTHS - Control - Information
# Appendix 7: The list of prohibited articles

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<td>Frozen beef</td>
</tr>
<tr>
<td>0203</td>
<td>Fresh &amp; Frozen pork</td>
</tr>
<tr>
<td>0207</td>
<td>Fresh &amp; Frozen poultry meat &amp; slaughter by products</td>
</tr>
<tr>
<td>0210中的&lt;**&gt;</td>
<td>Bacon, ham, dried meat, salt water ham</td>
</tr>
<tr>
<td>0301中的&lt;**&gt;</td>
<td>fresh fish</td>
</tr>
<tr>
<td>0302,0303,0304,0305,0306,0307中&lt;**&gt;，0308</td>
<td>fish and shellfish, mollush, Other aquatic invertebrates</td>
</tr>
<tr>
<td>0401 &lt;<strong>&gt;中、0402 &lt;</strong>&gt;中、0403 &lt;<strong>&gt;中、0404 &lt;</strong>&gt;中、0405 &lt;**&gt;中、0406</td>
<td>milk and related products</td>
</tr>
<tr>
<td>0701（0701100000除外）</td>
<td>Vegetables, tap roots &amp; tuber crops</td>
</tr>
<tr>
<td>070200000</td>
<td></td>
</tr>
<tr>
<td>0703（0703101100除外）</td>
<td></td>
</tr>
<tr>
<td>0704</td>
<td></td>
</tr>
<tr>
<td>0705</td>
<td></td>
</tr>
<tr>
<td>0706</td>
<td></td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>070700</td>
<td></td>
</tr>
<tr>
<td>0708, 0709, 0710, 0711</td>
<td></td>
</tr>
<tr>
<td>0712 (0712901100除外)</td>
<td></td>
</tr>
<tr>
<td>0713 (0713101000除外)</td>
<td></td>
</tr>
<tr>
<td>0714</td>
<td></td>
</tr>
<tr>
<td>0801, 0802, 0803, 0804, 0805, 0806, 0807, 0808, 0809, 0810, 0811, 0813</td>
<td>Fruit &amp; Nuts</td>
</tr>
<tr>
<td>160100</td>
<td>Sausage &amp; relative products with meat, slaughter by products and blood; other products which is made by meat, slaughter by products and blood</td>
</tr>
<tr>
<td>1901 90 1100中&lt;**&gt;</td>
<td>edible product &amp; finished product</td>
</tr>
<tr>
<td>1901 90 9100中&lt;**&gt;</td>
<td></td>
</tr>
<tr>
<td>2106 90 9200中&lt;**&gt;</td>
<td></td>
</tr>
<tr>
<td>2106 90 9804中&lt;**&gt;</td>
<td></td>
</tr>
<tr>
<td>2106 90 9805中&lt;**&gt;</td>
<td></td>
</tr>
<tr>
<td>2106 90 9809中&lt;**&gt;</td>
<td></td>
</tr>
<tr>
<td>1901 90 9900中&lt;**&gt;</td>
<td>edible product &amp; finished product which include 1.5% or more cheese</td>
</tr>
</tbody>
</table>
Appendix 8 interview protocol

Interview protocol

This section contains general information about the interviewee’s role and company / organization. Please answer below questions if applicable.

1. Name of the interviewee:

2. Job title of the interviewee:

3. Date:

4. Name of stakeholder organization:

5. Key role of stakeholder organization:

6. Key organization facts

7. Turnover:

8. Number of employees:

9. Sources of income: (product type etc.).

10. How is your company involved in the use of the CCR?

11. Primary stakeholder interaction: with which organizations that are involved in transport via the rail freight land bridges between Asia and Europe does your organization interact?

12. Is your company already using or intending to use the CCR?

13. What kind of products does your company need to transport?

14. How many products does your company transport yearly between Europe and China?
1. How are companies selecting the way of transport and which transport selection criteria are important in EU-China transportation?

1. What are the requirements / needs for customers that use intercontinental rail transport between Asia and Europe?

2. Can you rank these factors from most important to less important? Please put the most important factor on position one, followed by the second most important factors and so on.

3. Have these factors changed? If so, how come?

4. Do developments as capacity problems, empty backhaul, port congestion and internal transport problems in China play a role in selection of the CCR?
2. **What are the current strengths and weaknesses of the CCR?**

1. What are the strengths of the current CCR? Why are these important to you?

2. Have you ever considered other alternatives such as the Trans-Siberian route? Do these offer good alternatives to you?

3. Which factors make rail freight attractive for customers of intercontinental transport between Asia and Europe?

4. Which factors are restricting intercontinental rail transport between Asia and Europe? What are weaknesses?

5. What kind of developments play a big role in the importance of railroad transport to and from China?

6. Does your company need to transport goods to a destination in China more west than before? Does this influence your choice of transportation mode?

7. Do you or did you experience difficulties in transportation between Europe and China before? What kind of difficulties?

8. Are these difficulties a showstopper and how do you handle them?
3. How does EU and Chinese policy and governance influence the choice of modality for transport to and from China for organizations?

1. Are you familiar with European policy such as the White paper and corridor policy?

2. How does European policy support your organization to use the CCR? Does this policy influence the choice of transportation mode?

3. How does Chinese policy support your organization to use the CCR? Does this policy influence the choice of transportation mode?

4. What role should policy play in the use of CCR?

5. Do you think policy should support you more in using the CCR? In what way should you be supported?
4. **What makes a company choose for a modal-shift/new modality to use for its transportation? What are the motives and barriers of choice?**

1. Why is your company looking for alternative transportation possibilities?

2. How did you transport your goods before?

3. Why did you organize a modal shift?

4. Where there any barriers in organizing a modal shift?

5. Did the reputation of railway transport play a role in the decision for modal shift? If so how come?

6. What strengths does sea transport have compared to rail transport between Europe and China?
5. **Future Scenario**

These questions are very open on purpose as they refer to future scenarios. Any answer is valuable.

1. How do you see the future of rail freight land bridges between Asia and Europe?

2. How would you rank the steps to be taken to mitigate inhibiting factors in the future? Please put the most important factor on position one, followed by the second most important factors and so on.

3. How would intercontinental rail freight between Asia and Europe look like if all inhibitors had been mitigated? If possible, please relate your answer to aspects like time, cost and quality.

4. What are the most important weaknesses of the CCR you hope will improve in the future?

5. Do you think rail-freight will be a viable alternative in the future?
### Appendix 9: List of interviewees

<table>
<thead>
<tr>
<th>Stakeholders role</th>
<th>Turnover</th>
<th>Number of Fte.</th>
<th>Organization based in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logistic Service Provider</td>
<td>600m</td>
<td>&gt;5000</td>
<td>Worldwide – 16 countries</td>
</tr>
<tr>
<td>Logistic Service Provider</td>
<td>N/A</td>
<td>&gt;50</td>
<td>Netherlands, Germany, China, Poland</td>
</tr>
<tr>
<td>Logistic Service Provider</td>
<td>N/A</td>
<td>&gt;250</td>
<td>Worldwide</td>
</tr>
<tr>
<td>Rail terminal</td>
<td>N/A</td>
<td>&gt;400</td>
<td>Netherlands, Germany</td>
</tr>
<tr>
<td>Rail Terminal</td>
<td>N/A</td>
<td>&gt;100</td>
<td>Germany</td>
</tr>
<tr>
<td>Railway Company / Logistic Service Provider</td>
<td>N/A</td>
<td>N/A</td>
<td>Kazakhstan</td>
</tr>
<tr>
<td>Logistic Service Provider</td>
<td>N/A</td>
<td>&gt;400</td>
<td>Worldwide 8 countries</td>
</tr>
<tr>
<td>Manufacturer Electronics</td>
<td>22 bn.</td>
<td>&gt;105.000</td>
<td>Worldwide</td>
</tr>
<tr>
<td>Railway Company / Logistic Service Provider</td>
<td>20 bn.</td>
<td>&gt;95.000</td>
<td>Worldwide</td>
</tr>
<tr>
<td>Manufacturer Food Products</td>
<td>11 bn.</td>
<td>&gt;22.000</td>
<td>Worldwide</td>
</tr>
<tr>
<td>Manufacturer Electronics</td>
<td>19 bn.</td>
<td>&gt;110.000</td>
<td>Worldwide</td>
</tr>
</tbody>
</table>

Table 3: Profile of Interviewed companies
Appendix 10: Suggested model by Caqdas program ATLAS