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Future Strategic Directions for TSR and TCR from the Perspective of the Northeast Asian Logistics Network

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Abstract

As the global economy continues to boom, there remains a significant need for more efficient transportation and effective management in corporate logistics. In this regard, railways have been considered one of the most efficient modes for long distance transportation. In Asia, there are several extensive and direct railroads such as the TSR (Trans-Siberian-Railroad), the TCR (Trans-Chinese-Railroad) and the TMR (Trans-Mongolian-Railroad) which could connect Asia to Europe. If these railroad networks such as the TKR (Trans-Korean-Railroad) were fully operational, it is expected that they would replace a major portion of the current global trade transportation with is sent through other shipping methods. Therefore, the development of railroad networks is one of the most important steps toward an integrated international transportation system. However, in reality, it is difficult to achieve this vision because of the political and economic problems surrounding multiple countries that this network must cut across. Moreover, it is difficult to ensure the railways' economic competitiveness when it is compared with other logistics options. In this study, we aim to discover the status quo about railway networks by focusing on the TCR and TSR. Through in-depth interviews and surveys with actual users of these networks, current issues and problems are analysed in order to make suggestions for improvements. This research also provides meaningful insights which the TKR-TSR and TKR-TCR railway networks should consider if they want to continue to be successful in the future.

Keywords: *TSR, TCR, global trade, transportation network, customs process*

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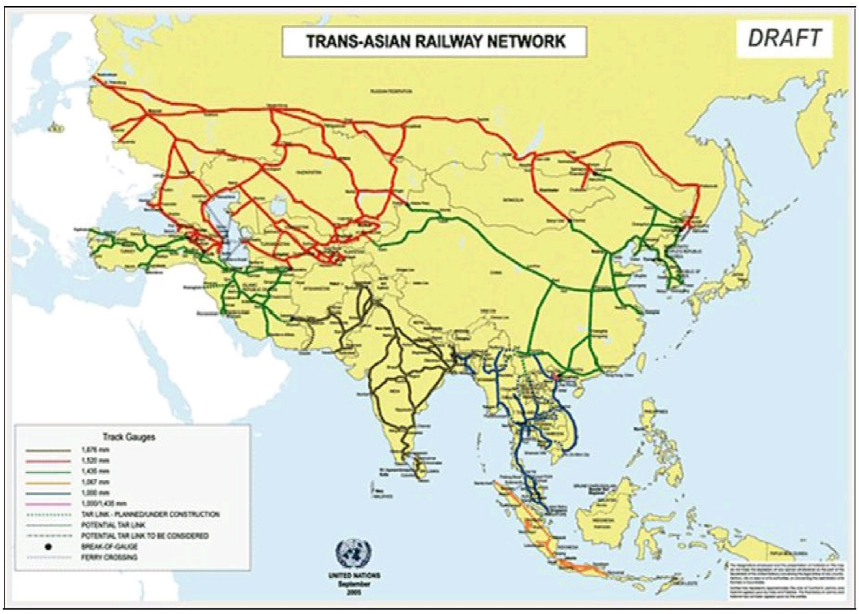
1. Introduction

1.1. Research Background

In BC 114, the ancient Silk Road through Asia was the most important cross-border artery in the world and Asia was one of the major trade and economic centers in the world. Though it has been regarded as a cultural heritage, Asia's importance is once again gaining significance as many Asian countries are once again becoming an integral part of the global economic network. In this regard the old Silk Road is being revitalized with several railway routes such as the TSR (Trans-Siberian-Railway), the TCR (Trans-China-Railway) and the TMR (Trans-Mongolian-Railway). These routes are very similar to that of the Silk Road of ancient times. There is also the possibility of building up the TKR (Trans-Korean-Railway) in the future. Once Korea is reunited, these connections will be spotlighted as the most important transportation systems in Asia.



Source: UNESCAP

Figure1.
Trans-Asian Railway Network

The development of these railway networks will give them significant potential to become the busiest international routes in the world. For many years, these paths have been studied as a future transportation route. However, there are still a lot of social, political, economic, and technical issues associated with them. Therefore, it is necessary to explore the potential challenges and opportunities within these railway networks in order to leverage the benefits which may someday have a huge impact on the Northeast Asian logistics network.

1.2. Literature review

At least in Korea, the international railway has not been a major transportation mode due to its geographical characteristics. However, railways in general play an important role in terms of concentrating and distributing cargo. In the case of the TSR, there are several problems and issues which need to be resolved in order to provide the general role which was described above. These include service quality issues such as timeliness, price, and stability (Choi, Lee, and Chung, 2002). The development of the TCR by the Chinese government is also an important opportunity to gain access to the continent (Won, 2006). In order for it to become a logistics hub with the TKR from the Korean perspective, it needs to analyze the existing conditions and environment of the TSR and the TCR (Kim, 2002). However, not much of the research has been done in this area. A brief summary of the existing study about the TSR and TCR are summarized in Table 1.

Table 1.
Summary of Literature Review on the TSR and TCR

Author	Summery
Choi,Eun-Young, Lee, ChanWoo Chung, Heung Cha (2002)	Described several problems and improvement efforts on the TSR, focusing on facility operation.
Won, dong wuk (2006)	Argued that the TCR plays a significant role in international transportation. Also suggested a way that the Korean railway can connect with the TCR.
Kim, Hongseop (2002)	To develop Korea as a logistics hub, the author argued that the economic and logistics environment of the TAR (Trans-Asian-Railroad) should be considered with the TSR and TCR
Lee, Jae-hak, Kim, Dong-hwan (2007)	Pointed out some ideas on how we can further develop and improve the TSR and TCR by using questionnaires.

In order to find out meaningful implications for further development of the TSR and TCR, we have conducted in-depth interviews and questionnaires with a few specialized companies which are currently using the TCR and TSR to do business. Through the interviews and questionnaires, some major significant issues have unfolded. The questionnaires were created based on the past studies and pilot interviews. The previously identified issues were converted into 10 questions, and it was distributed by industry experts and measured with the Likert Scale (‘5’ is the most important, ‘1’ is the least important).

2. The TSR and TCR

2.1. The TSR

The Trans-Siberian way (modern name) or Great Siberian Way (historical name) is an equipped railway throughout the continent of Europe that covers Russia, the capital Moscow, and the middle and Far East areas. This railway consolidates Russia, which is a country stretching through 10 time zones, but operates as a unified economic organism. Currently "Transsib" is used as a geo-political concept by connecting the Central and Pacific Ocean from Moscow to Vladivostok which includes the ports of in the West and the capital of Russia such as Moscow, St-Petersburg, Brest, Kaliningrad, Vladivostok, Nakhodka, Vanino, and Zabaikalsk. In a limited interpretation, the term Transsib means a main passage connecting Moscow - Yaroslavl - Yekaterinburg - Omsk - Irkutsk - Chita − and Vladivostok as described in Figure 2. The actual length of the Trans-Siberian railway (from Moscow to Vladivostok) is about 9288.2 km and is the longest railway on the planet. The transit passes through two main continents of the world: Europe (0 - 1777 km) and Asia (1778 - 9289 km): 19.1% of the Transit’s length belongs to Europe and 80.9% belongs to Asia.

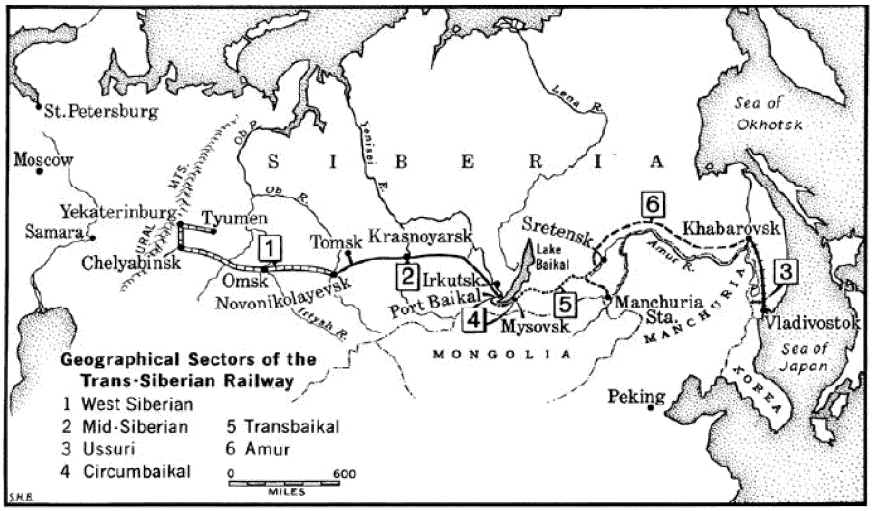


Figure 2.
Historical map of the Trans Siberian Railway

Due to the economic crisis in 2008, the transportation volume of passengers as well as cargo in Russia has decreased. Specifically, the cargo volume has been reduced by 14.9% and the number of passengers has dropped 12.2% as of 2009. The economic crisis also cut the subsidy from the Russian government which is given to private railway companies as well as the government budget for expanding the infrastructure. In the case of road transportation, cargo and passenger volume have also decreased by up to 23.9% and 6.8% respectively, but on the contrary, government investment for road infrastructure has recently increased (Center for the Northeast Asia and North Korea Transport Studies Brief, 2010). Shipping transportation has slightly increased because of the transport of oil, oil related products, coal and metals. However, air, inland waterway, and pipeline cargo have also decreased as shown in Table 2 and 3.

Table 2.
Volume of Cargo for Each Mode of Transportation

<unit: mil ton>

	1992	1995	2000	2004	2005	2006	2007	2008	2009
Total	15,737	8,814	7,907	8,978	9,167	9,300	9,450	9,451	7,469
Rail	1,640	1,038	1,047	1,221	1,273	1,312	1,345	1,304	1,109
Road	12,750	6,766	5,878	6,568	6,665	6,753	6,861	6,893	5,240
Pipeline	947	783	829	1,024	1,048	1,070	1,062	1,067	955
Shipping	91	71	35	29	26	25	28	35	37
Inland waterway	308	145	117	135	134	139	153	151	97
Air	1.4	0,6	0.8	0.9	0.8	0.9	1.0	1.0	1.0

Source: Center for the Northeast Asia and North Korea Transport Studies Brief (www.nk-koti.re.kr)

Table 3.
Total Transportation Volume

<unit: mil ton>

Year	2004	2005	2006	2007	2008	2009(Oct)
Total cargoes	12.21	12.73	13.11	13.44	13.0	9.6

Source: Center for the Northeast Asia and North Korea Transport Studies Brief (www.nk-koti.re.kr)

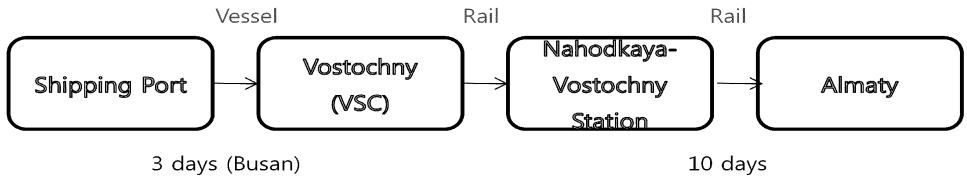
In 2010, the International Coordinating Council on Trans-Siberian Transportation (CCTST) reported that transit container cargo had been continually decreasing since 2005. As shown in Table 4, this pattern was dramatically impacted right after the global recession. In 2009, transit container cargo was 564,573 TEUs which is almost a 36% reduction compared to 2008.

Table 4.
Transportation Volume of Raw Materials on the TSR

Year	2005	2006	2007	2008	2009(Oct)
Coal	278.0	287.5	286.3	297.1	224.7
Oil/Oil painting	218.0	228.3	232.9	-	187.5
Iron Ore/Magnesium	101.0	108.3	110.2	-	78.8
ferrous metals	73.0	26.2	83.2	-	52.9
Woods	64.0	64.1	27.0	-	18.6
ETC	539.0	596.6	604.4	1002.9	404.3
Total	1273.0	1311.0	1344.0	1300.0	966.8
Year	2005	2006	2007	2008	2009(Oct)

Source: irail.net

In order to move containers using the TSR, it is necessary to follow the 4-step process which has been used by one of the leading TSR and TCR operation companies. Typically, cargo is transported from a departing port (Busan) to a transit port (Vostochny) by vessels. This typically takes between 7 to 14 days. When cargo in Vostochny is shipped using the Stevedoring Container Service (VSC), documents such as Commercial Invoice(C/I), Packing List (P/L), and Bill of Lading must be submitted (B/L) for the customs clearing processes. At the same time, a railway bill is issued in Almaty, Kazakhstan which normally takes 10 days. The cargo is then carried to a container yard by rail. The summarized TSR transportation process has been depicted in Figure 3.



Source: Pantos

Figure 3.
Logistics Process on theTSR

As for the transportation cost from Busan to Moscow, it costs about 2,600 US dollar (one 40ft container) as of 2009.

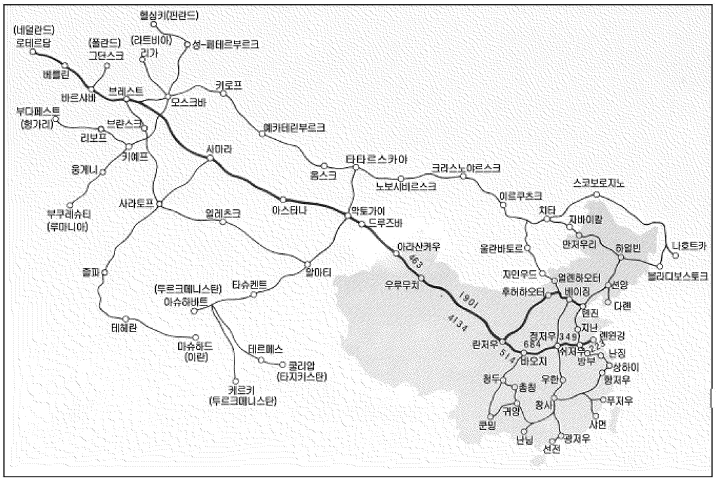
Table 5.
Transportation Cost from Busan to Moscow using the TSR

Depart	Route	Period	Cost(USD)
Busan	Vladivostok-TSR-Moscow	30 days	2,600

Source: status of the Russian food industry and making inroads into the Russian market, Ministry of Agriculture, Forestry, Fisheries and Food, 2009.

2.2. The TCR

The Trans-China Railway (TCR) begins at Lianyungang(連雲港), Rizhao (日照) an East corridor port city in China, and goes to Alashankou(阿拉山口) and Dostyk in Kazakhstan. The route directly connects Moscow in Russia, Berlin in Germany, and Rotterdam in the Netherlands and has a total length of 10,870km.



Source: Status of theTCR and tendency of development: strategic value and direction of theconnection, Won Dongwuk,2004

Figure 4.
Trans-Chinese -Railway

The TCR, which passes through about 40 differernt countries and regions such as China, Middle Asia, West Asia, Russia, and Europe plays an important role in economic development as well as cultural exchanges. After China joined the WTO, the TCR became the main transportation artery for economic growth. It is especially related to the 'Development Plan for the West of China' because it includes at least 10 underdeveloped areas such as Jiangsu(江蘇), Shandong(山東), Anhui(安徽), Henan(河南), Shanxi (山西), Shaanxi(陝西), Gansu(甘肅), Ningxia(寧夏), Qinghai(青海), and Xinjiang(新疆). Also, the population of this area is 0.435 billion, which accounts for about 34.93% of the total population in china. In addition, these areas are the main silos for natural resources with 63.2% of coal, 40% of oil, and 50% of natural gasses being produced there.

If we look at the container trade volume between Korea and China, exports from Korea were about 2,330,000 TEUs and imports from China were about 2,620,000 TEUs. Excluding transhipment cargo, the exports were about 1,820,000 TEUs (78.2%) and imports were about 1,410,000TEUs (54%). If we compare these numbers to the year 2000, the trade volume is almost three times larger than it twas in 2000. The detailed container staticstics for these two countries are summarized in table 6.

Table 6.
Korea-China Container moving statistics

(Unit: 1000 TEUs, (%))

	Exports			Imports		
	Local	T/S	Total	Local	T/S	Total
2000	609(75.37)	199	808	414(40.83)	600	1,014
2001	704(74.11)	246	950	491(39.28)	759	1,250
2002	935(72.82)	349	1,284	672(38.62)	1,068	1,740
2003	1,130(72.44)	430	1,560	853(45.32)	1,029	1,882
2004	1,286(76.14)	403	1,689	1,039(47.97)	1,127	2,166
2005	1,147(76.55)	434	1,851	1,120(46.59)	1,284	2,404
2006	1,555(78,50)	426	1,981	1,280(50.16)	1,272	2,552
2007	1,769(78.52)	484	2,253	1,479(53.18)	1,302	2,781
2008	1,823(78.24)	507	2,330	1,414(43.01)	1,204	2,618

Source : KOTI logistics brief, 2010

According to the CRIMT (China Railway International Multimodal Transport), which is a subsidiary company of the CRCT (China Railway Container Transport center), the cargo in Alashankou, where the final station of the TCR is located in China, rapidly increased from 143,000 TEUs in 2006 to 191,000 TEUs in 2007. Transit block trains passing through Alashankou dramatically increased at an annual average rate of 20%. There were 293 trains in 2006 and 377 trains in 2007 (SJ Logistics). This upward movement stems from the Chinese government's support, because it tried to modernize the infrastructure of railway transportation.

Dostyk (which was previously called Druzhba) in Kazakhstan is a border city. The station of Dostyk is a gate for Kazakhstan which plays an important role in the Trans-Asian-Railway. It connects Zauralye to Presngorkobka and measures about 2,035 km in length. Due to increased international trade within the north-eastern Asian countries and strong economic development in this region, container cargo has rapidly increased between Dostyk and Alashankou. According to the AO Kaztrans service, there were 74,551 TEUs from China to Dostyk and 35,126 TEUs from Dostyk to China in (tell when). When compared to statitics from 2006, TEUs have increased 40% and 31% respectively. The changes in container cargo in Kazakhstan are described in Figure 5.

(Unit: 1000 TEUs)

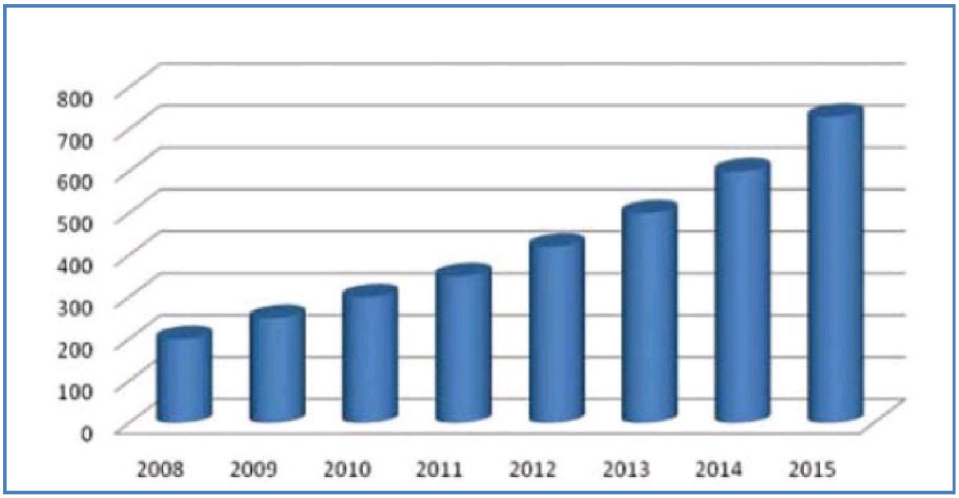


Figure 5.
Changes in Container cargo in Kazakhstan

In terms of customs clearing lead-time, Kazakhstan and Russia take relatively longer than that of the OECD countries. As shown in Table 7, the export/import document processing time in Kazahkstan was 89 days and 76 days in 2010, respectively. In the case of Russia, the export/import lead-time was 36 days, which is almost half that of Kazakhstan. As for the needed number of documents, these two countries require three times more documents than that of the average OECD countries. The export-related costs in Kazakhstan and Russia are also much higher than in most other countries because of these reasons.

Table 7.
The trade status of related countries compared to the TSR and TCR

Contents	Kazahkstan			Russia	Average of East Europe and Middle Asia	Average of OECD
Year	2008	2009	2010	2010	2010	2010
Business Evironment overall evaluation rank	71	64	63	120		
Rank of int'l trade	178	182	182	162		
Export cost ($/20ft container)	2,730	3,005	3,005	1,850	1,582	1,090
Import cost ($/20ft container)	2,780	3,055	4,600	1,850	1,774	1,146
Export document (per peice)	11	11	11	8	6.5	4.3
Import document (per peice)	13	13	13	13	7.8	4.9
Export time(day)	89	89	89	36	26.8	10.5
Import time(day)	76	76	76	36	28.4	11

Source: Charters of Kazakhstan trend and strategy for making inroads to the Kazakhstan market, Byun hyunseop, 2010

The transportation process for the TCR is described in Figure 6, which takes a total 23~30 days from Busan to Almaty.

Source : Pantos logistics

Figure 6.
Process for the TCR

Based on the data from Pantos Logistics, the route consists of 2 sub-routes beginning at the Busan port and moving to Qingdao via ocean transportation, then moving to Dostyk and Almaty on the TCR. The detailed process and description are as follows.

①Shipping Port
: Customs clearing for export. It takes about 3 days to Qingdao for the next transit.
②Qingdao－Luanyungang
: Railway bill, C/I, P/L, B/L is submitted to customs.
③Alashankou (Border)
: Border area between China and Kazakhstan. The container status should be checked. After checking, the container moves to the border of Kazakhstan.
④Dostyk (Border)
: This is also another border of Kazakhstan. The transit and customs clearing is done in this area.
⑤Almaty
: Arrives at a container yard. Is then loaded onto another rail car for the final destination.

Because of price variation and fluctuation, consignees typically do not make long-term contracts. Instead, shipping companies make contracts with transportation companies based on bidding which is conducted each year. The price scheme for the TCR on each sub-route is summarized in table 8.

Table 8.
Price of the TCR in detail

Contents	Cost (US dollar-40ft)	Etc
Inchon- Lianyungang	400	Shipping
Lianyungang - Alashankou	1,000	Railway
Kazakhstan	500	TSR route
Equipment rental	300	Transit port cost
Customs cost	1,000	Customs
Other cost	1,000	Container cost, Speed up charge
Total	4,300	

Source : Lee, Kim , 2007

Considering the lead-times in the export and import process which are shown in table 9 and table 10, Kazakhstan's route is a bottleneck during the entire TCR route. For example, export document processing takes 29 days and 33 days for import preparation, which is the longest delay within the entire route. Therefore, it is necessary to develop a more efficient method in order to eliminate this bottleneck, which in turn will enhance the operational efficiency of the TCR.

Table 9.
Detailed export time and costs for Kazakhstan

Export Time and Cost		
Nature of Export Procedures	Days	Cost(US$)
Document preparation	29	200
Customs clearnace and technical control	23	200
Ports and terminal handling	11	380
Inland trasportation and handling	26	2225
Total	89	3005

Source : Byun, Charters of the Kazakhstan trend and strategy for making inroads into the Kazakhstan market, 2010

Table 10.
Detailed import time and costs for Kazakhstan

Import Time and Cost		
Nature of Import Procedures	Days	Cost(US$)
Documents preparation	33	200
Customs clearnace and technical control	16	250
Ports and terminal handling	4	380
Inland trasportation and handling	23	2225
Total	76	3055

Source : Byun, Charters of Kazakhstan trend and strategy for making inroads into the Kazakhstan market, 2010

3. Empirical Case Study of the TCR and TSR

3.1 Selection of Issues and Questionnaire for the Case Study

In order to conduct an empirical case study and analysis, preliminary issues were drafted with the result of the literature study as described in section 1.2. Then, in a first round interview, we asked them to choose the most important issues associated with TCR and TSR. In the second round, a more detailed questionnaire for the surveys was elaborated based on the first round interviewees' responses and from the current status of the TCR and TSR which is described in Section 2.

As noted earlier, most research regarding the TSR and TCR has pointed out similar issues and problems. Furthermore, after the first round, all of the interviewers chose the customs process as the most important issue. Detailed results from the first round of interviews is summarized in table 11.

Table 11.
The main difficulties in operating the TSR and TCR (first round interviews)

No.	Question	Importance rank
1	Customs	1
2	Delivery cost	2
3	Routing transportation	7
4	Pilferage, lost, damage	6
5	Total delivery lead time	8
6	Delay of transportation	4
7	Difficulties in transit	5
8	Delays due to Complicated paper work	3
9	Cost problems of Shipper owned containers (SOC)	9

As in the previous literature review, all of the issues pointed out by the interviewees are almost the same. During the interview process, we let each interviewee assign a rank to each issue and the rankings were later summed up. The most critical issue was once again the customs process, followed by delivery cost, delays, transit process, and so on. Based on this preliminary survey, we later developed some more specific questions which follow.

1. During customs clearance, what is the most serious problem?
2. What advantages do the TSR and TCR have compared to other transportation routes?
3. How do you react/respond when you experience unexpected delays?
4. What percentage of pilferage, lost and damaged goods has your company experienced?
5. What type of efforts do you make in order to prevent pilferage or lost products?
6. What is the first action when pilferage or product loss occurs?
7. Do you have an efficient IT infrastructure which is dedicated to TSR and TCR operations?
8. During the winter season, the Russian government gives higher priority to its domestic cargo. How do your company respond to this situation?
9. What suggestions do you have for improving TSR and TCR operations.

3.2 Information about interviewing companies

A total of 4 companies responded to our questionnaire and agreed to participate in interviews. These companies are Pantos logistics, Ecovice logistics, Rosco global, and Unico logistics which are all representative companies who provide services which require the use of the TCR and TSR. Note that Pantos is an integrated logistics company whose service coverage includes global transportation, where as Ecovice, Rosco, and Unico are logistic service companies which handle Russian and CIS-bound freight which requires extensive usage of the TSR and TCR.

4. Research Results

4.1 Customs

According to the questionnaire and interviews, the most important issue was the 'Customs process'. An example of the customs process is depicted in figure 7. Due to the difficult customs clearance process, the competitive advantage of the TSR and TCR is definitely weakend. The delays and long lead-times also create a lack of trust from the shippers and customers. In terms of clearing customs, Dostyk and Alashankou are the first cities which require clearance between Kazakhstan and China. In the case of the TSR,

Vostochiny is also a gate city for clearing customs. When the customs process is conducted in these cities, there are numerous problems which can be classified into two main root causes: intensive regulations by governments and unclear customs administrations. Detailed reasons for some of the delays in the customs process are explained in tables 12 and 13.

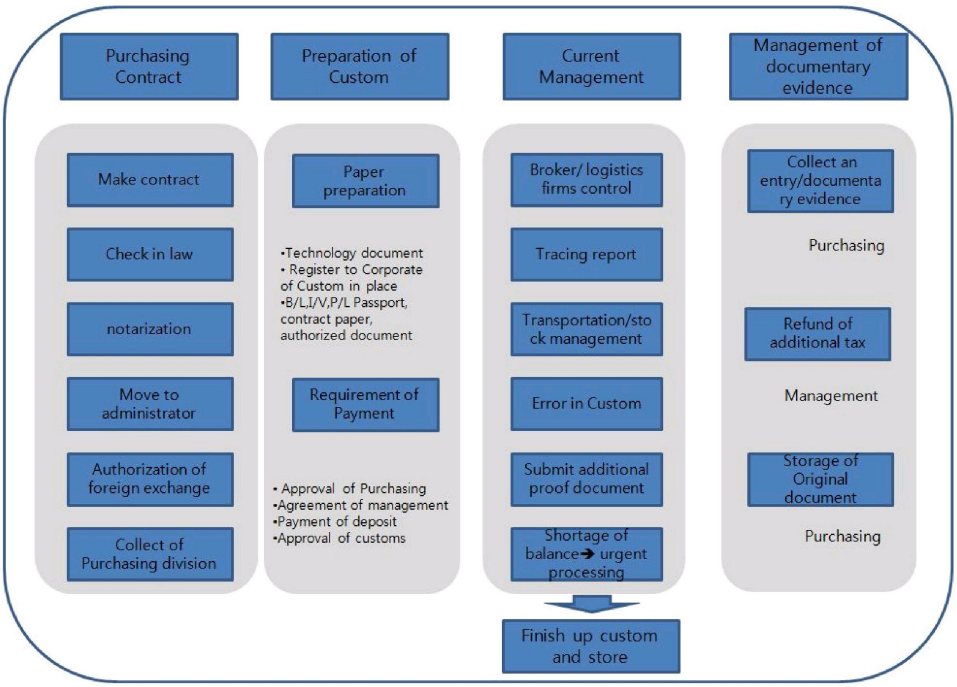


Figure 7.
An Example of the Customs Process

Table 12.
Reasons for customs delays – Intensive Regulations

No.	Intensive regulation system
1	A Sealed real document is only able to be certified
2	Frequency of inspections
3	Extensive import authorization system
4	post-paid / prohibited credit mortgage

Table 13.
Reasons for delays in customs – Unclear processes

No.	Unclear customs processes
1	Conventional bribes
2	Brokers in collusion
3	Deliberate delays at customs
4	Lack of an import company

In the case of air cargo, it is specified that the entire process should be completed within 30 days. However, in railway shipping, there are no due date guidelines for when the required documents have to be processed. Moreover, there is a malicious disturbance within the administration process by collusion with customs officers and brokers. Another difficult barrier is the lack of trust between customs and import companies, because 'Black import' (smuggling) and 'Grey import' (low declaration) are still prevalent in this area. From the vendor and customer perspective, data entry errors such as mismatched HS codes are the most common delay factors. Since customs brokers do not have the authority to determine the appropriate HS codes, they are solely dependent on the customs authrity's correct input.

Therefore, it is necessary to improve the customs process and the related infrastructure such as EDI implementation. Local customs knowledge as well as the customs brokers' capabilities are very important if improvements are to take place.

4.2 Delivery Costs

In 2006, the Russian government dramatically raised its TSR charges. They increased about 30%, but later on, they were adjusted to a rate of 13% for transit cargo to Europe and 30% for transit cargo from Europe to East Asia. However, in 2006 the Russian government implemented another 15% increase for domestic import and export charges. In 2008 and 2009, the Russian government increased the rates to 17.4% and 21.8%, respectively. As this information shows, the transportation charges for the TSR are extremely volatile. According to the interviewees, the TCR costs have been more stable than the TSR.

Because of the rapid changes in transportation costs, small companies have not been able to cope with the uncertainties. Considering that the customers of small transportation companies are normally large companies such as Samsung and LG who normally make annual contracts, the small logistics firms cannot pass the price increases on to their

customers when rates change. The demand and supply of containers has also been identified as one of the biggest cost related problems. For example, due to the global economic crisis in 2009, shipping companies have not been able to order new containers when they experience increased freight demand, which in turn has caused a used container shortage in the market. This problem makes it extremely difficult to operate the TSR and TCR and it also relates to the SOC (Shipping Owned Container) issue which will be described in section 4.9.

4.3 Paper work delays

Due to the complicated paperwork and customs processing, the companies that we interviewed pointed out that there are no consistent IT interfaces between the Russian Customs office and their own legacy systems. Currently, Russian Customs will sometimes open a direct connection to its system with the EDI for some companies, but for others only the open Web-based system is available. Since their paperwork processes are not standardized, consistent data transmission is also not available. Due to these inconsistencies, a large number of delays occur during the customs process.

4.4 Transportation delays

In terms of transportation delays, they typically occur because of many interrelated issues which will be discussed in this chapter. When a strange delay occurs for something like a military operation on the railroad in China, there is no other way to accelerate it and the customers and the logistics companies just take it for granted. Therefore, stable transportation is a very difficult thing to achieve in this region, and these problems make the railway system lose its competitiveness against other transportation modes such as maritime and air.

4.5 Difficult transits

In addition to the other barriers and bottlenecks which were discussed earlier, another problem in the transit process occurs due to the low number of available wagons, especially in Kazakhstan. Outdated and old equipment also causes unexpected problems and delays in shipping. The interviewees mentioned that they sometimes observe multiple pieces of equipment broken down and stopped in Vostochiny and other TCR related areas.

4.6. Pilferage, lost, and damaged cargo

Pilferage is one of the most serious problems on the TCR. The most common cases are that products are lost without any hampering being shown to the container because fake container seals are used. Many companies have gone to great effort to solve this problem by installing advanced container security devices. However, in some cases, using a special container seal gives an indication that valuable products are stored within that container and it is then targeted and pilfered. In this regard, it is necessary to create a close collaboration with the Russian and Chinese governments in order to enhance the security levels on the TCR and TSR. Figure 8 shows an actual pilferage incident during TSR transportation.

Source: Pantos Logistics

Figure 14.
Pilferage in the TCR

4.7. Routing priority

On the TCR and TSR, China and Russia give the highest priority to their domestic resources in cases of strategic cargo. For example, natural resources during the cold winter or military resources are given the highest priority. Many customers acknowledge that this is an uncontrollable situation, but in order to improve the stability of the transportation network, it is necessary to separate the commercial line from the military and strategic rail lines.

4.8. Total delivery lead-time

In terms of variation within the transit process, the TCR is simpler than the TSR because the TSR passes through only one country (Russia). On the other hand, the TCR operates in Kazakhstan, Uzbekistan, Trukmenistan and other countries. However, in terms of the total delivery lead-time, the TCR is more competitive than the TSR. However, even with the short lead-time, the TCR is still unstable due to the complex transit process.

4.9 The Cost of Shipper Owned Containers (SOC)

A SOC (Shipper Owned Container) is not owned by the carrier, but instead supplied by the cargo owners (shippers). Typically, there are two types of SOCs: DPs and conventional SCOs. The DP container (disposal container) is an used roll-off container. On the contrary, a COC (Carrier Owned Container) is owned by the shipping company. The problem associated with this type of container is that some countries only allow to use SOCs. This in turn increases the container cost for transloading as well as for container purchasing. Generally, shipping transportation costs for COCs are 45% lower than SOCs and railway tranportation costs are 20% lower than that of normal containers, which raises additional cost problems when using TSR and TCR containers.

5. Implications and Suggestions

From the in-depth interview and survey which was described in Section 4, we have reorganized the issues into the 3 following categories: policy, operation, and infrastructure.

5.1. Policy

The policy-related issues are closely related with international politics which could have an major impact on the operational efficiency and effectiveness of the TCR and TSR. In this regard, the EU could be a good reference model for this. In order to increase the operational strength of the TSR and TCR, it is essential to have an collaboration and cooperation among the nations that are directly and indirectly associated with the railways physical presence. More specifically, the customs process, delivery costs, trust, and container return problems fall into this category.

In order to make the customs process more streamlined, the transit process should become more simplified. For example, the CIQ (Customs, Immigration and Quarantine) area in Hong Kong typically takes about 15 to 20 minutes for a customs clearing and the inspection time for the process was between 45 to 60 minutes way back in 2001. Considering that the TSR and TCR's lead-time figure in a few weeks for processing, it is critical to simplify the process. To this end, when using government-level agreements, it is necessary to allow single language documents regardless of the borders which are being crossed and real-time information sharing should be used in order to eliminate the current document duplicating process. There are currently two effective international methods for railway transportation : the SMGS (The Agreement on International Goods Transportation by rail) and the CIM (International Convention concerning Carriage of Goods by Rail). In order to minimize confusion from practitioners, a united international agreement should be put into place. Another idea is to introduce the TIR Carnet, where container cargo does not need customs clearance if the process is conducted by an authorized customs inspection party. As for the cost-related issue, a new stable cost scheme should be introduced which will apply to multi-modal transportation including shipping by, rail, and trucking. Not only is there a need for a standardized cost policy, but stable operational trust also needs to be established on the TSR and TCR in order to prevent conflicts between foreign and domestic cargo. It is sometimes nesessary to give high priority to some special cargo based on the country's strategic purposes, but advanced notification should be given to the involved parties in order to provide clear visibility as well as predicatbility of freight movement. The last suggestion in the policy category is about the special requirements for container usage. Especially on the TCR, logistics providers are required to use SOC (Shipper Owned Containers), which creates a huge burden for logistics companies due to the volatile container prices as well as the difficult container return management system. If this strict policy can be abolished, the TSR and TCR can benefit from the increased cost advantages of not having to secure and return empty containers, This in turn, can also contribute to enhanced green logistics efforts.

5.2 Operation

Considering the lead-time and cost, the TSR and TCR are good alternatives to maritime and air transportation in the global transportation industry. However, these two routes are not that attractive when compared to other competing modes such as ocean and air. In order to make them more competitive, two operational issues should be resolved: inefficient paerwork and security problems.

To this end, developing the IT system is an essential prerequisite. Currently, EDI is not used to connect the relevant parties to the customs information or the processes. In the shipping industry for example, Hanjin Shipping uses an EDI solution called OPUS EDI for connecting information to the complicated customs clearing process. By introducing this new system, Hanjin lowered information requests per clearance process from 9 in 2006 to 2.7 in 2007. Although we acknowledge the environmental differences between ocean shipping and railway transportation, it is necessary to have at least an equivalent EDI system for connecting the relevant TSR/TCR stakeholders in order to reduce the lead-time in the customs clearance process. In addition, a standard document package should be used considering the fact that the TCR and TSR are passing through multiple countries which currently require multiple formats which must be written in multiple languages. Another operational issue is related to cargo security. Even though we cannot completely prevent cargo theft and pilferage, we at least need to have clear status information regarding the products and cargo. Once this information becomes commonly available, it will become relatively easy to minimize losses during the transportation process.

5.3. Infrastructure

The out-of-date infrastructure used by the TCR and TSR was one of the commonly referred problems given by the industry practitioners. One of this reasons for this is that these rail systems have different historical backgrounds with complicate the geographical features. To make this problem even worse, very little new invetstment has been devoted to this infrastructure. In ocean transportation, for example, large-scaled loading and unloading facilities have been constructed in order to accomodate mega vessels such as 12,000 TEU ships. In order to enhance the competitiveness of these rail systems, it is a must to expand the infrastructural capacity of the TCR and TSR. The core problem in connecting the TSR/TCR with other transportation modes stems from the different broad gauge. Due to the different gauge, the transit time takes much longer than the other transportation options. From a strategic perspective, the standardization of gauge is an long-term initiative which should be considered with all of the participating countries. In addition, the relating facilities should be modernized as we have seen from Vostochny's case, where the lack of nonoperational cranes helps contribute to stable and reliable operation.

6. Conclusion

The TSR and TCR are strategic transportation routes to North-East Asia which possess geographical significance as well as economic importance. As we continue to move towards a more globalized economy, these routes will play an even more important role as companys continue to face additional foreign competition. This network will help provide a gateway with cost-effective accessibility and connetivity to the rest of the world. However, as we have pointed out in this research, there are inherent limitations in facilitating the TCR and TSR due to politics, poor infrastructure and multiple operational perspectives.

In this paper, we have conducted in-depth interviews and surveys in order to discover the practical issues and problems which currently plague the TCR and TSR. As we stated above, these problems include IT issues, security problems, and the lack of compatibility. In order to overcome these imminent problems, improvements in operational efficiency must be focused on as well as providing the needed support to develop effective policies and infrastructure. However, due to the multiple countries and innate nature of complex connectivity that these railroads reach, it is necessary to conduct further research about the detailed situation surrounding the TSR and TCR. An economic analysis which includes the improvements mentioned in this paper and compares the TSR and TCR to other competing transportation modes such as maritime and air transportation should be conducted in the near future in order to determine how effective these proposed changes will be.

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