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The viability of the Belt Road Initiative

A qualitative analysis

Abstract:

In this bachelor thesis the viability of China's Belt Road Initiative will be assessed. First, the current transportation network design will be sketched. This sketch will include the emergence of the design, the motives behind it, the current transportation situation and the cons of the current network design. Afterwards, the Belt Road Initiative, as initiated by China, will be explained. Taking into account China's motivations, BRI-related investments, (geo)politics and the consequences. Knowing this, the future potential of the Belt Road Initiative will be discussed, which seems to be quite extensive. The conclusion qualitatively indicates that the Belt Road Initiative can be considered a viable complement to the current network design. Moreover, it can be stated, in a qualitative sense, that the Belt Road Initiative increases the current transportation efficiency. Taking this into account, the Belt Road Initiative is concluded to be a viable alternative, which gives China an even more stable position in global trade.

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Introduction

Eurasian trade has been exploited for centuries and has brought both continents several periods of wealth. Of course, the Italian explorer Marco Polo is a famous exploiter of this route, making him a central figure in the European Renaissance period. Nevertheless, the route was discovered centuries earlier by the Romans. The Chinese Han Dynasty started to use this network during the centuries of the Roman Empire. From approximately 130 B.C. onwards this connection came to be known as ‘The Silk Route’. After the fall of Byzantium in 1453 A.D. the trade route came into the oblivion, due to a boycott by the new rulers. (Histroy.com Staff, 2017)



Figure 1: the ancient Silk Route | Source: Quora

During current times of globalization, infrastructural integration has become a major topic in worldwide economic policymaking. To encourage this phenomenon both the United States and China designed plans to boost the trade relationship between The Far East and Europe. Despite, the two world powers clearly have different motives. The U.S. aims to secure and expand the political stability in Central Asia, after its planned withdrawal from Afghanistan during the Obama registration. China, on the other hand, wants to boost its own economy by providing transport opportunities for its domestic products. China’s president, Xi Jinping, wants to show the world “a more assertive China” by operating a self-led trade route. This trade route offers possibilities to further integrate in foreign trade, to stabilize energy supplies, to develop Asia’s infrastructure and above all increase China’s influence in Asia. China’s plans are twofold, whereas the plans from the U.S. only concern joint investment projects leading to regional trade blocs. The regional trade blocs have to ensure diplomatic stability amongst the countries situated in Central Asia. A more specific example of American plans is a pipeline network connecting Central Asia and China. The first focus of China’s project is named the ‘Silk Road Economic Belt’ which includes land-based infrastructural development in Central Asia. The second part contains the design of a ‘Maritime Silk Road’. All in all, the Chinese OBOR¹ initiative focuses on getting rid of the bottleneck in Asian connectivity. This bottleneck blocks the westward trade through former Soviet Republics and the southward trade towards India, Pakistan and the rest of Southwest Asia. (McBride, 2015)

Focusing on China, it can be concluded that the BRI² is a key component of China’s Greater Neighborhood Policy. This policy rests on the basis of investments in transport corridors; infrastructural projects regarding air, rail and road transport. To complete the so-named ‘Economic Belt’ China designed

¹ One Belt, One Road

² Belt Road Initiative

a network of sea routes, as stated above, contributing to the Eurasian connectivity as well. Above all, the sea network aims to provide China a mean of controlling its own trade routes, strengthening their position in international trade. (Fallon, 2015)

According to the Chinese government this new project offers several opportunities for the development and the increase of social stability in Western China and Central-Asia. Furthermore, it must clear the obstacles for economic growth, i.e. by decreasing the energy dependency on Russia. Several states in Central-Asia feature serious opportunities for the production of energy, which China aims to use. Therefore, they benefit from a good relationship with these particular countries. Besides that, the Chinese aim to establish themselves in Mediterranean ports. A good example of this, are the recent investments in the port of Piraeus, Greece. Such investments contribute to the development of the ‘Maritime Silk Road’. Conclusively, it can be said that the abovenamed plans and many others, mentioned in the theoretical framework section, increase China’s influence on the World’s stage and are part of its long-term economic strategy. (Brugier, 2014)



Figure 2: China's Belt Road Initiative | Source: Amaan, 2017

Before the BRI, there were two major connections to facilitate the east-west trade between Europe and China. The first one was and still is the sea route that runs between the huge Chinese ports and the ports of Western Europe, such as the Port of Rotterdam. Secondly, there was and still is the air connection, for freight with limited waiting times. Shortly, there is sea transport enhancing long transit times and cost efficiency, on the one hand, and air transport which is cost-ineffective, but very fast on the other. Looking at the existing modal options, it might be that the transport market is not facilitated to the most efficient

extent. Because there are some intermediate goods that might profit from faster transport than via enormous container vessels. However, air transport is too expensive for these goods. China's plans possibly aim to accommodate transport options for these intermediate goods through the introduction of both the 'Silk Road economic belt' and the 'Maritime Silk Road' (see figure 2). Throughout this research, the viability of the BRI will be investigated. Belonging to this is the following research question:

How viable is the BRI as an alternative to the currently existing transportation modes between the Far East and Europe?

This research question aims to sketch a good image of the exploited market in the east-west trade and China's OBOR plans. To formulate a complete and detailed answer on the research question five hypotheses are tested. All five are listed below:

1. *The BRI enhances efficiency in terms of costs and time.*
2. *The BRI exploits a niche market.*
3. *The BRI serves as a good complement to the currently existing transportation network.*
4. *The BRI makes China the leader in world trade.*
5. *The BRI has significant future potential, both land and sea wise.*

Since all the hypotheses focus on the BRI, it can be concluded that the main focus of this research is on the trade between China and Europe. Of course, several contextual subjects belonging to this trade network will be considered as well, for example geopolitics. These subjects will be elaborated on further on in this research. The elaboration starts off with the theoretical framework, which is divided up into a section upon the current transportation network design and a section upon the Belt Road Initiative. Throughout several subsections an image will be sketched about modalities, motives behind the current and desired situation, consequences and the future potential of the BRI. To finish the qualitative analysis, the hypothesis will be tested. Finally, the research question will be answered and the shortcomings of this research will be discussed.

Transportation network design

Globalization and its influence on the Euro-Asian trade

Asia

Over the past few decades globalization has been and still is one of the main drivers of the daily life of human beings. Globalization leads to a converging worldwide society and the main driver of this convergence is technology. (Levitt, 1983) Also, China has adapted and surrendered to this phenomenon at the beginning of the 21st century. This can be linked to their current development, which focusses on the integration in global, social and economic networks. (Long & Woods, 2011) China's development has significant consequences for the world economy, mainly due to its potential economic size. Therefore, it is logic that Harris (1993) typed globalization as the "increasing internationalization of the production, distribution and marketing of goods and services". China has always had a lot of economic potential. A huge population (working force) and wide variety of raw materials were the main components of this potential. Nevertheless, the communistic government prevented the country from utilizing it optimally. Since, the country has started to open up its borders and broadened its view, it has experienced a huge progression. Chinese ports became the biggest in the world, exporting companies such as Alibaba became world-leading and above all China established its position on the world's stage. Moreover, China wants to expand and invest to become the most dominant world power. They want to be in control of important economic facilities and exploit globalization to the fullest. Current actions and projects confirm this, but the most important question to be asked for this research is: 'How will China's aspirations concerning globalization affect the current structure of the trade between Europe and the Far East?'

In less than three decades China transformed from a marginal player in global trade to the number three trading country worldwide. (World Trade Organization, 2005) According to Branstetter & Lardy (2006) there are four central themes that lead to the rise of the Chinese economy:

1. The WTO³ accession, which opened up the country for trade. Prior this accession China already achieved a greater degree of openness. However, the admission to the WTO is considered to be a significant driver.
2. Additionally, the extra mandates included with the WTO accession made the economy the most open of all developing economies.
3. The developments in China's trade and investment strategies. These lead to competitive advantages for China and its trading partners.

³ World Trade Organization

4. Stubborn exchange rate policies that were not in line with macroeconomic fundamentals. Due to this the Yuan (China's currency) is undervalued, making it favorable for other countries to import from China.

So, the Chinese economy opened up during the late 1970s, helped by the WTO. Besides that, its government decided to adapt its trade and investment policies and change its exchange rates policies rigorously. All this helped the country to obtain a dominant position in world trade. China became a big exporter worldwide, which became constantly easier, because certain barriers were lifted by the process of globalization. (World Trade Organization, 2005) Good examples of such barriers are, communicative barriers and free trade agreements. The world simply became more international. People can understand each other better, because they speak the same language. Moreover, it is easier to come in contact, because of technological developments. Besides that, the removal of trade barriers facilitated international trade to a large extent. China, with its relative low production costs, anticipated on this and started to export more and more to the U.S. and Europe. This trade was again facilitated by the increasing ease of communication.

By opening up its economy China started to trade on world level. This could be seen during the late 1980s, because the variety of traded commodities grew. However, most commodities were subject to regulations (licenses and quotas). (Branstetter & Lardy, 2006) Positively, these restrictions were cut significantly a decade later, which resulted in an even more open and trade-minded economy. (Lardy, 2002) The fact that China left its protectionism somehow behind, gave several ports the room to grow. This is due to the fact that the country not only started exporting extensively, but importing as well. As means of support, fourteen coastal cities were opened in 1984 along the long coastal line, which gave the development of sea bound trade in China a bright future. (Cheung & Yip, 2011) This policy has shown its effectiveness through the attraction of foreign investors and the world port ranking, were Chinese ports dominate the top-10, led by the port of Shanghai. (Tongzon, 2011) The effectiveness of China's policy can also be seen in recent trade figures provided by the WTO in 2017, in their World Trade Statistical Review. Looking at figure 3, it can be seen that the U.S. and China are almost identical in size of merchandise trade. Then, looking at figure 4, it can be seen that China has grown 75 indices more than the U.S. since 2006. This implies that in terms of size the two countries fight for the leading position. Nevertheless, if China keeps up to growth pace they will be able to beat the U.S. in size of merchandise trade in the near future. Therefore, it can be concluded that China is the designated country to lead world trade during the remainder of the 21st century.

The ten largest economies by size of merchandise trade (2016)

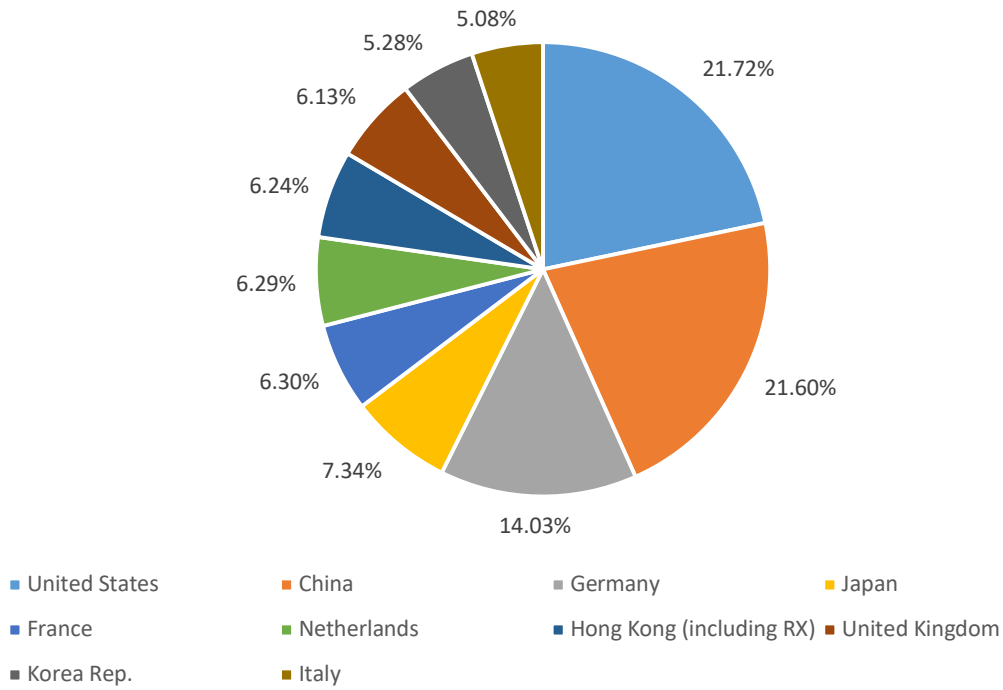


Figure 3: the ten largest economies by size of merchandise trade (2016) | Source: WTO

Leading traders and world exports of merchandise trade (2006-2016)

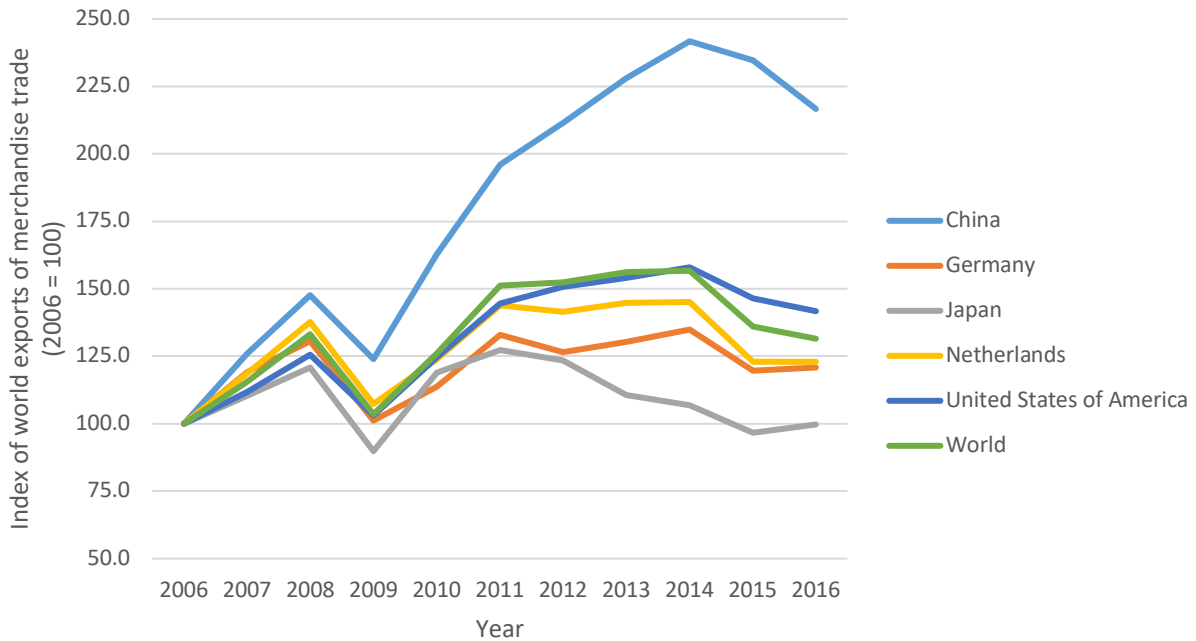


Figure 4: leading traders and world exports of merchandise trade (2006-2016) | Source: WTO

Europe

Since trade runs from one point to another, the European ports also had to emerge and develop to eventually establish the trade connection between the two continents. The serious port developments in Europe started during the Post-WWII period. Rotterdam was in ashes after the war, implying that the port area needed to be rebuilt for the largest part. This process was successful, because from 1946 to 1973 the port grew five times larger than it was at the beginning of the port's reconstruction. After 1973 the growth stagnated due to two major oil crises (in 1973 and 1979). This stagnation was followed by another growth period for Northern European ports that lasted from 1989 until 2005. During this development phase the Port of Rotterdam grew, but the ports of Antwerp and Hamburg grew faster. (Klemann & Koppenol, 2013) The precise development of the ports in the Hamburg-Le Havre range is shown in the figure 5 below:

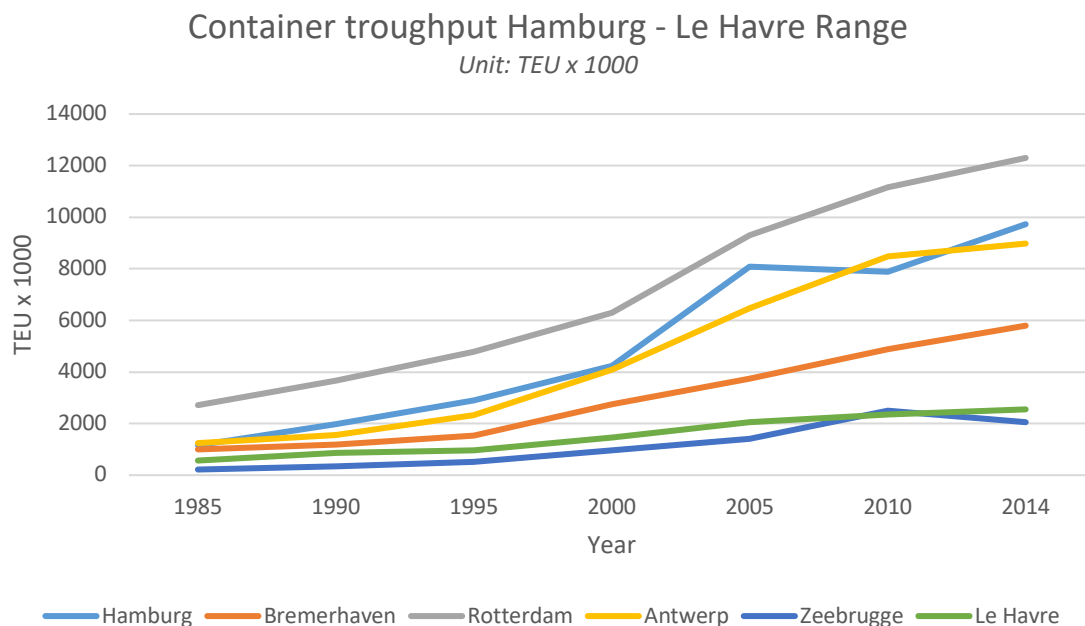


Figure 5: container throughput Hamburg-Le Havre range | Source: Port of Rotterdam

As shown in figure 5, Rotterdam is still the largest port in the Range, followed by Hamburg, Antwerp and some minor ports. For the Euro-Asian trade this implies that Rotterdam is the most important port on the European side of the trade connection. Rotterdam experienced rapid growth during the last few decades, which is partly due to globalization.

Conclusively, it must be said that globalization had a large impact on the establishment of the current trade connection between Europe and the Far East. Without globalization, trade hubs as Shanghai and Rotterdam would not have been able to grow so extensively. Furthermore, globalization boosted demand for certain goods in Europe and Asia. Without any export and import, trade is not possible. So, globalization boosted the Euro-Asian trade in two main ways. Firstly, by increasing the demand in both

continents and secondly, as a result of this demand rise, the currently leading ports got space to develop to where they are today. These two phases significantly contributed to the trade relationships as known today.

The motives behind the current design of the transportation network

Of course, the transportation network that links Europe and the Far East has emerged over decades. Although some factors have emerged naturally, there are a lot of areas where strategic choices have been made. Think for instance about the choice for slow steaming, which was purely strategic. Besides that, the strategy created opportunities for operators of other modalities. Also, the creation of alliances has a strategic background. The alliances aim to ensure reliability, cost reduction and some other minor conventional factors. Throughout this section several motives regarding the design of the current transportation network will be discussed.

Time

Today's world is all about time. Time has become a critical component of a cost-benefit analysis in transportation policy. (Wilson, 1989) However, since bunker costs started to rise as an effect of the economic crisis in 2008/2009 it became a bit of a minor concern. Liners started to prefer cost savings over a reduction in transport time. This was done to maintain profits, because revenues decreased. The cost reduction was managed by the idea of slow steaming (Meyer, Stahlbock, & Voß, 2012), which is explained in another section. Slow steaming is indeed convenient for a large share of the cargo. However, there are commodities that require short transit times. Some short-waiting-time-products can be transported as air cargo, but this already happened before the introduction of slow steaming. An interesting question is, how can the goods that suffer from slow steaming be transported? Air transport seems to be too expensive, but rail transport might be viable. Rail transport is faster than slow steaming and cheaper than air transport. However, the rail infrastructure between Europe and Asian is not sufficient enough to facilitate this at the moment. (Inland Transport Committee, 2018) So, here lay options for the BRI.

Reliability

“Reliability is generally defined as the probability that the system of interest has the ability to perform an intended function or goal.” (Chen, et al., 2011) According to Chen et al. there are three main aspects regarding transportation reliability: connectivity reliability, travel time reliability and capacity reliability. Connectivity reliability is not a problem for air transport neither for sea transport, due to the extensive network that has been built the last few decades. Travel time reliability became a problem for sea transport, because only longer travel times can be guaranteed on. For air transport, on the other hand, on-time delivery has never been a problem, because it is by far the fastest mode of transport. With the introduction of shipping alliances, the optimization of capacity reliability got a boost, before there was

excess capacity on many vessels. From this, it can be concluded that there is not a problem in capacity reliability in ocean transport. Nevertheless, air transport suffers from limited capacity, implicating problems with their capacity reliability. All in all, it can be said that the weaknesses of both modes in the transportation network design are covered by each other. Therefore, the motive for two main modes of transport comes forward in terms of reliability.

Costs

During both sea and air transportation a lot of costs are made. One of the major cost items for both modes are the fuel costs, also known as bunker costs for vessels. According to Notteboom & Vernimmen (2009) there are three major issues in the reduction of bunker consumption: the use of cheaper sorts of fuel, vessel design and the commercial speed and the scale of fleets. Especially the last issue is seen as applicable to Euro-Asian trade. Over the years slow steaming has been introduced and vessel sizes have increased significantly. This gives ocean shipping a lot of support as the cheapest transportation mode. Knowing this, the current transportation network has been designed. Including the passage of the Suez Canal, which has made the journey shorter, hence way cheaper. Also, the creation of liner alliances has contributed to the viability of the east-west route. Empty ships are being eliminated, increasing the cost efficiency of transportation. Ryoo & Thanopoulou (2010) name economies of scale as one of the most important reasons for the participation in alliances. Indeed, economies of scale contribute to cost reduction. Through the use of a vessel's maximum capacity and the operations of the world's largest vessels economies of scale are exploited. This exploitation, partly facilitated by liner alliances, has led to major cost reductions in liner operations. Due to the high number of liners on the discussed trade route, the creation of alliances was possible. This creation is also due to the network design in which connects two wealthy hinterlands that serve the market generously. These hinterlands are the wealthy hinterland of Northwestern Europe, importing a lot from China, and the Asian hinterland, exporting a lot of manufactured and agricultural goods. This fitting match requests a good connection, which is provided by the current network in a cost-effective manner.

For air transport the current design of the transportation network is explainable as well. Transport mainly takes place between the major airport hubs in Europe and Asia (Frankfurt, Paris, Hong Kong, Shanghai, etc.). Using these hubs in particular offers opportunities to exploit economies of scale, implying lower transportation costs. (Micco & Serebrisky, 2006) Furthermore, these hubs have good geographical locations, implying that they are in close proximity to potential buyers and producers, resulting in lower costs (and lower delivery times). Also, the infrastructure plays an important role for these hubs. Regarding infrastructure, they are all well developed, with good connections to the hinterland. This again lowers delivery costs. (Zhang, 2003) All in all, it can be said that it is logic why the current hubs are operated as

they are right now. Namely, they provide economies of scale and they are geographically so well located that it has a significant effect on the reduction of delivery costs.

Capacity

The current transportation network design carries a lot of options concerning several capacity strategies. This is due to the exploitation of several modes along the trade routes. As said above, the two main modes are air and sea transport, hence these will be elaborated on in the rest of this subsection.

According to Fransoo & Lee (2012) capacity in sea transport has increased since 2009. This is due to the developments concerning slow-steaming. The introduction of this technique led to longer transit times, hence higher inventory demands. The increase in inventory demands resulted from a lower ship frequency on a yearly basis. Logically, because ships took longer to go from A to B, implying the desirability of larger capacities. As can be seen, developments in sea transport have significant effects on the capacity. Currently, the demand for +18,000 TEUs⁴ vessels is increasing (Knowler, 2018), indicating that capacity is still growing in sea transport. All in all, it can be stated that capacity has become more and more important over the years, which is mainly due to the dynamics in the field of sea transport. This also requires the designs of transportation networks to be prepared for the trends concerning increasing capacities, hence making it a significant motive.

According Allyn International (2017) air transport is dealing with extensive capacity issues. This leads to high spot rates and increasing transit times. It can thus be said, that air transport cannot live up to the demand at the moment. This is mainly due to the rise of e-commerce. This major development is even worse according to Todd (2017) “the entire system is reaching its natural limits”. Especially during the peak period, which is during the holiday season, capacity is scarce. Nevertheless, this scarcity is covered by sea transport. The use of this other mode explains the capacity motive behind the current transportation network design. Namely, air and sea transport are able to serve as good complements concerning capacity. However, sea transport works increasing on transport times, hence it can only serve as a good complement in the sense that it can fix excess demand for commodities that do not require fast delivery times. So, the combination of the two modes contributes to the capacity possibilities in the network design. Therefore, it is explainable from a capacity point of view that the two are included.

The current situation

Transportation network design includes many facets. Of course, it includes the transport infrastructure and several modes of transport. Besides that, the operational side is very important, which includes practical manners and management, such as design, information provision, control and pricing.

⁴ Twenty-foot equivalent unit

(Allsop, 2008) This applies to the transportation network between Europe and the Far East as well. The transport infrastructure is quite extensive, because different modes of transport are utilized. Moreover, different routes as well. This variety in modes and routes requires, on its time, different approaches to the operational set of activities. To identify the transportation network design for this east-west trade a set of characteristics will be discussed. These characteristics include trade routes, modal split, cargo division and the organization of the market.

Cargo division

Having discussed both the trade routes for sea and air transport, a good inventory of the transported cargo needs to be made. First, there must be a clear distinction between which types of cargo are suitable for sea transport and which for air transport. According to a report by the Inland Transport Committee of the Economic Commission for Europe (2018), cargo that is containerized is transported too slow to be transported in bulk, however the conversion to air freight is too expensive for the certain commodities. This containerized cargo can either be transported via maritime routes or via inland transport modes. Logically, these inland transport modes for containerization seem to have common ground with the BRI. However, this is focused on later in this research. Besides that, there are two other types of commodities categorized in the report. Firstly, non-containerized goods, bulk or raw materials in other words, which are transported across the two continents using three modes: maritime transport, pipeline networks and rail. Interestingly enough, all these modes find a common ground again in the BRI. Implying that transport of this kind already exists. Nevertheless, it is questionable whether the current form of transport is efficient and developed. These can also be seen as motives for the Chinese project. Then, there are the high value goods that need to be transported between Europe and Asia. These are the goods for which air transport is typically chosen, which is logical since the goods are not often transported in high quantities where on the other hand they require a short delivery time. All in all, there are three types of main commodities transported between Europe and the Far East: bulk, transported via sea, rail and pipeline; containerized goods, transported via sea and inland networks; and high value goods, transported via air, some carrying opportunities for land transport.

Conclusively, it is important to note that according to organizations as UNCTAD and Eurostat the trade between Europe and Asia is dominated by maritime transport. This can be found back in their statistics⁵ regarding container transport, indicating that 97% of the total cargo volume is transported by sea. This 97% counts to almost 70% of the total cargo's value. Logically, this implies that the share of air transport is very small, although the value share is a bit bigger, which is explainable.

⁵ UNCTAD Maritime transport reviews, <http://ec.europa.eu/eurostat/web/transport/data/database>, www.uic.org, <http://www.iata.org/publications/economics/Pages/industry-performance.aspx>, containerstatistics.com

Ocean shipping

Two important aspects of the current transportation network design regarding ocean shipping are the routes and the ones operating routes. Briefly, it can be said that the routes that are currently operated run via the Indian Ocean, the Mediterranean Sea and the Atlantic Ocean in particular. The ones operating are so-named shipping liners in fact. In the rest of this section these two aspects will be discussed in more detail, to give a better overview of the current situation in the Europe-Asia trade.

Sea routes

Almost 30 years ago Toll (1989) predicted that the connection between Western Europe and the Far East would become the world's most important trade route in terms of cargo volumes. He also said that ocean trade would be the foremost mode of transportation for this trade relationship. Looking back on this statement, it can be considered as true to a certain extent. According to the figures provided by the World Shipping Council (2012) the Asia-North America route and the Asia-Europe route are competitive with each other in terms of TEU, although the Asia-North America trade still carries more cargo. However, it can be concluded that the most important trade routes run via sea. The development of ocean transport in Asia is displayed in the ranking of the world's biggest ports. This ranking, named the 'Lloyd's list annual Top 100 Ports', lists nine ports in the Far East in the top ten. Implying that ocean transport is a big trade driver for the Chinese and the rest of Asia. Europe's biggest ports are situated predominantly in the Hamburg-Le Havre range. With the Port of Rotterdam as the biggest, followed by Antwerp, Hamburg and the rest. According to iContainers (2016) these three ports handled 30,707,000 TEU, which is equivalent to about 40% of the total number handled TEUs in Europe. Combining the findings about the European ports and the ports in the Far East, it can be concluded that most of the ocean trade runs between Western Europe and the Asian east coast. For the sake of completeness, it must be stated that the trade routes all run via the Suez-canal, which prevents ships from having to pass the African Cape. These trade routes, 'Europe/Asian' route in the legend, are mapped in figure 6 on the next page.

Shipping liners

According to a report by the Inland Transport Committee from the Economic Commission for Europe (2018) the sea trade routes between Europe and Asia are dominated by shipping liners. This is due to the fact that no other institution is able to compete in terms of "economies of scale and punctual services". Another driver of this dominant market position is the extensive market flexibility, which results in the customer's loyalty. This flexibility is displayed by the introduction of slow steaming and the creation of shipping alliances. Consequently, both factors facilitate flexible service rates.



Figure 6: worldwide shipping routes | Source: Daitoh trading

Slow steaming has become popular during the latest economic recession. During this period freight rates were simply too high. Liner costs had to be declined, which resulted in the introduction of slow steaming. It improved vessel fuel efficiency (Cameron, 2010), because the bunker costs declined. Since “bunker costs constitute a considerable expense to container shipping lines” (Notteboom & Vernimmen, 2009), a decline in this cost item would imply enormous decreases in freight rates. Moreover, because the vessel capacity on the Euro-Asian routes is often above 18,000 TEU, fuel saving is even more significant. Another advantage of slow-steaming is the increased schedule reliability. Nevertheless, speed is considered to be more important for ocean shipping (Saldanha, Tyworth, Swan, & Russell, 2009) and because time is costly in the carriers’ business, this was a stumbling block for some. According to Maloni, Paul & Gligor (2013) slow steaming offers benefits as the reduction of fuel costs, lower carbon emissions, the absorption of excess fleet capacity and the possible improvement of schedule reliability. Therefore, this technique is likely to remain important. Especially when slow steaming actually enhances the improvement of schedule reliability. Although, this is often claimed by ocean carriers, it is not totally valid in real world situation. Hence, a certain extent of conscious is desirable in this case. Nevertheless, it would be beneficial when it works improvingly on reliability, because “delivery reliability is of great importance for retailers and manufacturers”. (Lee, Lee, & Zhang, 2015) Conclusively, it can be said that the invention of slow steaming created a brighter future for the lining business.

Shipping lines alliances are defined as “cooperative operational arrangements between two or more carriers that lie anywhere between a traditional arms-length relationship and an integrated strategic relationship that amounts to a virtual merger”. (Sheppard & Seidman, 2001) The alliances offer several benefits, which are: the offering of services to a larger market extent, more efficient operations, reduction

of risk exposure and quality improvement of services. Alliances date from before the 2009 economic recession; the first alliance was formed in the 1990s. It was setup with the motive to “offer shippers greater geographical coverage through cooperation. (Haralambides & Veenstra, 2000) The current situation of ocean alliances is as following:

2M

- Maersk
- MSC
- Hamburg Sud
- Hyundai

Ocean Alliance

- CMA-CGM
- Cosco Group
- OOCL
- Evergreen
- APL
- China Shipping

The Alliance

- Hapag Lloyd
- One Company (NYK, MOL, K-Line)
- Yang Ming

Figure 7: the current situation of liner alliances | Source: logisticsplus.net

So, through the exploitation of economies of scale and the cooperation on several shipping routes, the lining business has become more and more efficient over the years. Because capacity is shared, it is utilized more efficiently, and costs decreased. This is also the case on the Euro-Asian routes, which has made the lining business more attractive and competitive for this transportation network.

All in all, lining companies are in a dominant position worldwide. This also counts for the shipping routes from Europe to the Far East. Both the introduction of slow steaming and carrier alliances have contributed to this significantly. Although slow steaming offered opportunities to rail operators, costs did decrease for carriers strengthening their market position in times that are economically troubled. Both developments exploit economies of scale, increase reliability and reduce the unused capacity. This makes the liner business viable, both in an economic and environmental sense. Adding this all up, it can be said that there is a bright future ahead for this business. However, other modes are approaching a competitive position for certain commodities quite rapidly.

Aviation transportation

Besides ocean shipping, aviation transportation is an important alternative in the current transportation network design for the trade between Europe and the Far East. This mode is predominantly

used for the delivery of goods with high value and “small postal shipments”. (Inland Transport Committee, 2018) Aviation transportation differs from sea transportation in commodities that are transported, as explained above. Different commodities imply a different approach to both the design of the routes and the operators of such routes. These two aspects will be explained in the rest of the section, to sketch the current situation in aviation transportation.

Air routes

In both Europe and Asia this type of transport is mainly organized through a network of hub airports. These airports are a cornerstone in the transcontinental air freight transportation and therefore fulfill an important job in the transportation network design. According to the ACI the airports of Hong Kong, Shanghai, Seoul and Tokyo are the most important hubs in Asia and the airports of Paris and Frankfurt are the most important European hubs. This implies that the trade route for air freight between Europe and the Far East is organized in flights that travel between Western Europe and the east coast of the Asian continent including the isle of Japan. However, there are some other airports that have been expanding their cargo capacities significantly. These are the airports of Istanbul, Moscow, Baku and Ashgabat. (Inland Transport Committee, 2018) A remarkable phenomenon that stands out is that these airports are situated on the border of Europe and Asian, possibly indicating a shift in European hubs. This possible shift only applies to Europe, because the applicable hinterland for Asia is too far away from these airports. Regarding Europe, it is easier to reach the wealthy hinterlands of this continent. This is because infrastructure is more advanced. Moreover, it can also be the case that these airports serve as a sort of intermediate hubs. Implying that cargo will partly be dropped here before it is transport further towards Western Europe or Eastern Asia. On the other hand, it might also be the case that this region will be exploited for its cheap labor, explaining the importance for several aviation hubs in this area. The role of the airports in Eastern Europe/Western Asia can be of importance for the current transportation network design, since they can be used as distribution relievers for existing hubs or as facilitators for a shift in manufacturing sides. So, whether the hubs will serve as a competitor or complement is something that will become clearer in the near future. Another threat for current EATL⁶ routes is the recent growth of airports in the Middle East, i.e. Dubai. In this area the development of cargo terminals is a hot topic, which could result in a shift of trade routes in the future. Of course, this shift cannot only result from changes in air transportation hubs, overall infrastructural developments are needed, because several wealthy hinterlands still need to be accessed. All in all, it is clear that the traditional design of air transportation routes is likely to be changed. With emerging airports in the Middle East and in Eastern Europe/Western Asia there are

⁶ Euro-Asian Transport Links

some new players entering the playground. Nevertheless, it is clear that for now the trade relies on the hubs in Western Europe and Eastern Asia.

Air liners

The lining companies operating for air cargo are very limited. This type of transport is mainly done by two kinds of companies. The first type are the major express carriers, such as UPS, Cargolux and FedEx, combined with newer entrants from for instance China, such as SF Express. The second type are the commercial airlines. Most of the big commercial airliners do both passenger and cargo transport. The biggest commercial airliners cargo-wise are Emirates Airline, Korean Air and Cathay Pacific Airways. On the European side of the market airliners such as Lufthansa and British Airways are the biggest occupants. (AirCargo News, 2017) Since the market for air cargo has been globalized over the years, it can be concluded that the abovenamed liners cover this entire subsection of the market. Therefore, it is logical that most carry out services on the route from Europe to the Far East, especially the Europe and Asia based companies.

The viability of the Belt Road Initiative in the current transportation network design

In the subsections shown above the transportation network design for the Euro-Asian trade has been elaborated on. Several interesting facts regarding the viability came forward. In the remainder of this section these facts will be discussed. Finally, the viability of the BRI will be assessed by its opportunities as either competitor or complement to the current design.

The possible inefficiency of sea trade routes

In one of the first paragraphs it has been said that the world's most important trade routes go via sea. If you look at the structure of the world's trade routes this seems to be true. However, when we focus on the trade between Europe and the Far East in particular there is something interesting regarding the distance. Due to the land connection between the two continents, the sea trade routes run from Western Europe to Eastern Asia. Implying that as the crow flies this is the longest distance there is. This might lack efficiency for some goods that have to be transported on shorter distance, e.g. from Eastern Europe to countries such as Kazakhstan or Turkmenistan. (Lee, Lee, & Zhang, 2015) So, there might be space here for inland connections as for instance facilitated by the BRI.

The trade-off between time and costs

As said before the main trade-off in the current network design is the one between the fast, expensive air transport and the cheap, but slow sea transport. Especially with the introduction of slow steaming this has become a more serious consideration. Namely, because slow steaming is simply too slow for certain kinds of sea cargo with a relative high demand variance. (Lee, Lee, & Zhang, 2015) For this

same type of cargo air transport is too expensive. This might imply a new transport market for commodities which require short delivery times and relatively cheap means of transport, see figure 8. The modes facilitating this might be either inland modes, such as railway networks, or faster modes of sea transportation with smaller vessels. For certain bulk commodities belonging to this type of cargo pipeline transport might be an option as well. (Huang, 2016) Taking this into account, it can be said that there are opportunities for the BRI here to make the trade-off easier and more specific for certain commodity types. However, regarding this trade-off the BRI is most likely to serve as a complement, because it cannot directly compete in prices with sea transport and delivery times in air transport. So, the BRI is able to make this trade-off more efficient by providing services that are specifically designed for certain types of cargo.

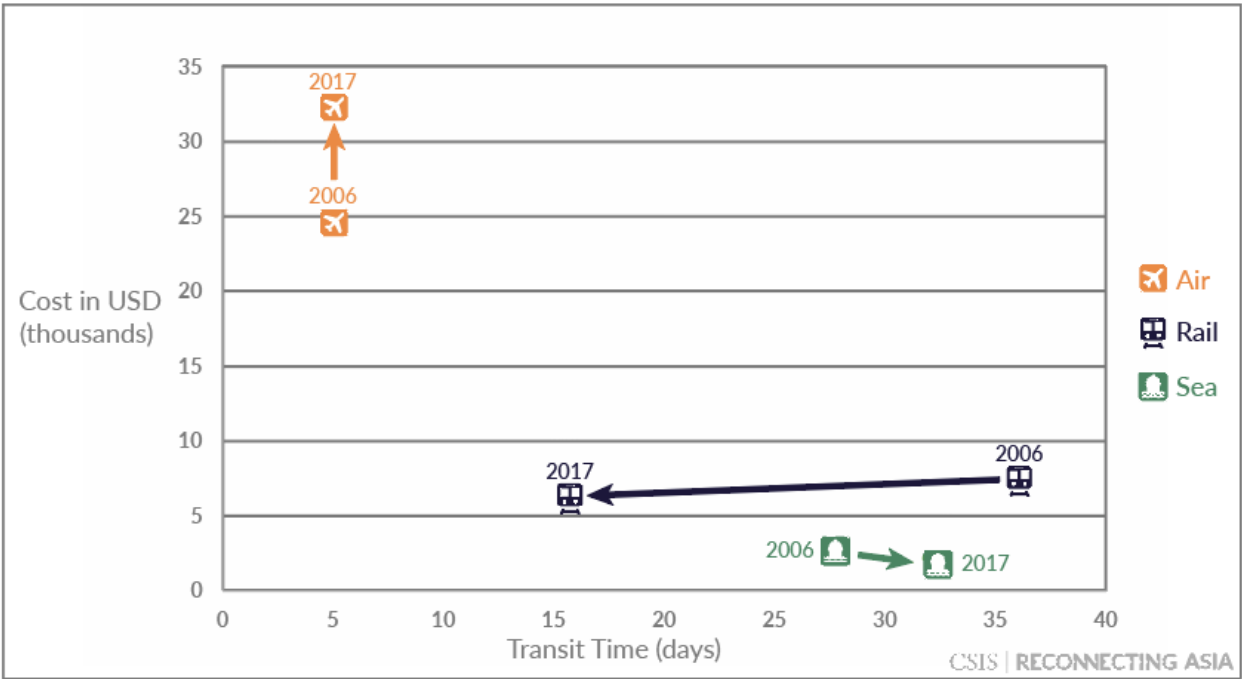


Figure 8: The shift in transit costs and time (2006-2017) | Source: Xu Zhang, Cranfield University

The lacking reliability of the current modes

In the second subsection the motive of reliability has been discussed. Two things came forward in this subsection: the lacking capacity reliability of air transport and the lacking travel time reliability of sea transport. Although, the two modes seem to cover each other, because air transport is very reliable regarding travel time and sea transport is high in capacity. The reliability can be increased to a more efficient extent. This can be done by taking ‘the best of both worlds’. Implying the creation of a connection with a relatively high capacity and a short travel time. This will offer the consumers of transport more options, when facilitated in the right manner. Looking at the shape of this in-between mode/connection, this efficiency

improvement is achievable. Namely, by levelling travel time and capacity. Resulting in a decrease of capacity with respect to ocean transport and an increase of travel time with respect to air transport. Currently, air transport takes about one day of travel time, whereas ocean transport takes 20-40 days. On the other hand, the capacity of ocean transport is very high with 18,000 TEUs or more and air transport's capacity ranges from 0.5 TEU to approximately 16 TEUs. (World Class Shipping, 2013) Taking the 'best of both worlds' would imply delivery times to be around 10 days and capacities to be ranging from 1,000 to 10,000 TEUs. Regarding capacity, this is not realistic, because the only mode able to facilitate the transport of over 1,000 TEUs is sea transport. However, transport in lower volumes with a higher frequency is possible, indicating space for rail transport, having a capacity of 742,000 TEUs a year on the BRI rail connection in 2027, with a frequency that keeps on increasing, which is currently estimated to amount to 2,200 direct freight services a year. (Hillman, 2018) So, when the BRI manages to create a connection for this possible in-between mode, reliability can be increased in the Eurasian trade. Logically, this requires thorough decision-making and strategic thinking. Nevertheless, the modes already exist, namely smaller vessels for container transport and trains, which can nowadays operate with double or even triple stacking. (Rodrigue & Notteboom, 2012) All in all, it can be concluded that the opportunities for the BRI are definitely present, only efficient exploitation has to be managed upon. With the introduction of new modes, a lot challenges lay ahead that must be encountered at first. In the long-run these new modalities seem to be able to contribute to transport efficiency significantly. Whether this will succeed is something that time has to point out, but when they do succeed it is definitely an enrichment for the current transportation network.

Economies of scale

As discussed, shipping lines exploit enormous economies of scale. These economies of scale have been exploited to an even larger extent with the creation of shipping alliances. Because of this, their transport services are the cheapest in the market. The alliances have also lead to more punctual services, although the delivery time is significantly longer. (Ryoo & Thanopoulou, 2010) All in all, it can be concluded that the options as proposed in the BRI are not able to compete with the low service costs offered by the shipping alliances.

How viable is the Belt Road Initiative?

Taking everything into account it can be concluded that the plans in the BRI are a viable complement to the current transportation network. Due to the fact that there is no way of competing with the economies of scale in liner shipping, a fully competitive position is impossible. On the other hand, there are several opportunities in the market regarding: delivery time, costs, reliability and travel efficiency. When these opportunities are exploited, there is certainly space for the BRI in the current network design.

However, this is conditional on a few factors. These factors include the creation and operation of a more reliable transport mode as addition to the network, the costs related to this in-between transport mode and the travel efficiency of the new transport mode. When the opportunities are exploited in the best way as possible, then transport reliability can increase due to lower average delivery times and more efficient capacity possibilities for certain intermediate goods. Furthermore, average transport costs can decrease, resulting from the exploitation of opportunities that the BRI offers. Finally, travel efficiency can get a boost, because transport modes are better adjusted to specific transport preferences regarding for types of cargo. When these opportunities are handled in the most optimal way, a bright and sustainable future awaits the BRI. Altogether, this future holds a place in the market for the new plans where the BRI can especially serve as a good and viable complement.

The Belt Road Initiative

General overview

The Silk Road Economic Belt project as presented by China's president Xi Jinping knows both a land and a maritime component. According to Fallon (2015) "the core of the initiative seems to consist of several overland and maritime transport corridors that should boost trade and economic development". In the latter part these corridors will be discussed together with the routes. Besides that, it is important to say that the BRI is an enormous project with a lot of different stages and subdivisions. Eventually, the project has to result in a "vast network of railways, energy pipelines, highways and streamlined border crossings" (Xi, 2013) which have to cover the continents of Europe, Asia and a part of the African continent. To realize the project the AIIB⁷ and the Silk Road Fund have been initiated. These institutions must ensure the necessary infrastructural investments in transport corridors beyond Chinese borders. In the progress of the project these investments have to result in shorter delivery times and a better accessibility to countries in the landlocked region of Central Asia. In the section regarding investments this subject will be elaborated on further.

Initially the BRI consists of five routes and six corridors. (HKTDC Research, 2018) These routes have as purpose to connect Europe, Asia and Africa and are divided as following:

1. The link to Europe through Central Asia and Russia; via land
2. The link connecting China with the Middle East through Central Asia; via land
3. A network connecting China with South-East Asia, Southern Asia and the Indian Ocean; via land
4. The link with Europe through the South China Sea and the Indian Ocean; via sea
5. The link with the South Pacific through the South China Sea: via sea

These routes are supported by the following six main corridors of the Belt and Road project, which are also projected in figure 9:

1. The New Eurasia Land Bridge
2. China-Mongolia-Russia
3. China-Central Asia-West Asia
4. China-Indochina Peninsula
5. China-Pakistan
6. Bangladesh-China-India Myanmar

⁷ Asian Infrastructure Investment Bank

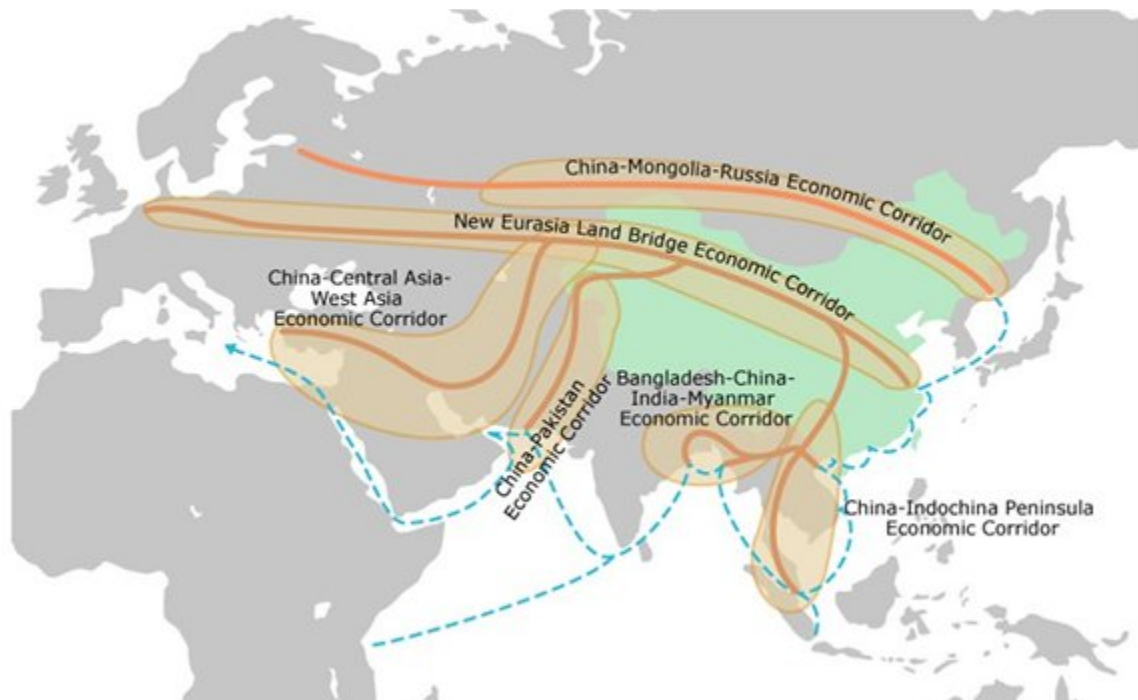


Figure 9: the six corridors and their main routes | source: HKTDC Research

As can be seen in figure 9 the extensive network covers Europe, Asia and Eastern Africa. The main land route connecting Europe and China is a network of railways. The sea route is aberrant from the current design in the sense that it runs via Africa and stops in the Mediterranean area. The two routes converge in Venice. Besides these two routes, the BRI also includes plans for pipeline connections, to secure China's future energy supplies, needed for economic development.

Currently, there are three operational corridors. The initial plans aimed to circumvent Russia. However, this has not been realized, since the Trans-Siberian Express route is used in one of the corridors that runs via the north, through Russia to Europe. The second route also links to Russia, after it passes through Kazakhstan it ends up on the railways of Western Russia. The third, southern route is more divergent. It passes through Kazakhstan as well, where it ends up in the city of Aktau. From here, either the Caspian Sea can be crossed by ferry towards Azerbaijan or the land route could be chosen, via Iran, Azerbaijan, Georgia and Turkey towards Europe. At the moment, all three corridors take about 10.5 to 16 days of delivery time, which beats the maritime transport. (Shepard, 2017) From this, it can be said that the three land corridors perform well. Regarding maritime transport, it can be said that several investments have been made by the Chinese in European ports. However, this has not had any significant effects on the preexisting sea routes. (The Economist, 2017)

China's motives

“The gravity of the world economy is shifting to Asia.” (Dreyer, 2014)

China wants to rejuvenate the Eurasian continent by boosting its regional trade, which is conceptualized as the “Silk Road Spirit”. (Fallon, 2015) Moreover, Ye Zicheng said that this rejuvenation is not complete when China does not become a world power. (2010) To achieve this, the BRI was invented. These plans had to solve China's stagnating growth, by opening up new trade markets. (McBride, 2015) According to the same author China has four main motives to develop the BRI: streamline foreign trade, ensure stable energy supplies, promote Asian infrastructural development and consolidate Beijing's regional influence. However, both Fallon (2015) and Brugier (2014) argued that there was one missing motive to this list. Namely, improving the regional security in Western China and the rest of Central Asia. In this part of Asia, especially in Western China, the country aims to combat the so-named ‘three evils’ (extremism, separatism and terrorism). A stable situation in these areas is desirable, because the region holds a lot of energy stock. This stock can be used by China for its extensive industries, needed to boost its trade and to grow towards the leading position in world trade. Looking at the motives, it must be said that the project has been designed primarily on economic ground. This is logic, since China aims to seriously compete with the ‘big boys’ on the world stage.

Investments

When the Chinese president launched the OBOR idea, one of the key pillars was infrastructural investments in international corridors. (Huang, 2016) The financing for infrastructural investments has been fixed through several national and international institutions. These institutions include the Silk Road Fund, the China Development Bank, the AIIB, the BRICS New Development Bank, the World Bank and the Asian Development Bank. These institutions aim to help Chinese companies, especially state-owned, in making FDIs⁸. (Du & Zhang, 2018) These FDIs can be either Greenfield Investments or Mergers & Acquisitions. The support of the abovenamed institutions can also be seen in figures regarding Chinese FDIs in Europe. These figures show that FDIs have grown from \$2.5 billion to \$79 billion from 2010 to 2017. (Seaman, Otero-Iglesias, & Huotari, 2018) With China's total financial commitment of \$1.4 trillion of which \$300 billion is spent (Casarini, 2015), it can be concluded that the project is far from complete. Nevertheless, some major investments have been made. These investments will be discussed in the section below.

⁸ Foreign Direct Investments

The current investment situation

The first infrastructural investment projects have taken place in Southeast Europe around the Mediterranean Sea. These investments aim to significantly reduce the transit time by approximately 10 days. (Casarini, 2015) An example of this are Chinese acquisitions in the port of Piraeus. In this port Chinese shipping company COSCO has made a 35-year concession contract. Another part of this plan concern investments in rail infrastructure in Eastern Europe. These investments generate a railway connection between Belgrade and Budapest, significantly reducing travel time. (Casarini, 2015) Additionally, the Greek railway system will be upgraded to connect it to Belgrade, Serbia. With the completion of this project a high-speed rail connection is realized between Piraeus and Budapest, situated at the 'heart' of Europe. These plans make the port of Piraeus competitive with other European container ports, such as Rotterdam, because from an east-west perspective, Piraeus is a better gateway towards the rest of Europe. (Casarini, 2015) Also, Italian ports (Naples and Genoa in particular) have experienced interest from Chinese investors over the last few years. (Yu, 2017) Besides investments in Mediterranean ports, Chinese firms have also bought a lot of interests in cargo terminals in the Atlantic Rim (e.g. Zeebrugge) and the Indian Ocean. (Johnson, 2018) These investments are being made by China's biggest firms, such as China Merchant Port Holdings, COSCO Shipping and Chinese Shipping Company. (Johnson, 2018) Regarding Suokas (2018) BRI-related investments cover more than 60 countries involved in the BRI. Besides investments in Southeast Asia, in countries as Malaysia, Singapore and Pakistan, countries in the Middle East and Africa also profit from development. (Yu, 2017) As can be seen, the BRI has a large perspective, implying a wide variety of investments, relating to ports, railways, pipelines and energy infrastructure. (O'Dea, 2017)

China's investment strategy

Chinese SOEs⁹ invest in a lot of countries and in a lot of different subdivisions of the BRI, as stated in the previous subsection. According to Johnson (2018) this is done with "a series of aggressive acquisitions that are physically redrawing the map of global trade and political influence", leading to the ownerships of 10% of the European port capacity. The string of acquisitions has led to concerns for several EU members. Therefore, these countries have proposed investment screening mechanisms, to protect their companies from being completely overtaken by Chinese SOEs. (Seaman, Otero-Iglesias, & Huotari, 2018) This is a point of attention for the Chinese government, due to the mutual dependency that Europe and China share. Nevertheless, the number of ODIs¹⁰ keeps on growing, mainly in the infrastructural sector at strategic locations, such as the Mediterranean area. (Du & Zhang, 2018) According to the same authors, the ODIs result in direct acquisitions, because the investing firms want to "capture investment opportunities

⁹ State owned enterprises

¹⁰ Overseas direct investments

more quickly”. In developing countries Greenfield investments seem to be more logical, instead. Therefore, Chinese Greenfield investments are predominantly made in developing countries, due to lacking basic facilities. (Du & Zhang, 2018) Although the focus of the BRI is on the exploitation of Eurasian trade at the moment, these countries will sense more of the BRI the coming years. All in all, the Chinese investment strategy can be sketched as quite aggressive, because direct opportunities are explored and invested in to a rapid extent.

(Geo)politics

Together with Russia and the United States, China belongs to the three dominant world powers. Besides these two countries the European Union is another big player on the world stage. (WTO, 2017) A reaction from these countries was therefore not surprising when China announced their plans for the BRI. Especially Russia felt threatened, because the Chinese tried to enter their ‘special zone of influence’ consisting of former Soviet states. (Brugier, 2014) Also, the United States countered China’s plans. They did this by executing a design made by Hillary Clinton (Secretary of State during the Obama registration) in 2011. (Press Trust of India, 2017) Initially, the plan was designed for the withdrawal from Afghanistan to secure a stable situation afterwards. (Kim & Indeo, 2013) It was Donald Trump (president of the U.S.A.) who started using it as a tool to counter the Chinese developments. (Delaney, 2017) As said before, European Union members felt threatened as well. As reaction the European Union is now researching foreign policy measures, although the diplomatic relationship between both have been strengthened since. (Seaman, Otero-Iglesias, & Huotari, 2018) As shown the BRI is more than just an economic strategy. A lot of politics is involved in it too. To elaborate more on the political side the following subjects will be discussed in the remainder of this section divided in the internal and regional stability and the international implementation.

Internal and regional stability

China’s territorial integrity is important for the country. However, this integrity is threatened in the province of Xinjiang in the northwest of China. The population of this province consists mainly of Muslim Uighurs, a minority in China. Some minority members started to fight for independence through a string of terrorist attacks. As a reaction the Chinese started to execute the strategy of combating the three evils, which are extremism, separatism and terrorism. The idea is to provide welfare in the western provinces and neighboring countries in Central Asia, like Uzbekistan and Kyrgyzstan. This welfare has to ensure stability, resulting in a favorable business climate for the Chinese and their OBOR plans. (Brugier, 2014) According to Campbell (2017) this is not only an issue in the Chinese border regions. Also, countries involved in the BRI situated further away from China suffer from political instability. Countries like Myanmar and

Afghanistan and the region of Eastern Africa are threatened on a daily basis by terrorist attacks. The BRI has to ensure stability in these regions. As said by Zhu Feng, dean of the Institute of International Affairs at Nanjing University: “Security is the most important challenge facing Belt and Road”. So, internal and regional stability is one of the BRI’s main pillars. Stability is key to good trade relationships that China wants to build up through the BRI.

International implementation

The big question concerning the implementation of the BRI is whether China will use a string of bilateral agreements with individual countries or agreements with bodies as the ASEAN¹¹ and the EU¹² (multilateral). (Szczudlik-Tatar, 2013) According to the same author, China’s president Xi signed partnership agreements with Kyrgyzstan and Turkmenistan during his Central Asia Tour. Tajikistan and Uzbekistan signed comparable agreements and bilateral agreements with Kazakhstan and Russia date from before the BRI was announced. Currently, China has bilateral agreements with all states in Central Asia. (Szczudlik-Tatar, 2013) Besides the bilateral agreements with Central Asian states, China has also made bilateral deals with the ASEAN states. (Kawai & Wignaraja, 2011) The EU and the Chinese have close ties as well through the AIIB for example. In this cooperation almost all EU-members take part, besides that there are several trade agreements between the Union and China. (Lungu, 2017) Despite the wide set of opportunities, The United States have not wanted to cooperate with China since Trump’s reign. (Delaney, 2017) He even cancelled some existing deals, such as the Trans-Pacific Partnerships. Hence, it is not surprising that China has chosen to focus on Europe rather than the U.S. This has brought us to the current situation in which China has agreements with Asian countries in a bilateral structure on the one and multilateral agreements with the EU on the other hand.

Conclusively, it can be said that China performs well (geo)politically. The BRI seems to ensure stability in troubled states. Above all, the relationships with the EU are strong, which is important since the BRI is mainly focused on the trade with the continent. Also, in the region, China seems to have gained influence, resulting in a more dominant trade position.

Consequences

The current transportation network design mainly relies on air and deep-sea transport. However, as illustrated above, air transport is not taken in perspective in the OBOR plans. Also, the design for deep-sea transport routes seem to be undergoing a serious shift. To get a better view of the BRI’s consequences for

¹¹ Association of Southeast Asian Nations

¹² European Union

the current transportation network design, the main and significant consequences will be elaborated on in the rest of this section.

Air transport

Although air transport is not included in the plans for the BRI, the mode is not likely to completely disappear as a result of this. The BRI will disrupt the transportation industry, but according to Zubkov (2018) this does not imply a definite impact on the current design of the industry. This is the case, because industry wide disruptions usually come in two forms, according to the same author (Zubkov, 2018). The first form replaces the old technique with the new one. The second form results in coexistence, thus a division of the market and is observed more often. The second is most likely to be applicable to air transport. (Zubkov, 2018) The BRI has the potential to elevate global trade to a new level, hence the likeliness of the applicability of the second option to air transport. The elevation of global trade will result from the exploration of new markets by the Chinese. (Wijeratne, Rathbone, & Wong, 2018) The BRI consists partly of plans for countries with developing economies, such as Afghanistan and Pakistan in Central-South Asia, Bangladesh in South-East Asia and Kenya in Africa. (Shrestha, 2017) Developing economies are likely to have locked revenues/profits. The BRI, in fact, aims to unlock these by involving such countries in the BRI. Through the completely new generated profits, China is possible to boost global trade to a new level. Both the profits unlocked in developing economies and the profits captured through the exploitative techniques in the BRI will have a positive effect according to a statement by Zubkov (2018): “the overall profit pools should be large enough to sustain all modes of transport”. So, both techniques of profit generation create a basis for not-included transportation modes to remain in the picture. Increasing trade profit pools has an effect on all transport modes. A good argument for this is provided by Rodrigue & Notteboom (2017) who state that: “When transport systems are efficient, they provide economic and social opportunities and benefits that result in positive multipliers effects such as better accessibility to markets, employments and additional investments.” Especially the outcome “better accessibility to markets” will have positive effects on all trade modes. When more markets become accessible to certain populations, these populations will demand a larger variety of goods. (Rabbi, Ahmed, Saha, & Sutradhar, 2013) These goods will have to be transported to the country, implying a higher transport demand (which is indirect). In the end, developing economies that become more involved in trade will see increases in both import and export as result from this inclusion. Returning to air transport it can be stated that such effects are applicable to this mode as well, since it is an established mode of transport worldwide. Moreover, increasing wealth leads to an increasing demand for luxury goods, such as the latest fashion clothes. Such goods can be transported by air, hence opening up developing economies to trade has positive effects on the demand for air transportation. Taking this into account it is not questionable whether air transportation will remain existent. Nevertheless, it is interesting to see how air transportation will position within the proposed transportation network design.

Of course, modernization is important, because intermediate modes of transport, proposed in the BRI, are looking to capture market share. Note that there is another challenge for air transport ahead in the near future. As pure postal services seem to decline and eventually disappear, the mode must focus on the transportation of cargo. (Crew & Brennan, 2016) As known air transport is the fastest mode in the market, resulting in a serious competitive advantage for particular commodities. With consumers that are more demanding than ever, this focus seems to be quite sustainable. When the right developments take place in the business, i.e. if air transport is modernized to a sufficient extent, there is a lot of space for the mode to be competitive. Think about the increasing sizes of air planes, implying further exploitation of scale economies and cheaper services. (Givoni & Rietveld, 2009) These cheaper services increase the competitiveness of air transport, implying a bright future for the transportation mode. All in all, it can be stated that the consequences of the BRI for air transport are not extensive. This is due to the fact that increasing wealth in countries included in the BRI will lead to increasing demand for transportation. Therefore, the business should focus on the transportation of (luxury) goods requiring high-speed deliveries. Furthermore, there is a lot of space for development for the mode due to possible exploitations of scale economies, leading to cheaper services.

Deep-sea transport

According to industry observers, the New Silk Road is very unlikely to change global deep-sea shipping as the world knows it. (Scott, 2017) The limited capacity that the rail component of the BRI offers is not sufficient enough to bring deep-sea transport a lot of damage. Besides that, deep-sea transport has a strong, established position in the trade market. This implies scale economies for ocean shipping, resulting in significant cost reductions. (Ryoo & Thanopoulou, 2010) To profit from these scale economies, the designers of the BRI decided to include the transportation mode. However, the trade routes will change, because of efficiency considerations. The current design takes up a lot of time, because European freight is not unloaded directly after reaching the continent. The new design ensures this on the contrary, by unloading in Mediterranean ports, instead of ports within the Hamburg-Le Havre range. Besides that, rail connections are a good idea according to Woo (2017), because rail transport is 20 times less expensive than air transport, but 3 to 5 times more expensive than shipping. This indicates that rail transport is an efficient mode of transport. Nevertheless, rail transport is not able to replace deep-sea transport due to capacity constraints. Therefore, rail transport is a good addition to the current network, serving as a complement rather than a competitor. So, regarding time efficiency deep-sea transport does not score very well in the prospects of the BRI. However, the transportation mode has extensive capacity possibilities, implicating that it is not possible to completely abandon it. This also explains why it is partly integrated within the BRI.

Although capacity constraints prevent the BRI from having significant consequences on deep-sea transport, it is possible to capture some of the commodities that are currently transported, for instance

commodities with a high demand variance (Lee, Lee, & Zhang, 2015) or cargo as laptops, cell phones, auto parts or other kinds of high-value cargo produced in China's inland provinces. (Hillman, 2018) The BRI enhances the optimization of these particular markets. Therefore, it is necessary to reallocate certain commodities to modalities, because the introduction of extensive rail transportation offers a wider set of alternatives. So, there are commodities that require a faster delivery time than 20-40 days (deep-sea transport). However, the profit margin of this particular commodity is too low for air transport. This implies that such a commodity needs an intermediate mode of transport, enhancing shorter delivery times and more sustainable profit margins. (Lewis, 2012) Such commodities are currently often transported via sea, e.g. motorized vehicles. (Hillman, 2018) Since Asia has a large share in car production, this could be a fitting commodity for the export to Europe via train. (Notteboom, 2016) Also other commodities, which are trend sensitive will qualify for this intermediate mode of transport, to get such commodities to the marketplace in the most cost and time efficient way. Looking at this situation, it can be said that rail transport would be a good alternative to the existing transportation modes. (Lee, Lee, & Zhang, 2015) So, the introduction of intermediate transportation alternatives will contribute to further optimization of the transportation network. Implying that the introduction of rail transport will not have extensive consequences for deep sea transport, because this mode has never been able to serve intermediate commodities to the most efficient extent.

Also, shipping as explained in the plans for the 'Maritime Silk Route' is not likely to change deep-sea shipping. The 'Maritime Silk Route' can only be considered a complement to the current sea routes. This complement is aimed to be optimized and more efficient than the existing sea routes. The Chinese want this, because in this sense they have control over the transportation network. (Hillman, 2018) They want to gain influence through acquisitions in outland ports. These outland ports must become the hubs, connecting the 'Maritime Silk Route'. Another way of competing with the current design of deep-sea transport is not possible, because of the dominance of the liner business. As said above, the liner business exploits extensive scale economies and it has a very stable market position. Therefore, the 'Maritime Silk Route' can be seen as a Chinese alternative to current routes, enhancing the country's willingness to have a self-led trade route.

Europe

When projecting the BRI on Europe it also seems to have a positive effect. (Garcia Herrero & Xu, 2016) This is predominantly due to the fact that Europe only profits from stronger trade ties with China. Besides that, China finances almost all the infrastructural investments. (McKern, 2018) So, the only thing Europe does, is benefiting from the increased transport flows, both import and export, from and towards the Far East. However, this can lead to a relocation of logistic activities. Implying that Piraeus partly conquers the relative market share of ports as Antwerp, Hamburg and Rotterdam. (Notteboom T. E., 2017) To what extent this market share will be conquered is something the future has to teach. (Grieger, 2016)

This shift does have an effect on the efficiency of the overall network design. Of course, it decreases the delivery time, because Mediterranean ports are simply at the end of the Suez Canal, which is being deepened as well to make it more suitable for larger container vessels. (Fardella & Prodi, 2017) In despite of these developments, the Ocean Alliance (CMA CGM, COSCO, Evergreen and OOCL) started a service concerning the Asia-North Europe trade in April 2017. This service calls at all the major Northern European ports. (Schinas & Graf von Westarp, 2017) Conclusively, it can be said that the consequences of the BRI are mainly positive for Europe. However, there are some threats for the current transportation hubs in Northwestern Europe. Although their position is strong, they cannot compete with the location of Mediterranean ports. What this difference will result in in the long-term is not clear, but it does not seem that the Northwest European hubs will totally lose their market position, due to their reputation, terminal efficiency and experience. Also, the Northwest European hubs are included in the OBOR plans through the BRI's rail connection. This connection converges with the Mediterranean, 'Maritime Silk Route', hence capturing the opportunity to reach a more extensive hinterland, namely a larger part of Europe and some minor parts of Western Asia. (Notteboom & Yang, 2016). Besides that, Northwest European ports are likely to remain important for another reason: the railway connection departing from Piraeus only runs to Budapest, from where it is still a large distance to the European west coast. Since this west coast is a highly demanding region, supply still needs to be very efficient. The rail connection will not be able to provide this supply on its own, due to the fact that it will just cover an intermediate commodity market and trains face capacity constraints. (Reuters, 2017) So, the Northwestern ports in Europe seem to have enough power to still be supplied by the Chinese. The total supply picture is likely to include rail, sea and air transport for this part of the European continent.

All in all, it seems that the BRI will not affect the current transportation network design drastically. The only changes that will occur, are changes that will contribute to the creation of the market for several intermediate commodities and changes that will ensure better hinterland supply for Eastern Europe. The ports in the Hamburg-Le Havre range will still be visited a lot, because they have such wealthy hinterlands, implicating opportunities for the generation/capturing of profits. It can be concluded with moderate certainty that the current transportation network will not change for Europe, thus the BRI will mainly be a complement.

The future potential of the Belt Road Initiative

The future potential of the BRI seems to be extensive. This future potential can be summarized in three main reasons. The first is about the more efficient approach to the European continent. The second enhances the exploitation of new markets in Central and Southeast Asia, but also Eastern Africa. The third

and last one explains the fine-tuned trade for intermediate commodities. The three reasons will be explained below to a more detailed extent.

The more efficient approach to Europe

For decades the Eurasian trade routes ran between the Asian east coast and the European west coast. Looking at the map, this is very inefficient. Namely, because it passed the Indian Ocean, the Suez Canal and the Mediterranean Sea, where Europe is in principle already reached. Besides that, the route is far from a straight line as the crow flies. The Land and Maritime Silk Road are more efficient in terms of distance than traditional routes. The land connection enhances the straight line phenomena more or less. Whereas the sea connection unloads in the Mediterranean area, the point where Europe is reached in principle. Unloading in the Mediterranean ports also circumvents the passing of the busy and narrow Strait of Gibraltar. (Candela, 1991)

Where the land connection enhances efficiency in terms of time (Casarini, 2016) and distance, the maritime component enhances efficiency in terms of costs. (Shu, 1997) As stated by Lin (2011) sea transport takes more than twice longer than transportation by rail. Where a ship takes 40 days to ship goods from China to Germany, a train takes about 15 days to reach Hamburg from China. Regarding time efficiency this is a very significant improvement. For example, when a certain good needs faster transportation because of a due date, the new connection can be the ultimate solution. On the other hand, however, rail transport is very expensive as compared to sea transport as illustrated by Shu (1997). This author provided figures showing that the transport of 1 TEU from Eastern China to Western Europe costs \$3,500 by rail and \$1,200 by sea. Although, these figures seem a bit old, the author stated that the prices for sea transport are declining on and on, due to severe competition. This decline occurred indeed, prices for sea transport are currently almost \$700 per TEU (UNCTAD, 2017) and about \$3,000 per TEU for rail transport. (Valentine, 2017) This severe competition has proven to be true, taking into account the formation of shipping alliances and the introduction of slow-steaming. Potentially, this rises the need for a trade-off to be made between either time or cost efficiency. However, the BRI also consists of plans for the convergence of the land and the sea component. As stated above, a rail connection is established towards Piraeus in order to link this port to the rest of Europe. Casarini (2016) states that such connections can improve the competitiveness of Chinese goods in Europe significantly. What this author suggests is a maritime connection between Eastern China and the Mediterranean Sea, in ports such as Piraeus, Naples and Valencia. Here, the freight is unloaded and distributed over Europe via rail, which ultimately cuts the travel time by 10 days in comparison to freight unloaded in North-West European ports. Moreover, a lot of terminals in the Mediterranean have been acquired by Chinese companies, such as COSCO. Such terminals have a very high likeliness of attracting Chinese ships which would have traveled to the ports in the Hamburg-Le Havre range otherwise. Besides that, the Chinese want to remain active in investing in

Mediterranean ports, because they observe very positive effects resulting from this strategy. (van der Putten & Meijnders, 2015) This again indicates that China sees this approach as their main option, implying that numerous European imports will be unloaded in this area. So, the land component of the BRI and the Maritime Silk Road will function most efficiently when combined. This is the case, because the first one enhances time efficiency and the second one enhances cost efficiency. The combination will result in serious cost reductions, because shipping has been proven to be cheaper than rail transport. The time cutting results from two major changes, the abandoning of ports in the North-West of Europe by Chinese liners and the distribution from the Mediterranean area to the rest of Europe by rail connections that have recently been developed through Chinese investments. Ultimately, this combination will lead to a further optimized transportation network, implying higher efficiencies and a more competitive position for Chinese exports.

The exploitation of new markets

When the newly inaugurated president of the United States, Donald Trump, cancelled the ‘Trans-Pacific Partnership’ he opened the door for China to increase influence in countries they were already targeting through the BRI. (Rapoza, 2017) The countries that show serious overlap are the countries in Southeast Asia, such as Malaysia. Furthermore, the BRI targets economies in Central Asia and Eastern Africa. The Chinese aim to open up these economies, to unlock new profits, which can be a very positive addition to their own economic power. Especially the opportunities for energy production in Central Asia are considered as good additions to China, because it can give a boost to China’s stagnating, though powerful manufacturing industries. (Buxbaum, 2017) Also, Southeast Asia and Eastern Africa have unlocked profits that can contribute to the development of China’s economy towards the world-leading economy.

The last few decades China has experienced both economic and population growth, implying increasing usage of energy. In fact, China is the world’s largest consumer of energy. (Weidong & Dunford, 2016) However, the country is not able to satisfy its domestic energy demand. Therefore, they started to rely on Russia through the import of energy. Despite, they do not want to be dependent on Russia, due to the unpredictability of this trade partner. Therefore, China incorporated the switch to other energy suppliers in the BRI. The plans consist of major investments in areas with extensive possibilities for the production of energy, e.g. Kazakhstan. (Shepard, 2017) In this country a lot of investments in infrastructure have been made to transport the LNG that Kazakhstan holds to China. In China this LNG can be used as an energy source that is needed for numerous manufacturing sites throughout the country. In the former Soviet states situated in Central Asia, security/stability might be an issue. To solve this problem, China aims to strengthen its diplomatic and economic ties with this area, leading to increasing prosperity in Central Asia, enhancing a more stable society. (Chamorro, 2017)

When the plans for the BRI were freshly announced, the main interest seemed to be a ‘Sino-centric’ Southeast Asia. This main interest is explainable, because the Chinese want to increase their regional influence. After increasing regional influence they will feel to be ready to ‘conquer’ the rest of the world. (Callahan, 2016) It is not surprising that the Chinese government sees Southeast Asia as a cornerstone for the envisioned trade expanse embodied through the ‘Maritime Silk Road’. (Yu, 2017) This region bears an important strategic asset, the Strait of Malacca, which is an essential passage when visiting the ports on the Chinese east coast. Besides that, the Chinese see potential in ports on the west-side of this sea strait. Due to their more efficient locations with regards to Europe, it could be interesting to invest in such ports, enhancing further optimization of the transportation network design. (Yu, 2017) Furthermore, the Chinese see its neighboring countries in Southeast Asia as a good market for some excessive production. Hence, good connections with this region are essential to extract profits from through excess domestic supply. (Yu, 2017) All in all, it can be very beneficial to open up the region of Southeast Asia by means of the BRI for two reasons, strategic locations for more efficient trade routes with Europe and interesting markets on which Chinese excess production can be sold.

The trading ties between Eastern Africa and China existed from before the introduction of the OBOR plans. These ties are based on raw materials, which China imports from the continent, and Chinese investments made in the region of East-Africa. (Pilling, 2015) Besides Eastern Africa, the North of Africa also receives particular interest from China. The North is situated along the Mediterranean Sea, making it a strategic location within the plans for the ‘Maritime Silk Road’. One of these strategic locations is Port Said, situated at the northern end of the Suez Canal, where the Chinese have been investing in much as well lately. (van der Putten & Meijnders, 2015) As said above, East-Africa is an important location for the import of natural resources. These natural resources concern mainly oil and gas, but think about coffer as well, for instance. (Myers, 2016) China needs these products for their own industries in order to function. Therefore, they value the trade relationships with countries as Ethiopia and Kenya highly, hence the investments made in these regions. Exploiting this relationship to a larger extent, could imply a boost for the Chinese economy causing exports to increase further and strengthening the Chinese position on the world stage. The strategic locations in both Eastern and Northern Africa mean a big deal to China. Eastern Africa is well-suited for Chinese naval bases in the fight against pirates. This is necessary for the security along the Maritime Silk Road. Otherwise, potential trade revenues could be harmed as a result of terrorist, pirate violence. (Swaine, 2015) Northern Africa, on the other hand, primarily has important locations in Egypt for the BRI. Egypt, of course situated on the northern end of the Suez Canal, receives a lot of interest from Chinese investors. This is explainable, since the Suez Canal is a determining factor in the realization of the OBOR plans. (Xinhua, 2017) The Chinese see the Suez canal as the gateway to Europe, hence the investments in the ‘Suez Canal Economic Zone’. Besides that, ports such as Port Said and Alexandria could be a good gateway

to Northern Africa, the more wealthy part of this continent. All in all it can be stated that the BRI has a lot of future potential in Eastern and Northern Africa. Both areas can provide strategic locations for the BRI and are gateways to hinterlands rich of natural resources. Opening up these areas to trade to a larger extent can boost China's economy through the supply of inputs on the one hand. On the other hand, the BRI could facilitate the creation of African export markets, because the Chinese imports create prosperity in these regions, hence increasing the demand for more luxury products.

Trade fine-tuning for certain commodities

There are a lot of commodities for which it is economic unviable to not be transported via sea. As stated above, ocean shipping is the least expensive transportation mode for containerized cargo. Nevertheless, this modal option contains a downside, the long delivery times. (Freight Hub, 2018) Ocean transport is the most conventional way of transporting bulk commodities and "high volume and heavy cargo" (e.g. minerals). As can be seen these are all commodities for which it is impossible to be transported by air freight. On the other hand, air transport is more expensive though much faster. This mode can live up to the demands of just-in-time goods and perishable goods, such as pharmaceuticals. It is important to note that sustainability and awareness of the environment are hot topics nowadays. Both of the above mentioned modes do not fulfill the desires in terms of fuel usage, hence they are considered to be quite harmful to the environment. (Rondinelli & Berry, 2000) Moreover, air transport is proven to be more harmful than sea transport when comparing relative transport capacity to fuel usage. (Rondinelli & Berry, 2000) So, from this point of view sea transport is more viable than air transport, this is something that the BRI enhances by abandoning air transport as a modal option.

Besides sea transport, the BRI includes rail transport, which is considered to be a 'green' modal option according to Freight Hub. (2018) This mode can also carry containerized cargo, just as container vessels and above all it is faster than deep-sea transport. This opens up a lot of opportunities for the trade between Europe and the Far East.

Since air transport seems to be partly abandoned due to its environmental inefficiency and high costs, a path is paved for the modes included in the BRI. Commodities that might be affected by this are less-perishable commodities transported as air freight, with opportunities for containerized transport. Such commodities are fresh goods, which can be transported using reefer containers, valuable goods, with sufficient protection or trend-sensitive goods, e.g. the latest fashion. (Cargo from China, 2017) These are the goods that formerly were transported through the air. However, they do not have very severe time pressures, implying that they can be transported using a slightly slower mode of transport, which is rail transportation. Although rail transportation is more expensive than the multimodal option proposed in the section 'the more efficient approach to Europe' it is not realistic to use several modes for the abovenamed commodities. This is the case, because the multimodal option, combining sea and rail transport, is too slow

for these goods. This implies that a niche market is opened for these particular commodities. The niche market explains the plans for the design of the ‘Eurasian Land Bridge’ in the OBOR plans. So, this land connection is a good means of fine-tuning the transportation of intermediate goods discussed in this section.

Commodities for which transportation is fine-tuned using the multimodal are several kinds of containerized goods that are already transported via sea. This new transportation structure enhances optimization, due to decreasing transit times relatively to increasing costs. According to the European Commission (2018) China’s main exports to Europe are “industrial and consumer goods, machinery and equipment and footwear and clothing”. As stated in the former paragraph the last cargo type of this list is more likely to be transported by rail only, due to its trend sensitivity. However, the first two cargo types are likely to be transported using the multimodal connection, because this is containerized cargo. Especially containerized cargo is suitable for the multimodal option, because containers can easily be unloaded from vessels and placed on trains to continue for the last phase of transportation. All in all, it can be said that the multimodal option increases efficiency for containerized cargo that does not require fast transit times. This is something that the BRI takes care off throughout their projects. Also, the types of cargo that require rail transport only are facilitated through the BRI by the land connection. This implies that the BRI chooses to serve a niche market and chooses to optimize the market for ocean shipping.

Conclusively, it can be said that all three reasons stated above significantly contribute to the future potential of the BRI. The first reason, the more efficient approach to Europe, increases the efficiency of the trade relationship between Europe and China both time and cost wise. This is achieved by using two modes, rail and sea transport, that optimizes the transportation network design to a significant extent. This optimization implies a lot of potential for the land and sea component of the BRI, because transportation is cheaper and faster than existing modal options. The second reason, the exploitation of new markets, opens developing economies in Central Asia, Southeast Asia and East and Northern Africa up to more extensive trade. This is done by creating a foundation for import and export markets and the exploration of mutual beneficiaries in terms of strategic locations and the exchange of inputs necessary for the growth of the Chinese economy. The acquisition of strategic locations in safety and economic terms gives China more influence on trade routes that are important for the entire world. This strengthens China’s position on the world stage, may be even leading to the number one position. The third reason, trade fine-tuning for certain commodities, states that both the multimodal connection and the land connection optimize transportation for specific commodities. This means that there are intermediate commodities for which the BRI exploits a niche market, through a more efficient transportation mode that is enhanced with the OBOR project. Although, the niche markets partly rely on commodities abandoned by air transportation, this modal option will never disappear completely. This is logical, because products like pharmaceuticals sometimes need

ultimately fast transportation. So, the BRI has brought and will bring changes to the current transportation network design it will never completely replace it. This is due to the fact that there are a lot of goods that actually profit from either sea transportation on the one side of the transportation spectrum or air transportation on the other side of this spectrum. Bearing this information in mind, the hypotheses can be assessed in the next section.

Conclusion

The assessment of the hypotheses

‘The BRI enhances reliability and efficiency in terms of cost and time.’

The focus of the first hypothesis is on efficiency. Several aspects regarding efficiency on multiple routes of the BRI have been discussed throughout this paper. Most efficiency gains have and will be achieved on the route between Europe and China. Furthermore, gains are achieved in the proposed network design for Southeastern Asia. A brief overview of these gains will be given, afterwards the first hypothesis will be assessed.

As stated above the designed routes between Europe and China contain sea and land components. The design of the sea component looks quite familiar to the currently operated network design. The land component, on the other hand, is more innovative, because it introduces the extensive operations of the rail connections between Europe and Asia. Both components have their own pros and cons. That is why a multimodal connection seems to be a viable idea.

First, the efficiency considerations for the ‘Maritime Silk Road’. Sea transport is a very slow means of transport (Woo, 2017), this is something that the BRI wants to improve. Traditionally, the sea trade routes between Europe and Asia ran between the Chinese east coast and the west coast of Northern Europe (Hamburg-Le Havre Range). In principal, Europe is already reached when exiting the Suez Canal in the Mediterranean. Therefore, the BRI aims to unload cargo designated for the European market in the Mediterranean area, hence the investments in Mediterranean ports, such as Piraeus and Naples. (Casarini, 2015) This strategy has to lead to significant cost reductions, mainly because of the reduction of travel time and the circumvention of the busy Strait of Gibraltar. (Candela, 1991) Above all, sea transport is very cost efficient. (Shu, 1997) This is due to the high capacities, implying the exploitation of scale. Furthermore, the introduction of liner alliances (Haralambides & Veenstra, 2000) and slow-steaming (Maloni, Paul, & Gligor, 2013) has led to the reduction of excessive capacity, hence cost reductions. The price per TEU for sea transport also reflects the cost efficiency of this modal option, because with almost \$700 per TEU it is by far the cheapest of all. (UNCTAD, 2017) So, the Maritime Silk Road enhances mainly cost efficiency, but also time efficiency to a smaller extent.

Then, the land component and its efficiency scores. As stated above, the land component consists of a network of rail connections stretching between Western Europe and Eastern China. According to Lin (2011), rail transport is way faster than sea transport. Namely, it takes 15 days to reach Hamburg (Germany) from China by rail and 40 days to reach the same destination by sea. So, rail transport enhances serious reductions in travel time comparing it to sea transport. Nevertheless, this mode is not as cost efficient as sea transport, because it is 3 to 5 times more expensive. (Woo, 2017) This is also reflected in the price per TEU which is currently \$3,000 per TEU for rail transport, which is almost 4.5 times as much as sea

transport. (Valentine, 2017) (UNCTAD, 2017) So, rail transportation ensures time efficiency in comparison to sea transport. However, sea transport is more cost efficient.

The fact that the two modes included in the BRI enhance different forms of efficiency, opens the door for a multimodal option. As suggested by Casarini (2016) this multimodal option can improve the competitiveness of Chinese goods on the European market extensively. This author proposes a network where ships are unloaded in the Mediterranean ports. From here, the goods are distributed over Europe by means of the rail connections that the BRI provided. The multimodal option enhances both time and cost efficiency and improvements, hence it leads to a further optimization of the transportation network design.

Besides the efficiency gains on the European routes, the BRI also aims to improve efficiency in Southeastern Asia with some strategic choices. Southeastern Asia own a strategic locational asset in the form of the Strait of Malacca. A narrow sea strait that all ships have to pass to reach the Chinese east coast. To prevent the passing of this street, the BRI aims to invest in ports on the west side of the strait. This leads to a reduction in travel time, hence further optimization of the sea trade network between Europe and China. (Yu, 2017)

Reflecting the multimodal efficiency gains and the strategic efficiency gains on the first hypothesis, it can be concluded that the BRI indeed enhances efficiency in terms of cost and time. This implies that the BRI further optimizes the transportation network design, which is mainly due to the opportunities for the multimodal option in the approach towards Europe.

'The BRI exploits a niche market.'

The current design of the transportation network for which air and sea transport are the main modal options, is not likely to be completely phased out by the BRI. Of these two modal options, air transport is not included in the OBOR plans. Nevertheless, the mode will not be phased out completely according to Zubkov (2018). This is the case, because the BRI causes disruption that will lead to coexistence of preexisting transportation modes and newly introduced transportation modes. (Zubkov, 2018). That air transport is included in this situation of coexistence can be granted to the speed of the transportation mode. Air transport is the fastest modal option that exists, implying that the mode is needed to satisfy the demands for just-in-time goods. Just-in-time goods are goods that needed the fastest transportation mode as possible, due to the urgency of consumption, pharmaceuticals are a good example of this, because they can be the difference between life and death. So, as long as air transportation is the fastest available mode, it will not disappear completely. Although, the BRI is able to capture some market share in terms of goods for which this mode is slightly expensive.

According to Lee, Lee & Zhang (2015) the land component of the BRI could be able to capture some commodities that are currently transported by sea. Such commodities are the ones with a high demand variance. Also, cargo as laptops, cell phones or other Chinese domestic products can be transported in a

more viable way by rail. (Hillman, 2018) This viability comes from the fact that rail transport is significantly faster than sea transport, the current mode of transportation. Also, trend-sensitive goods need sufficiently fast transportation, but air transportation is sometimes too expensive. (Cargo from China, 2017) For all the goods named above, sea transport can be too slow in some cases, also the multimodal option as proposed in the previous section can be too slow. This implies that the modal option that wins the time-costs tradeoff for such goods is rail transportation, which is relatively fast and relatively cheap.

So, air transportation is not likely to disappear due to demand for very fast modal options. Moreover, the BRI will not capture the total market share of current sea transportation, because of its cost effectiveness. Although, several commodities will be reallocated due to the introduction of the BRI. This is the case, because the BRI includes modal options that are cheaper than air transport and faster than sea transport. For several commodities this can lead to further optimization of their transportation options. Thus, reflecting this on the second hypothesis, it can be concluded that the BRI exploits a niche market. The plans introduce innovative modal options that will cause goods such as electronics and fashion and other goods with high demand variance to be transported by other means. This shift in transportation indicates the fact that the BRI exploits a niche market, mainly the market for goods with a high demand variance.

'The BRI serves as a good complement to the currently existing transportation network.'

This hypothesis consists of two parts, the current transportation network and the magnitude to which the BRI is either a complement or a competitor to the current transportation network. The current transportation network consists of two modal options, air and sea transport. The first one is very fast, but also very expensive. The second one is very cheap, but also very slow. It seems that the two modes are positioned in the two outer boundaries of the transportation spectrum regarding time and costs. This implies that there is space for the BRI's modal options in-between the spectrum, resulting in further optimization of the current transportation network design.

There are several reasons why the BRI would rather be a complement to the BRI than a competitor. The first reason are the economies of scale that are exploited by the currently existing transportation network. These economies of scale have caused sea transport to be the cheapest, existing mode of transportation. (Micco & Serebrisky, 2006) This is also the reason why the designers of the BRI decided to include sea transportation in their plans, by means of the 'Maritime Silk Road'. The only thing that has been changed are the ports of destination in Europe. These ports are not situated in the Hamburg-Le Havre range anymore, but in the Mediterranean Sea area. This change leads to significant cuts in transit times. By making this strategic choice, the Chinese have also ensured their grip on a self-led trade route, which was one of the aims of the BRI. (Hillman, 2018) However, due to the stable market position of the ports in the Hamburg-Le Havre range, it is not likely that the BRI will completely replace the traditional sea routes. Another reason for this, is the wealthy hinterland of the Range, which bears a lot of opportunities for the

generation of profits, also for the Chinese. So, the Chinese will not completely abandon ports such as Rotterdam and Antwerp. All in all, it can be said that the BRI by upgrading the currently existing trade routes, by turning Mediterranean ports into hubs, but the power of Europe's traditional sea ports is too extensive to replace them. Besides that, rail transportation is not able to compete with the economies of scale exploited in the currently existing transportation network. Therefore, the new sea route design for the 'Maritime Silk Road' will serve more as a complement to the traditional sea routes.

Although rail transport is a very efficient mode of transportation, the 'Eurasian Land Bridge' is not able to compete with sea transport in terms of capacity. (Hillman, 2018) Nevertheless, rail transportation is a good complement, due to the fact that it enhances time efficiency more extensively than sea transportation. Besides that, rail transportation cannot cope with the cost efficiency of sea transportation. Implying that it is a more expensive means of transport whose costs are not sufficiently enough for certain commodities, e.g. liquid bulk goods, that experience cost pressures. (Woo, 2017) So, rail transportation is a very fast mode of transport. However, it cannot exploit the economies of scale nor achieve the level of cost efficiency that the traditional transport network can. Therefore, rail transport can be considered to be a good complement to the currently existing network, providing transport for intermediate goods that need fast transportation, but for which air transport is too expensive.

The power of the other mode of transport in the currently existing transportation network, is its speed. As stated above, air transport is the fastest mode of transportation, but is very expensive. (Woo, 2017) This implies that for certain commodities it is not acceptable to operate this mode, although these commodities need fast transportation. Sea transportation is not able to provide transportation to this speed, so the modes proposed in the BRI can be able to fill up this gap. All in all, it can be concluded that air transportation will not disappear, because certain commodities (e.g. pharmaceuticals) need very fast, just-in-time transportation in order to be competitive and facilitate demand.

Reflecting the previous paragraphs on the third hypothesis, it can be concluded that the BRI serves as a good complement to the currently existing transportation network. The BRI cannot be competitive to it for several reasons: the economies of scale in sea transport, the capacity constraints of rail transportation and the high time efficiency of air transportation. It is also not surprising that the 'Maritime Silk Road' is a kind of variant on the traditional sea routes, although it cuts transit time significantly. Also, the multimodal option is not able to defeat the traditional sea routes, due to the stable market position of the ports in the Hamburg-Le Havre range.

'The BRI makes China the leader in world trade.'

The U.S. used to be the leader in world trade for many years. (Baldwin & Lopez-Gonzalez, 2015) However, China has been chasing the country from the beginning of the 21st century. Looking at figures 3 and 4 on page 8, this chase can be seen. From 2006 onwards, China grew with approximately 75 indices

more than the U.S., implying a rapid growth for the country that will be explained in the latter part of this section. Looking at figure 4 in particular, it can be seen that the size of merchandise trade of the two countries more or less equals. This shows that China's merchandise trade is ready to overthrow the U.S.' merchandise trade. The remaining growth opportunities will also be explained in the latter part of this section.

China has been able to grow rapidly due to certain plans included in the BRI. These plans mainly rest on the basis of the broadening of the Chinese perspective. Due to the BRI, China started to explore other markets more thoroughly. Think about Europe, which is the main focus on the BRI. On this continent a lot of Chinese investments have been made recently, resulting in increased trade flows between China and Europe. (McKern, 2018) Also, the increased regional influence has given China more grip on the trade within Asia, hence positive effects on China's trade. (Garcia Herrero & Xu, 2016) Moreover, the Chinese decided to invest in important sea passages through the BRI. These investments focus mainly on the Strait of Malacca (Yu, 2017) and the Suez Canal (van der Putten & Meijnders, 2015), important passages for the trade between Europe and the Far East. These investments can also lead to a situation in which Europe values trade with China more than trade with the U.S., implying that the U.S. loses one of his main trade partners. Especially, with the trade war that President Trump just started, the Europeans are likely to focus and rely more on China. All in all, it can be stated that China's good relationships with both Europe and the region have strengthened their position in global trade, especially with respect to the U.S. Also, the strategic investments that the Chinese have made can contribute to their strong position in global trade, creating space to develop.

Besides the growth that has already been realized by the BRI, there are still some aspects that can result in significant trade increases. The most important aspect is the new energy suppliers that China desires. The BRI has to ensure the fact that China is not dependent on Russia anymore concerning energy supplies. Instead, China aims to export their energy from Central Asia. (Shepard, 2017) The new supply has to provide the country new opportunities to grow. Nowadays, China is already the world's largest consumer of energy. (Weidong & Dunford, 2016) Nonetheless, they seem to be a bit constrained by the Russian energy that is not stable enough for its manufacturing companies to grow extensively. With energy from Central Asia this stability is ensured more, hence more extensive growth of the Chinese manufacturing industry. All in all, it can be said that when China ensures more stable suppliers of energy, its manufacturing industry will grow more, implying more exports and more favorable trade statistics.

Looking at the growth path of China's merchandise trade, the accomplishments of the BRI (stronger trade ties with the region and Europe) and the future prospects of the BRI, it can be said that the BRI has contributed to China becoming the leader in world trade. However, the extensive growth of the country's trade started before the introduction of the BRI in 2013, therefore the BRI is not the only driver of China's

of trade. Nevertheless, it is a very important driver, taking everything that still has to come from the project into perspective as well. Thus, the BRI is not the first reason for China's rapid trade increase, but it is likely to be the driver that pushed the country to the number one position during the last few years. So, the fourth hypothesis cannot be rejected.

'The BRI has significant future potential both land and sea wise.'

When Trump cancelled the 'Trans-Pacific Partnership' the future potential of the BRI increased even more. (Rapoza, 2017) There are several things that have contributed significantly to the potential of the land component, such as rail connection between Piraeus and Budapest. These things will be discussed in the latter part. The latter part also contains the factors that have contributed to the potential of the sea component and the intermodal option.

According to Garcia Herrero & Xu (2016) the initiative has a positive effect on Europe, this is especially the case for the land component and the intermodal option. These positive effects come from that fact that Europe is approached to a more efficient extent by unloading in the Mediterranean Sea and distributing the loads over the hinterland by the BRI railway systems. Also, the fact that the land component reaches all the way to the wealthy region of Northwestern Europe contributes to the future potential. (Notteboom & Yang, 2016) This is due to the demanding market in the region, which the Chinese very much like to serve with their domestic production. Thus, the more efficient approach to Europe and the stretch of the 'Eurasian Land Bridge' increase the potential of the entire BRI.

Also, the fact that the rail connection is considered to be a 'green' modal option (Freight Hub, 2018) is good for the BRI's future potential. The environment is becoming more important than ever, so by including the rail connection in the BRI, the Chinese definitely took a look at the future, sustaining transportation in the long-run even more.

The fact that investments in the Mediterranean area enable Mediterranean ports to capture market share from ports in the Hamburg-Le Havre range (Notteboom, 2017), is good for the future potential of the sea component. This is the case, because this reflects the space/opportunities for the BRI in the current transportation network design. Moreover, the investments in Southeastern Asia and East Africa give the sea component a lot of potential. Strengthening trade ties with these countries implies the creation of export markets on the one hand. On the other hand, the Chinese will be able to acquire more inputs for domestic production from these countries. (Pilling, 2015) This will lead to more production, leading to more exports, hence more profits from trade for the Chinese.

Casarini (2016) states that the intermodal option of the BRI increases the competitiveness of Chinese goods on the European market significantly. This increase in competitiveness is very good for the future potential of the entire BRI. Besides that, it is good for the future potential that China's main exports to Europe qualify for the intermodal option in terms of time and cost efficiency. (European Commission,

2018) Namely, because this indicates that there is space in the current transport market for the BRI, although it is only the case for several intermediate goods.

Reflecting the aspects of the sea and land component and the intermodal options on the fifth hypothesis, it can be concluded that the BRI has significant future potential both land and sea wise. The land component ensures a connection with Northwestern Europe. The sea component has options to capture market shares from Europe's traditionally largest ports and ensures inputs for domestic production and export markets in developing regions. Above all, the combination of the two components increases efficiency and makes Chinese domestic products more competitive on the most important export market of the BRI, which is Europe.

The answer to the research question

How viable is the BRI as an alternative for the currently existing transportation modes between the Far East and Europe?

To answer the research question, the existing transportation modes are considered first. The trade between Europe and the Far East is currently facilitated by two modes of transportation, air and sea. As stated before, air transportation is fast though expensive and sea transportation is cheap though slow. This indicates space for an intermediate mode of transportation that could be viable to the setting of Eurasian trade.

Two modes of transportation are included in the BRI. Sea transportation and rail transportation. The so-called 'Maritime Silk Road' is shorter than the existing sea routes, because it unloads in the Mediterranean Sea instead of Northwestern Europe. Taking into account that this mode of transportation is the cheapest mode of transportation, it can be concluded that the BRI enhances the same level of cost efficiency as the existing route, but the time efficiency is significantly higher. Therefore, the sea component of the BRI is a very viable alternative for the currently existing sea transportation route. Besides that, it is important to note that sea transport is an essential component of the BRI, because it has, by far, the highest capacity of all available transportation modes. Also, the land component can be seen as a viable alternative, because it decreases transit time significantly. Whereas, the travel time used to be 40 days (China-Germany by sea), the BRI ensures a travel time of 15 days by rail for a route that also ends in Germany. Moreover, the rail option provides a more efficient mode of transport for goods that were first transported by sea or by air. Think for instance about trend-sensitive goods, which experience a lot of cost pressure, for which air transportation is too expensive or electronics, China's domestic production, for which sea transport is too

slow. All in all, it can be stated that both components of the BRI are viable alternatives, due to their efficiency improvements, in terms of cost and time.

Above all, there is one aspect of the BRI that definitely stands out, the multimodal option. As stated, this option improves the competitiveness of Chinese goods on the European market. This is of course very important for China and this makes this multimodal option very viable, especially for the Chinese. By executing this mode, China's exports are likely to grow even further, hence China definitely overthrows the U.S. as the leader in global trade. Furthermore, this multimodal option gives the BRI a lot of future potential, by securing Chinese exports even more than the two components separated.

Conclusively, it can be said that the BRI is a viable alternative to the currently existing transportation network. This is to the extent that the BRI is a good complement, because the current modal options are hard, nearly impossible, to completely phase out. Besides that, the BRI will exploit niche markets, for intermediate goods by positioning more in the middle of the transportation spectrum. Therefore, it can be said that the BRI is a viable complement to the current network.

Recommendations for future research

The major recommendation for future research rests on the basis of novelty. Because the BRI is still in its development phase, a lot of future implications are unknown or uncertain. This implies that hard numbers on the project are very scarce and future effects cannot be estimated to a sufficient extent. This is also the reason why this thesis does not consist of an empirical component. Besides that, this thesis focusses mainly on the implications of the BRI of Europe. The implications for Eastern Africa and Southeastern Asia are discussed shortly. However, to get a good impression of the BRI as a whole, the implications for these regions should receive more consideration and care. Finally, it seems to be essential that the BRI should be reassessed after the completion of this project. This will give a good overview on the implications for the entire world and it will give a more detailed view on the actual markets that have emerged or have been exploited by the BRI. When these markets can be identified with full certainty, the viability of the BRI will become even clearer as well as China's motivation to design the project.

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