On-Rail Competition in Korea: A Comparison with Railways in Japan and Europe

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Abstract: Korea implemented railway reform in 2005 through vertical separation. At present, a state-owned railway, Korail, operates trains by accessing the nation-wide railway network owned by Korea Rail Network Authority (KRNA). Nevertheless, the government has plans to introduce on-rail competition on its high-speed network in the near future. Whilst there are some examples of on-rail competition in Europe, the effects and implications of this reform have not yet been fully determined, particularly in the passenger sector. In addition, there are many tasks and issues to be considered and addressed in order to introduce on-rail competition among railway operators. This paper discusses the issues regarding on-rail competition in the passenger railway sector through comparisons with railway operations in Japan and Europe. As the introduction of on-rail competition significantly changes railway operation and management, sufficient preparation and investigation should be made by the government before delivering its reform plans.

Keywords: Vertical Separation, Railway Reform, Open Access, Franchising, Cross-subsidy, High-speed Railways

1. INTRODUCTION

In 2005, the rail sector in Korea was reformed through vertical separation, and a public corporation, Korail operates trains and pays track access charges to the Korea Rail Network Authority (KRNA). Nevertheless, the government has some concerns about the efficiency of Korail, and has therefore expressed a desire to introduce on-rail competition on its high-speed railway network.

Although there are some cases of on-rail competition in the European railway transport market, the rail environment and the background between Korea and Europe has some marked differences. It is also recognized that there are some disadvantages to the model of vertical separation used in Europe in that coordination problems could be enlarged between infrastructure and operation. In addition, the effects of European railway policy are under serious discussions at present, and there are various issues that have not yet been fully clarified in the passenger sector in Europe. As on-rail competition is not yet common on high-speed railway lines across the world, sufficient investigation is required as to its effectiveness before introducing the policy in Korea. Even if the decision is taken that the policy will be introduced, there are many tasks and issues to address in order to introduce on-rail competition to the railway sector in Korea effectively.

Based on the background above, this paper in-turn discusses the key issues regarding on-rail

competition in the passenger railway market by comparing the examples of railway operations in Japan and Europe. As on-rail competition drastically changes railway operation and management, sufficient preparation and investigation should be made if the government promotes its plan.

Whilst a number of studies have been undertaken regarding European railway policy, there has been relatively little investigation into railway reform in Korea and its future steps.

Therefore, this paper aims to investigate the following issues regarding railway reform in Korea:
1) outline of the railway reform undertaken in 2005 and the conditions since the reform;
2) future plan to introduce on-rail competition;
3) comparison of railway operation and management with those in Japan and Europe; and
4) issues and tasks for introducing on-rail competition on the high-speed railway network.

The methodology adopted, includes the research of available materials and also interviews with those engaged in transport research and railway operation in Korea, Japan and Europe with their details kept anonymous. The analysis and investigation centers on the comparison of railway reform in Japan and Europe. The railway policies in these regions are also investigated.

2. RAILWAY REFORM IN KOREA IN 2005

This section outlines the railway reform implemented in Korea in 2005 and investigates the current management.

2.1 Outline of the 2005 Korean Railway Reform

Similar to Japan, railways in Korea are passenger-dominated. As background to this, the geographical nature of Korea being surrounded by sea enables maritime transport to lead the freight sector. Thus, there are similarities between Korea and Japan in terms of geographical and transport market conditions.

Before the 2005 reforms, the nation-wide railway network had been operated by state-owned railways, including the infrastructure management component. However, as private car use grew, the market share of rail decreased and the railways have worried about the accumulated debts and loss-making conditions since the 1970s. Accordingly, the railway systems lacked the sufficient maintenance works and investment for upgrades.

In order to begin to address the above issues, alongside the construction of new high-speed lines, the government planned a scheme of railway reform. These reforms in 2005 transformed the railways into a public corporation, and the infrastructure was transferred to the Korea Rail Network Authority (KRNA). Since the reforms, a sole state-owned railway company, Korail, has operated the nation-wide railways by accessing the network which is owned by KRNA. According to Lee (2004) the level of access charges were set so as to cover about 70 % of the maintenance costs.

The transition of passenger and freight traffic volumes is shown in Figure 1.

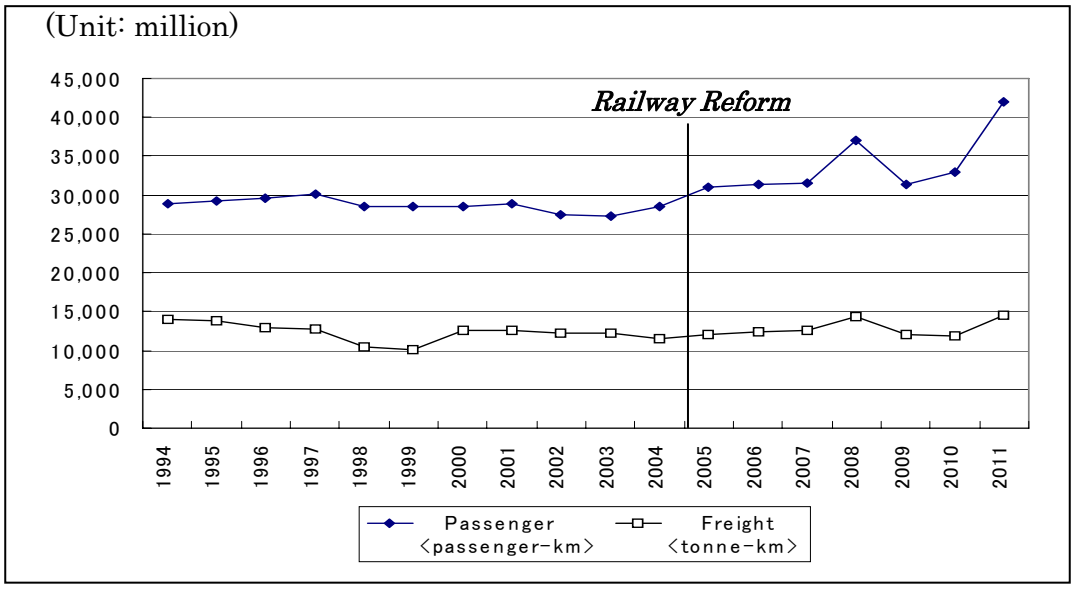

Figure 1: Transition of Railway Traffic in Korea
Source: Korail (2012)

As shown in Figure 1, railway transport volumes have been increasing since the railway reform of 2005, especially in the passenger sector. The increases in passenger traffic volumes indicate that Korail have been making efforts to attract customers.

2.2 Existing Railway Management

Despite the railway reforms in 2005, there has been some criticism leveled against the management of Korail particularly regarding its inefficiency.

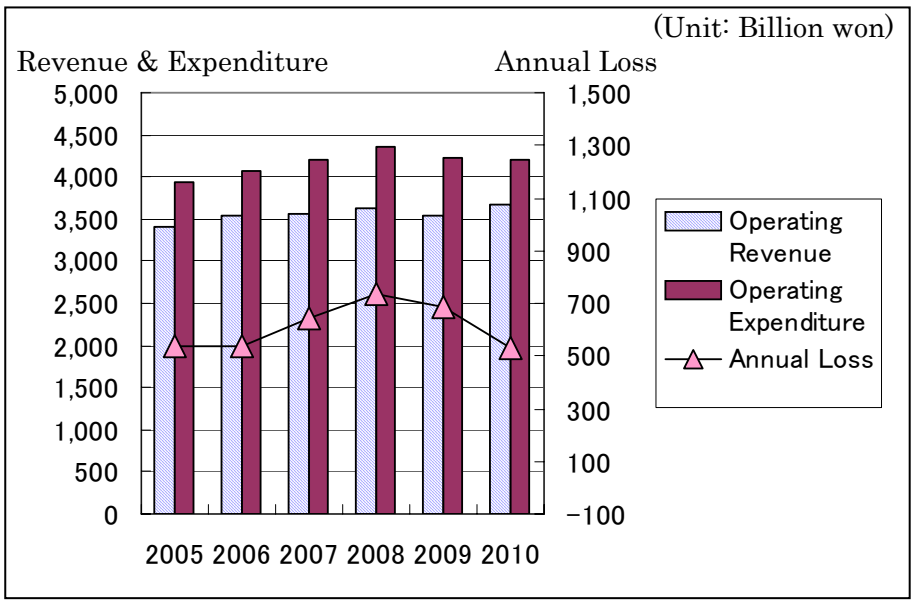

Figure 2: Revenue and Expenditure of Korail
Source: Ministry of Land, Transport & Maritime Affairs (2012)

As Figure 2 shows, the annual expenditure of Korail has exceeded its revenue year on year. Accordingly, the financials of Korail have been deteriorating, and the amount of liability has been increasing gradually. Accordingly, as the liability increases interest payment levels has been increasing as well (see Figure 3).

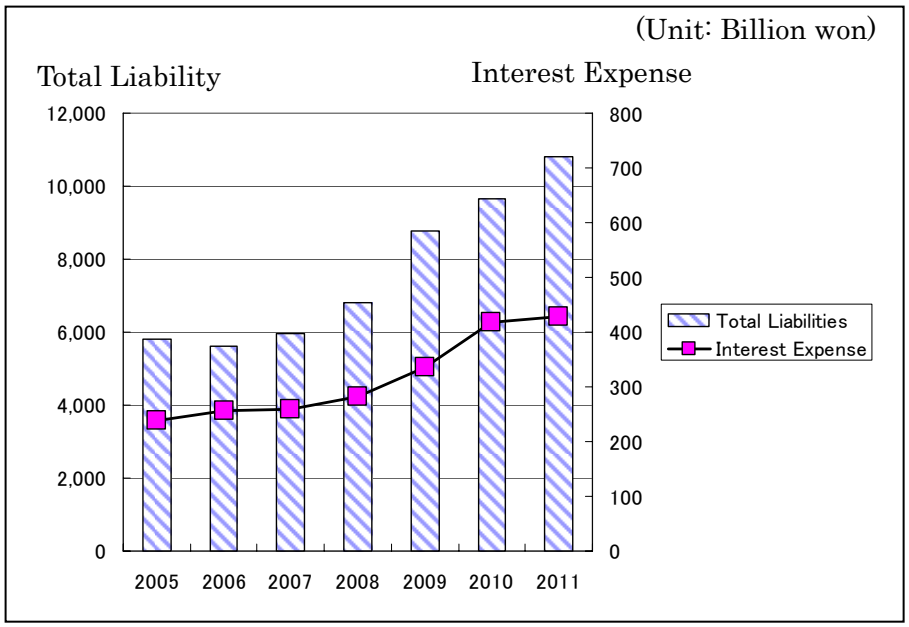

Figure 3: Total Liability and Interest Expense for Korail
Source: Ministry of Land, Transport & Maritime Affairs (2013)

The above-mentioned issues help provide the case for reform measures for Korail. In fact, the government has the intention to introduce on-rail competition on its high-speed railway lines to break the state-owned operator's monopoly. Nevertheless, it is not clear whether this railway policy will make Korail more efficient or in fact skim the lucrative revenue and result in increasing losses and liabilities for Korail (RGI, 2012).

3. A PLAN FOR ON-RAIL COMPETITION ON THE HIGH-SPEED NETWOK

3.1 Overview of the Korean High-speed Railway Network

Korail operates railways on high-speed lines and conventional rail lines, both of which are owned by KRNA. Figure 4 shows the high-speed railway network in Korea. At present, the two sections are under construction by KRNA:

1) Extension of the Honam high-speed Line running southwest from Osong to Mokpo; and
2) A branch from Pyeongtaek to Dongtan and Suseo serving the eastern side of the Seoul metropolitan area.

Although the Honam high-speed line is due to be completed in 2015, the operation of the line is under detailed discussion, as the following section outlines.

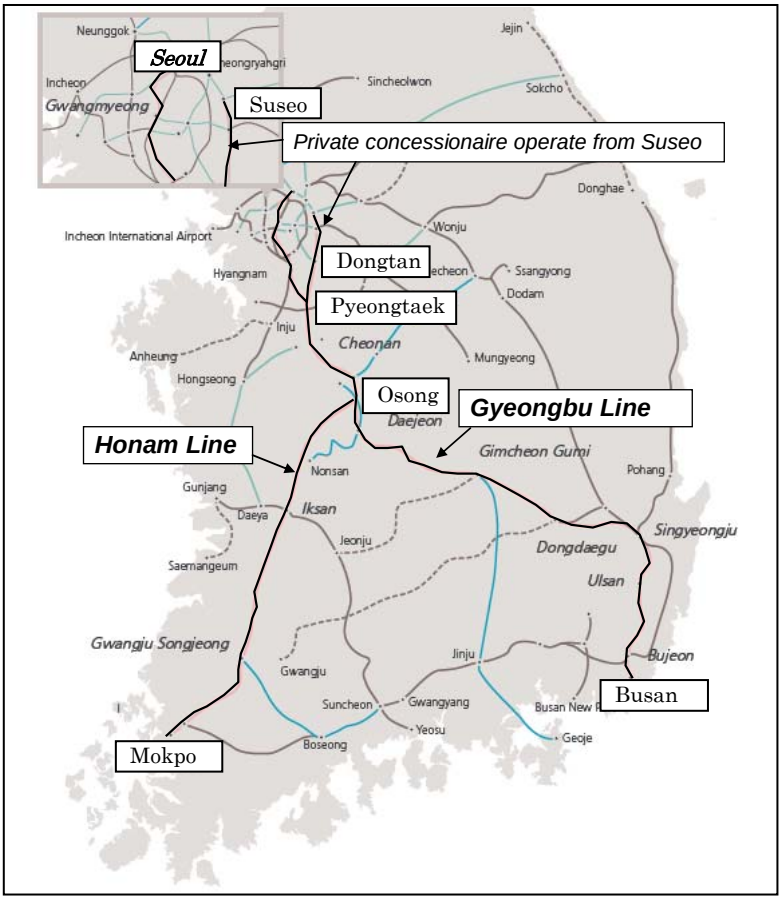

Figure 4: The High-Speed Railway Network in Korea
Source: Korea Rail Network Authority (2012)

3.2 On-Rail Competition on the High-speed Railway Network

In January 2013, the Ministry of Land, Transport & Maritime Affairs revealed its proposals to invite competitive bidding for the concession to operate the high-speed railway lines. Whilst Korail is on course to launch KTX services from Seoul to Mokpo in addition to its Seoul - Busan route, the ministry plans to invite a private concessionaire to operate high speed trains from Suseo to both Mokpo and Busan (RGI, 2012). The Ministry's plan will result in on-rail competition between Korail and a private concessionaire, which will lead to a drastic change of the current railway operation.

Based on the available information, detailed scheme information and plans are not fixed yet and they are currently still under discussion. It seems that the operational scheme for the high-speed lines in Korea after the opening of the new sections is also not fixed at present in Korea, and the concerned entities are still discussing the final plans. Nevertheless, different from the franchising system in which a sole operator operates the railway system, on-rail competition requires significant changes to the current railway operation.

It is highly recommended that the government should examine how examples from other countries operate their railway systems, and how the management status of those railways has changed and the results benefits or issues. Therefore, the following sections examine the key examples of the operation and management of railways in Japan and Europe.

4. RAILWAY OPERATION IN JAPAN AND EUROPE

4.1 Railway Operation Examples in Other countries

In order to investigate the most appropriate railway operation in Korea, it is important to investigate how passenger railways are operated in other countries. Figure 5 shows passenger traffic density[1] of the national networks in a selection of country examples.

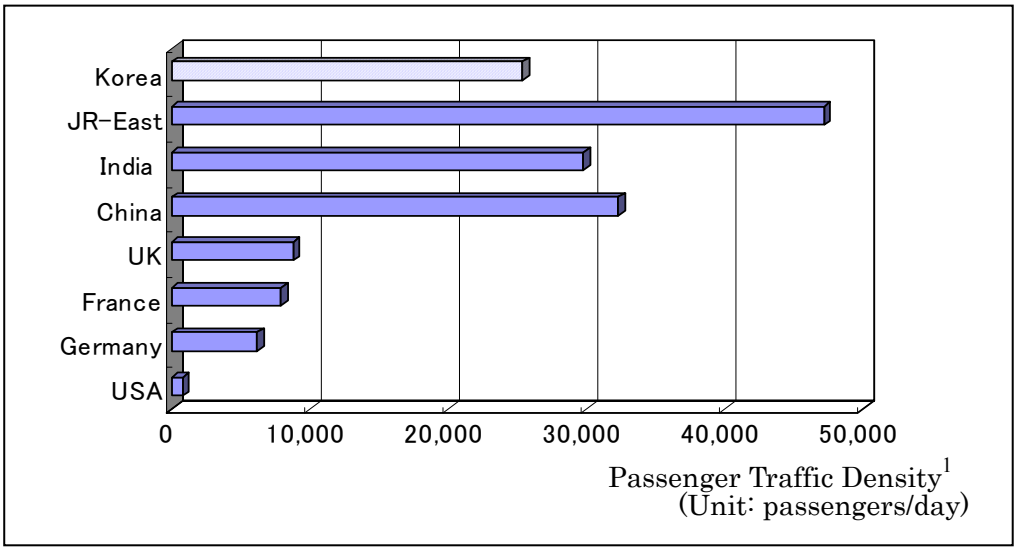

Figure 5: Comparison of Passenger Traffic Densities
Source: UIC Statistics 2009

The above comparison shows that passenger densities (passengers/day) are much higher in Korea than European countries, although less dense than that of JR-East in Japan.

Passenger traffic densities in Korea are a similar level to that in China and India, although slightly less than both those two countries. Nevertheless, since railways in China and India are operated by state-owned railways through the model of vertical integration, this paper focuses on passenger railway operation in Japan and Europe due to the following reasons:

1) Both have distinct characteristics in their railway operation;
2) Both have high-speed railway networks;
3) Private railway companies operate railways in both these countries; and
4) Both have highly regarded passenger railway services.

4.2 Railway Operations in Japan

4.2.1 Outline of Railways in Japan

In addition to several underground railways operated by public authorities, Japan has a number of private railways, most of which own the infrastructure. Based on the very advantageous market for railway operation, it is usual for Japanese railway companies to own and pay for the infrastructure costs. Figure 6 shows the passenger density of six Japan Railways (JR) passenger companies and two major private urban railways in the Tokyo Metropolitan Area.

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[1] Passenger Traffic Density = Passenger Traffic(Passenger-km)/(Track Length (km)×365days)

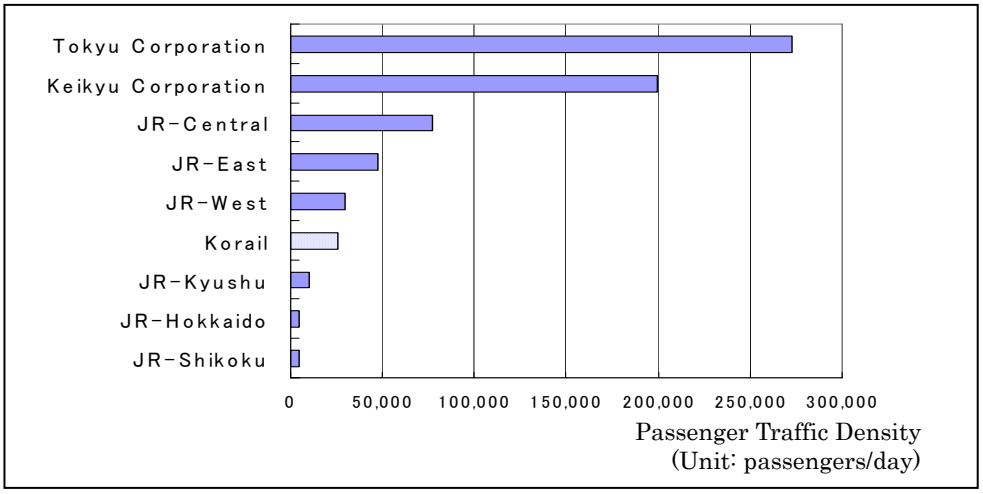


Figure 6: Passenger traffic densities of 6 JR passenger companies and two major private urban railways
Source: Ministry of Land and Transport (2012)

As Japan's high-speed railway lines are operated by JR passenger companies, which were established in the process of the railway reform of the Japanese National Railways (JNR) in 1987, this section focuses on the management and operation of JR passenger companies.

As railways in Japan are passenger-dominated, JNR had accumulated heavy debts especially in the freight sector. The freight sector had been operated by the cross-subsidy between the passenger and freight sectors, but the excess cross-subsidy worsened JNR's financial conditions as a whole. As a result, JNR was reformed in April 1987, and the railway operation was transferred into six passenger companies and a single freight company (JR-Freight). Since the unprofitable freight division was separated from the profitable passenger division by the reform, there is no direct cross-subsidy between the passenger and freight divisions at present.

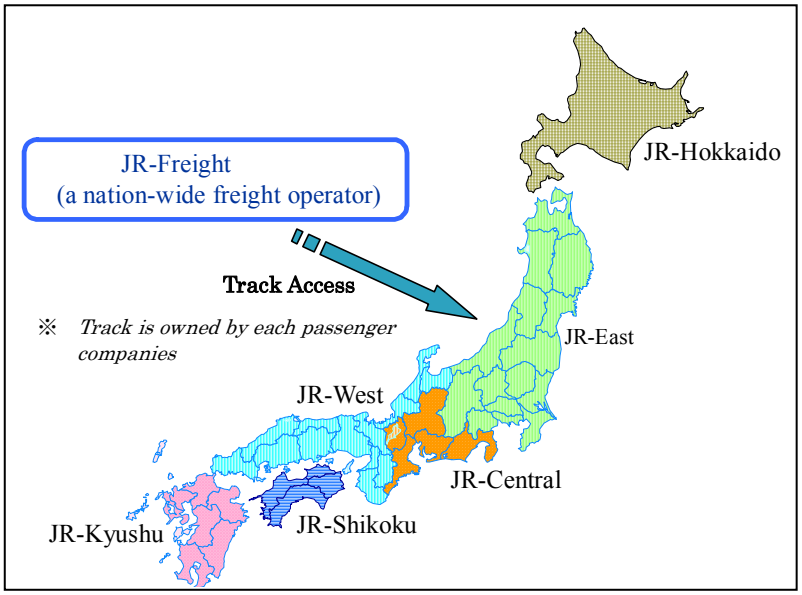


Figure 7: Outline of the 1987 Japanese National Railways (JNR) Reform
Source: Authors

Since the reform in 1987, each of the six passenger railway companies owns the infrastructure and operates the railways paying infrastructure costs. By the model of vertical separation, JR-Freight accesses the trunk line section owned by the passenger railway companies and operates rail freight services nation-wide. The passenger railway companies are able to provide services bearing financial costs of the infrastructure, and this is a distinct characteristic of the Japanese passenger railways as compared with other countries.

The government owned all stocks of the six passenger companies and JR-Freight at the time of railway reform. Gradually, the stocks of the three passenger railway companies on the main island of Japan (JR-East, JR-Central and JR-West) were listed on the stock market during the period 2002 - 2006. However, the government still owns the stocks of JR-Freight and the other three passenger railway companies of the other three islands of Japan (JR-Hokkaido, JR-Shikoku and JR-Kyushu). This shows that the financial conditions of the passenger companies have become diverse due mainly to the market conditions in each region of Japan.

4.2.2 Effects of the JNR Reform

As shown in Figure 8, the effects of the 1987 JNR railway reforms were significant.

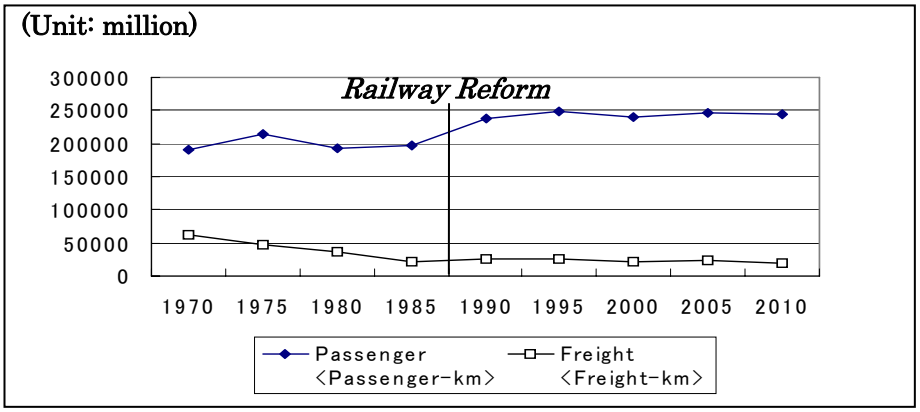


Figure 8: Transition of Railway Traffic in Japan
Source: Ministry of Land and Transport (2012)

Although JNR failed to improve its outputs before the 1987 JNR reform, since the reform, the transport volume trends have shown some marked changes. Regarding the freight sector, although the traffic output had been in serious down-turn trend since 1970's until the reform in 1987, the freight sector has been stabilized since the reform. The output of the passenger sector has shown greater changes. Despite the lucrative transport market, JNR had failed to greatly improve its output. However, the passenger traffic transported by the six JR passenger companies started to increase with much higher rate after the JNR Reform. It is generally recognized that the rapid growth after the JNR reform depended on the improvement of the management of the railways.

Compared with other overseas railway reforms, the experiences of the JNR Reform imply the following:

1) The rail sector in Japan has succeeded in increasing transport volumes without 'within-rail' competition. Japanese railways do not have lines which operate under on-rail competition;

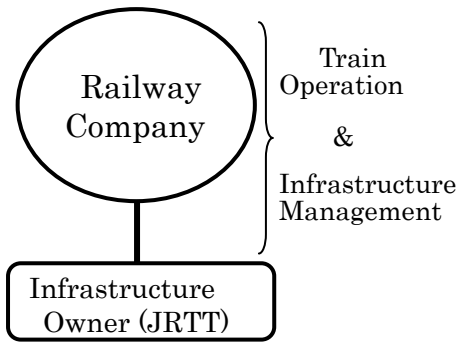
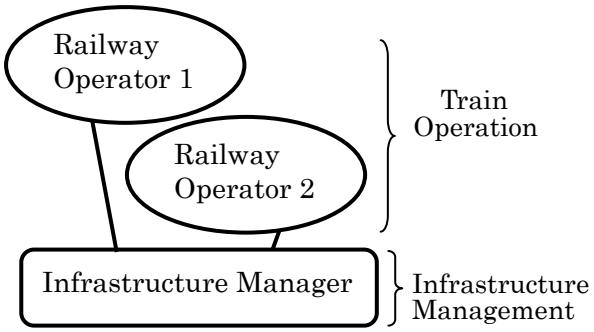
2) Private participation has been implemented through the public listing of shares of the three passenger railway companies - JR-East, JR-Central and JR-West;
3) Gaining management freedom through the reformed railways is regarded as one of the essential reasons for the improvements. JNR previously worried about interference from politicians and was obliged to operate many unprofitable lines;
4) Each railway company promoted their affiliated businesses actively. As railway operation bears external economy, such as raising the land value around the stations, this effect has been utilized by the JR companies and they have promoted their management like many other Japanese private railways.

4.2.3 Operation of New Shinkansen Lines

The operation of the high-speed railway lines in Japan (Shinkansen) after the rail sector reform should be highlighted. As explained above, most of the passenger lines of six JR passenger companies have an integrated structure where these companies own, maintain and control the infrastructure. Nevertheless, as each JR company can not cover the construction costs of new Shinkansen Lines, they are largely covered by the state and local governments since the JNR reform. Accordingly, the extended sections of new Shinkansen lines have been owned by the public entity, Japan Railway Construction Transport and Technology Agency (JRTT) since then. Therefore, different from most of the other lines, these extended sections have been operated by vertical separation.

Nevertheless, different from railway operation in Europe, JR companies perform all of the railway operation components including the maintenance works and control of the infrastructure covering the costs even in these extended sections (see Table 1).

Table 1: Comparison of vertical separation operation in Japan and Europe

Vertical Separation in Japan (new Shinkansen Lines)	Vertical Separation in Europe (a case in Sweden)
	
<Characteristics> A railway company implements all of the railway operation including infrastructure management and affiliated businesses. Thus, they do not have many coordination problems through vertical separation.	<Characteristics> Railway operation is separated into different independent organizations. Railway operators perform train operation and an infrastructure manager performs infrastructure management such as track maintenance and signaling. The sector faces coordination problems through vertical separation.

Source: Author

In addition, JR companies undertake affiliated responsibilities such as developing the station buildings and so on. Although JRTT performs the construction works utilizing public funds, it does not perform any part of railway operation after the opening of the high-speed lines. Thus, although the ownership of infrastructure is separated from railway companies, each JR passenger company performs all factors of railway operation including the affiliated responsibilities. Therefore, the extended sections have been operated like integrated railways in other sections, and so there are few coordination problems between JRTT (infrastructure) and a JR company (operation).

Since the JR passenger companies cannot operate both profitable conventional lines and profitable Shinkansen lines, the management of the conventional lines along with the new Shinkansen lines would be separated from the management of the JR companies. The agreement of this separation is prerequisite to promote the construction works of Shinkansen lines.

4.2.4 Through-Train Services in Japan

Since the conventional railway lines of the JR companies and many private railways and underground lines have the same gauge in their track, they operate through-train services among these organizations. Through-train services yield benefits for passengers such as a reduction in travel time without the inconvenience of changing trains, and also benefits for the railway companies such as reducing terminal congestion for both passengers and trains. As the concerned railways can achieve these advantages without heavy investment in the infrastructure, through-train services have been increasing in Japan.

These through-train services are operated in a different way from those in Europe, and reveal the characteristics of railway operation in Japan clearly. Therefore this section investigates how these services are provided. It should also be noted that the Shinkansen trains which cross the border of JR passenger companies are operated in the same way.

In summary, through-train services in Japan are provided by two or more vertically integrated railways. The outline of through-train service operations is shown in Figure 9.

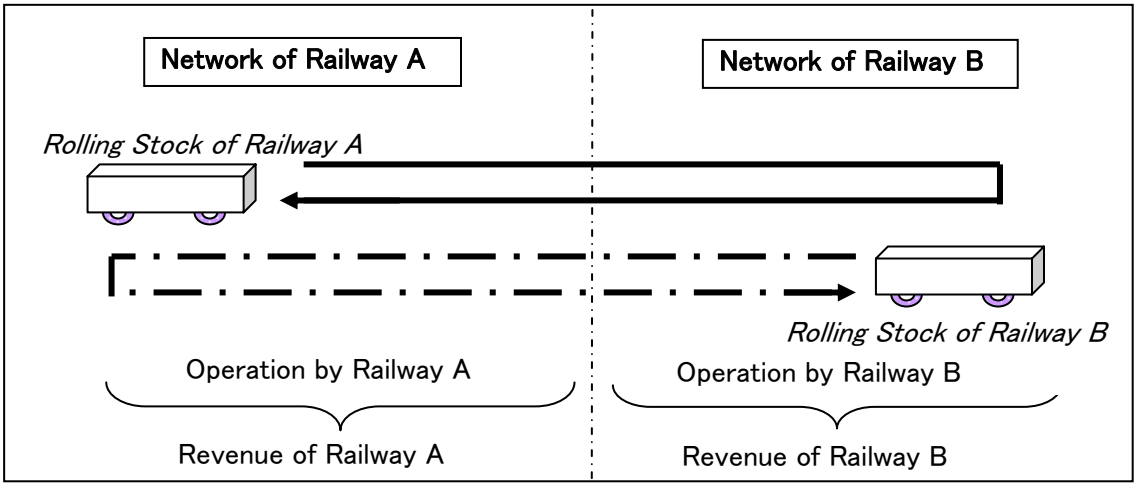


Figure 9: Through-train services between two integrated railways
Source: Revision of Kurosaki (2008)

For through-train services in Japan, the trains of an integrated Railway (Railway A) leave its own network and access the tracks of another integrated Railway (Railway B). The fare for railway operation using Railway A's tracks belongs to Railway A even if Railway A uses Railway B's rolling stock. When Railway A uses Railway B's rolling stock, Railway A pays rent-fees of the rolling stock to Railway B (Kurosaki, 2008).

As the railways permit the access of other railways' rolling stock, the concerned railways negotiate in advance of through-train services, mutually-agreeable terms regarding the conditions of access. For example, they have to agree regarding rolling stock performance such as gauge width, size of rolling stock, type of car body and bogie, standard for fire-resistance, electrical systems, signaling apparatus, train-control systems, weight of rolling stock, passenger capacity, brake performance, telecommunication systems, safety measures, and so on. Usually, they promote unification of basic equipment standards for emergency repair of rolling stock. Close communication and understanding about an integrated schedule and rolling stock operation are also essential factors for avoiding problems and accidents (*ibid.*).

For the through-train services in Japan the responsibilities of train operation are clearly separated at the 'border station', and each railway is fully responsible for the train operation on its own network. In general, the drivers change at the border station and therefore only drive a train on their own network. This helps secure operational safety, and this kind of measure has become fundamental policy since a serious train accident on the network of Shigaraki Highland Railway in 1991. Since this accident, in order to secure greater safety, each railway company takes measures to distinguish its own operational responsibility from that of other railways more clearly. These measures, such as changing drivers at the border station in through-train services, have become widespread across Japan (*ibid.*).

This philosophy has been also applied to the high-speed railway network operation in Japan. For example, the track of Shinkansen Lines is connected from Tokyo Station to Kagoshima-Chuo Station, and some trains are operated crossing the border stations between JR passenger companies. Nevertheless, operational responsibilities are clearly separated at the border stations, and each integrated railway company takes responsibility of train operation within its own network only, as shown in Figure 10.

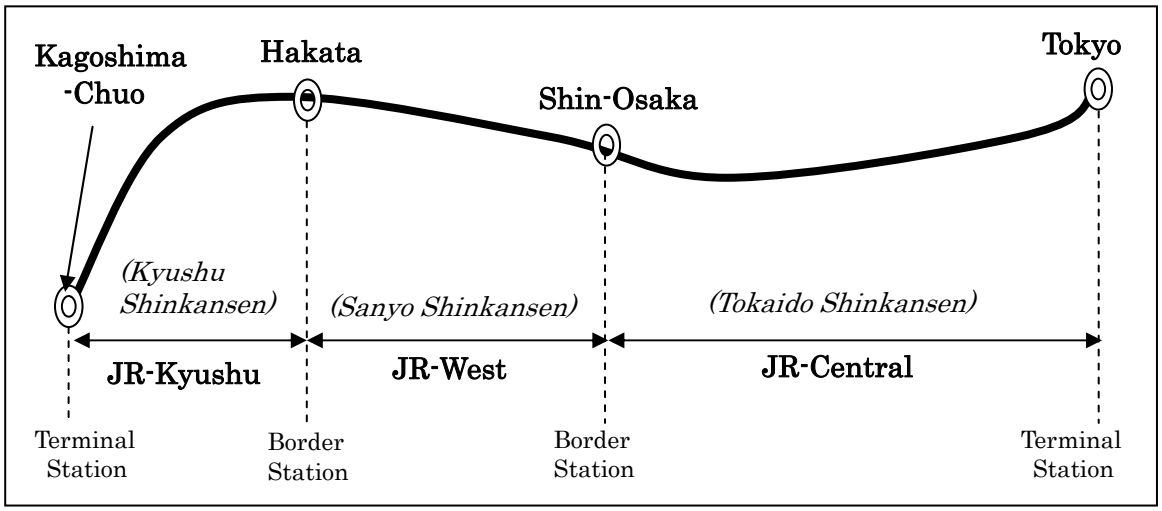


Figure 10: Operational Responsibilities of Tokaido, Sanyo, Kyushu Shinkansen Lines
Source: Authors

Shinkansen trains and also conventional trains in Japan have gained an excellent and highly evaluated reputation in terms of safety and punctuality, even under conditions of very dense traffic. As trains in Japan have been operated as described above, it should be noted that the effectiveness of the railway operation for through-train services in Japan has been justified.

4.2.5 Summary: Characteristics of Railway Operation in Japan

There are several examples of vertical separation in Japan, but one of the essential characteristics of railway operation in Japan is that railways are trying to clarify operational responsibilities between the integrated companies. This philosophy can be seen in the operation of their passenger through-train services. In other words, in principle, they have tried to avoid vertical separation when the operation is profitable. For example, most of the inter-company trains, such as those between JR passenger companies and those between a JR passenger company and a private railway, are operated with an integrated structure.

Even in the case of vertical separation, Japanese railways make efforts towards smooth and safe operation by one of the following two means. The first method is that a sole railway company performing all the operation, like integrated railways as seen in the case of new Shinkansen Lines. Another method is that more than one railway company keep close cooperation between each other. For example, as JR-Freight accesses the infrastructure of JR passenger companies, they cooperate closely in daily operation. In summary, the concerned people in Japanese railways believe that close communication and cooperation among concerned parties are pre-requisite for securing safety, and there are no cases of on-rail competition on their railway network in Japan.

4.3 Railway Operation in Europe

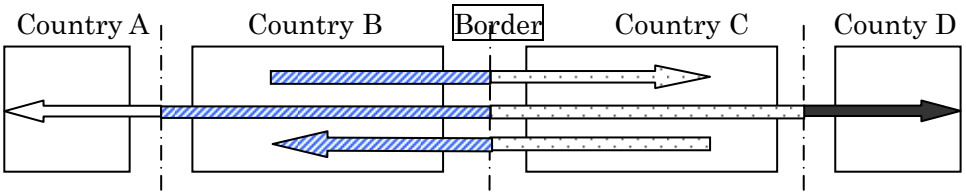
4.3.1 European Railway Policy

In contrast to the case in Japan, railway policy in Europe aims to introduce competition within the railway sector utilizing vertical separation. Behind the background of its aim, there was the European Commission's intention to strengthen international rail freight transport by realizing through-train services from origin to destination as shown in Figure 11.

In other international examples, besides the railway policy in Europe, Australia has a similar railway policy in which vertical separation is utilized to promote on-rail competition among operators. Kurosaki (2008) noted the common background of the railways in Europe and Australia as follows:

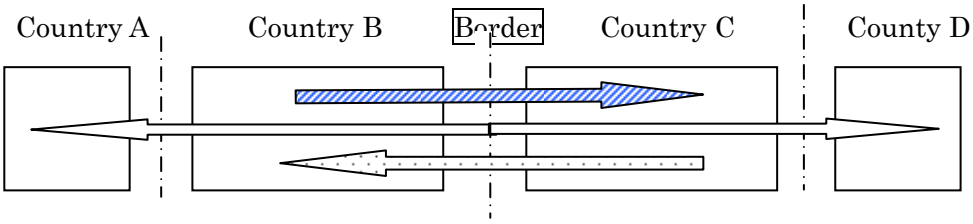
- Each railway has been developed as an state-owned integrated railway;
- Each railway has introduced its own technical systems within the states, even if a railway line goes through different states. For example, a wide variety of signaling systems, electrification and safety rules exist in Europe;
- Therefore, it has not been easy for a specific railway operator to access smoothly the track which is owned by a different organization;
- Due to the barrier for mutual access, railway transport has gradually lost its competitiveness, especially in the freight sector;
- Smooth cross-border transport in the railway sector has been required to compete with road transport in recent years.

1) Traditional international railway transportation（Vertical Integration）



※ International trains follow the regulations of each country, and each railway is responsible for the train operation on its railway networks.

2) Liberalized international railway transport requested by European Directives （Vertical Separation）



※ International railway undertakings are allowed to operate railway services on routes inside a Member countries.

Source: Revise from Hori. M. (2000)

The current transport policies in Europe and Australia aim to resolve the above issues. Therefore, it can be expected that this distinct background has resulted in adopting the transport policies, which have quite similar characteristics (*ibid.*):

- Ensuring management independence of railway undertakings (fostering competitive neutrality between rail operators);
- Promoting access for third parties to essential rail facilities based on legislations;
- Establishing regulatory pricing and rail access oversight institutions;
- Promoting competition within railway market.

Aside from Europe and Australia, when governments try to introduce competition within the railway sector, competitive bidding is often utilized. Since open access is utilized only in the freight sector in Australia, on-rail competition is not very common in the passenger railway sector except for some cases in Europe.

4.3.2 Railway Operation in Europe

As railway market in Korea does not have above-mentioned background to introduce on-rail competition, it is worth evaluating advantages and disadvantages of introducing on-rail competition carefully, since some of the disadvantages have been highlighted in some European countries.

Despite the advantages of introducing competition among operators, European railways worry about coordination problems between infrastructure and operation. For example, timetabling procedures are very complicated in European railways as Figure 12 shows. Based on

interviews with several managers in European Railways, Kurosaki (2008) found that the coordination between infrastructure and operation, such as timetabling, would be difficult especially when infrastructure capacity is limited.

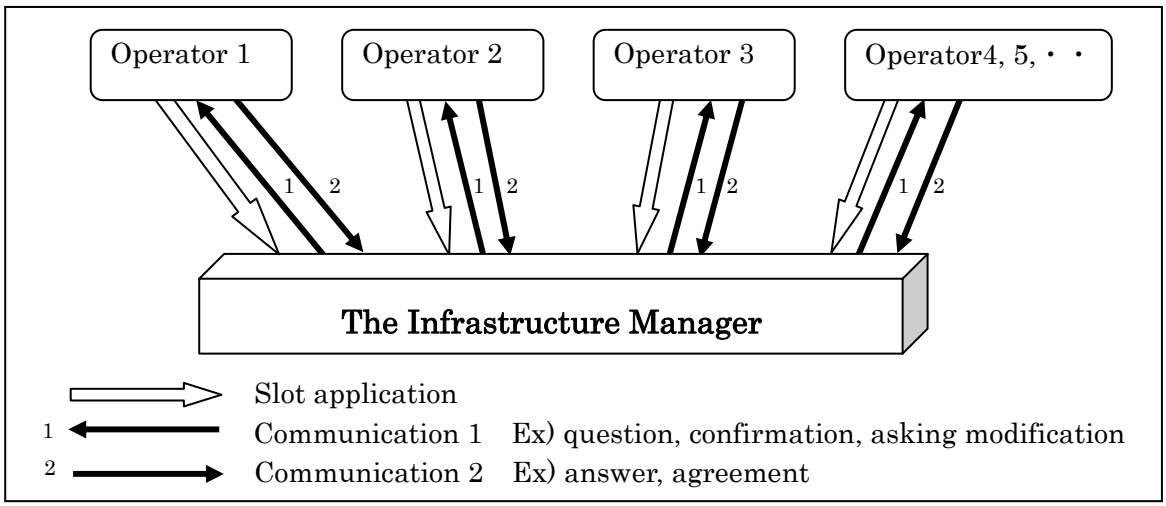


Figure 12: Procedure for Making a Timetable in European Railways
Source: Based on Kurosaki (2008)

4.3.3 Recent Discussions and Changes within European Railways

Within EU countries in recent years, there has been serious debate regarding European railway policy. For example, the "McNulty Report" issued in 2011 criticized the inefficiency of UK railways by comparing with examples in other countries and explained that it is partly due to the fragmented structure of railway operation. Following the report, the Department for Transport (2012) responded and recommended an alliance between the passenger franchisee and an infrastructure manager to cooperate in daily operation. As it was recommended, some passenger franchisees, such as South West Trains (SWT), made an alliance with the infrastructure manager, Network Rail, in April 2012.

In addition to McNulty Report, CER (2012) demonstrated that vertical separation increases costs at higher traffic densities based on new econometric evidence.

In Europe, though Germany had kept a holding structure in their prime railways (DBAG), France separated its railways into two entities, SNCF and RFF, in 1997 to follow EU Directives. The French government originally intended to concentrate most of the railway operation into SNCF, but the separation of some railway operation components, such as slot allocation and financial responsibilities for maintenance works, resulted in coordination problems between the two entities. In October 2012, after operating for more than 15 years as separate entities, the French government announced that RFF would merge with SNCF. This decision also appears to show that the separated entities faced coordination problems between infrastructure and operation to a large extent helping to prompt the merge.

5. ON-RAIL COMPETITION - DISCUSSION AND ISSUES

5.1 Comparison with Japanese Railways

Korail has a traffic density of 25,385 passengers/day, a density that falls inbetween those of JR-West and JR-Kyushu (see Figure 6). The annual income and expenditure of these two companies are as follows:

1) JR-West yielded a traffic density of 29,829 passengers/day in 2012 and has been making a profit in the railway businesses year on year, although the profit level is less than that of JR-East and JR-Central. In addition, steadily JR-West has been repaying the long-term liability which was taken over from JNR.
2) JR-Kyushu had a traffic density of 10,205 passengers/day in 2012 and has been making a loss in its railway business. Based on the 2011 financial statement the income of the JR-Kyushu railway business was 159,996 million JPY and its expenditure was 170,468 million JPY. As JR-Kyushu succeeded a Management Stabilization Fund from the government at the time of the JNR Reform, the company could make a profit including its interests and profit from its non-rail businesses.

In Japan, there is general recognition that all of the JR companies, including those in the three islands of Japan such as JR-Kyushu, have been developing their businesses much more actively compared with the time of JNR. As the government still owns the stocks in JR-Hokkaido, JR-Shikoku and JR-Kyushu, Japanese people believe that the above-mentioned difference in management status between JR-West and JR-Kyushu is not because of the ownership of the stocks but because of the conditions of the railway transport market. The experiences of the JNR reforms evidence that management of railways can become active and efficient without competition among railway operators if the management is relieved from strict government regulations on its activities.

As the passenger traffic density of Korail is similar to that of JR-West, in terms of the comparison with Japanese railways, it appears that Korail can make a profit based on the following conditions:

1) Cross-subsidy between profitable divisions and loss-making divisions is minimized;
2) The organization is relieved from the burden of the interests payment; and
3) Management including non-rail businesses is relieved from strict government regulations.

Another characteristic of Japanese railways is that, in effect, each railway company has been undertaking all factors of railway operation independently. For example, after the JNR reform JR-Kyushu started Shinkansen operations on the extended section between Hakata and Kagoshima-Chuo. Although the infrastructure of this section is owned by the public sector (JRTT), the railway operator (JR-Kyushu) performs all of the railway operations including operating the affiliated businesses around the stations. Therefore, even in the case of vertical separation, Japanese railways do not have many coordination problems between infrastructure and operation.

This kind of independent management and operation of railways is regarded as one of the essential factors of the efficient management of Japanese railways.

5.2 Comparison of European Railways

As discussed in Section 4.3.1, European railway policy is promoting competition among railway operators. Nevertheless, the effects of this policy have not yet been fully clarified even though more than two decades have passed since its introduction. Figure 13-1) and

Figure 13-2) outline the transition of railway transport volumes of four European countries (German, France, Sweden and the UK) for the freight and passenger sectors respectively.

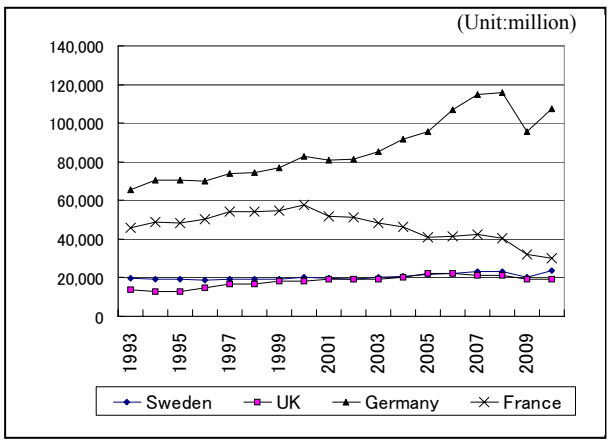


Figure 13-1) Freight Traffic (tonne-km)

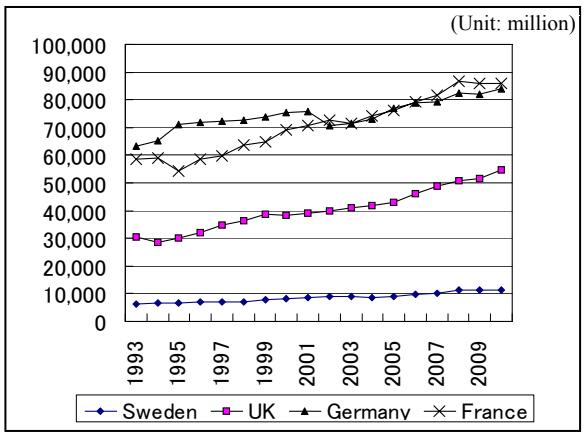


Figure 13-2) Passenger Traffic (passenger-km)

Figure 13: Transition of Railway Transport Volume of the four European Railways
Source: Sweden: Trafikanalys (2011)
Germany: Verkehr in Zahlen 2011/2012
the UK: Department for Transport Statistic (2011)
France: Department for Transport and Energy (2011)

The railway transport market in Germany, Sweden, and the UK was liberalized and with some new entrants now operating in the market. In contrast, in France the railway market has not been liberalized sufficiently and SNCF dominates both the freight and passenger markets.

In terms of the freight sector, Figure 13-1) shows that the railway traffic volumes in Germany, Sweden and the UK have been increasing whereas the freight traffic in France has been decreasing. Therefore, this may indicate that railway traffic in the liberalized market tends to increase more than the traffic in the non-liberalized markets in the freight sector. However, in the passenger sector (see Figure 13-2) railway traffic volumes in France are also increasing as in the other three country examples. Therefore, it is difficult to conclude that the passenger railway traffic in the liberalized market tends to increase more than that in the non-liberalized market.

Behind the background of the above comparative effects, new entrants can be expected without subsidy by open access in the freight sector. On the other hand, as subsidy is required for most passenger lines, franchising or service contracts have been generally utilized to operate railways, and provision of the appropriate subsidy appears to be more important to increase the transport volumes. In order to promote efficient railway operation in the passenger sector, competitive bidding has been utilized in many cases such as in the passenger rail services in the UK. As the responsibility of the regional public transport services was transferred to each state in Germany, competitive bidding is also utilized to select the railway operator, whereas negotiations between the state and a particular operator is also permitted to make a service contract.

Since the introduction of the current European railway policy, the method of promoting competition has been a key interest for policy makers. In practice, as many passenger lines are not making a profit and that private operators do not have an incentive to enter into a market

without subsidy, franchising through competitive tendering is commonly utilized for the passenger railway services in Europe. On-rail competition on high-speed railway systems in particular has not occurred on a large-scale, except in the case in Italy where a new entrant started its operation in April 2012. Therefore, the advantages and disadvantages of on-rail competition on high-speed railways have not yet been clarified thoroughly.

5.3 Tasks and Issues for Introducing Competition within the Rail Sector

It is apparent that the most significant competition for the railway sector is that with other modes of transport, especially with road transport. Nevertheless, there are other types of competition which can be introduced for railway management. If the conventional lines in parallel with high-speed lines could be operated by another operator, the two operators can compete with each other to some extent through the model of "competition between the tracks". It might be also possible to make "yardstick competition" among several operators or "profitability competition" on the stock exchange.

Nevertheless, provided that policy makers intend to introduce more intense competition within the rail sector, there are two types of competition:
1) Type 1: competition *for* the tracks (competitive bidding)
2) Type 2: competition *on* the tracks (open access)

Although the best method is still being debated in Europe, recent studies including CER (2012) and the McNulty Report insist the disadvantageous effects of complete separation, of which structure is essential for introducing "competition *on* the tracks".

In addition, ECMT(2005, p68) insists the advantages of competitive tendering noting that "it permits the preservation of an integrated network of rail services, subsidized where necessary, whilst still introducing competitive pressures, leading to incentives to reduce costs and improve quality of service." Despite some disadvantages, it also indicates that "compared with the alternative of open access competition as a way of introducing competitive pressures into the rail passenger industry, competitive tendering has particular advantages, and is especially useful in cases in which competition in the market is not feasible." (*ibid.* p68)

The railway structure itself would be completely different depending on the type of competition which should be introduced. Thus, policy makers should carefully decide the type of competition, especially the above-mentioned type 1 or type 2, if they intend to introduce it into the rail sector.

Competitive bidding could be introduced in Korea without major structural changes to railway management, since railway systems can be operated by a sole operator even though the new entrant might replace the incumbent, Korail, as an operator of some networks. Despite some disadvantages[2], there are many overseas countries where the railway sector has introduced competitive bidding.

However if the government introduce "competition *on* the tracks (open access)", it will change railway operation drastically. In addition, the effectiveness of this type of competition has not been clarified in terms of:

[2] Kain (2006) notes several disadvantages for competitive bidding.

1) whether it would improve the efficiency of railway management; and
2) whether it would increase the transport volumes on the total network/market.

As the passenger sector in Japan and also the freight sector in the United States have shown, there are possibilities to keep railway management very efficient without competitive bidding nor open access reforms. Therefore, it is worthwhile investigating into whether some kind of competition would work in the railway transport market in Korea. For example, in order to introduce new entrants, there would need to be train drivers recruited with cheaper salaries than the incumbent operator. A rolling stock leasing company/entity is also required for promoting competition.

If on-rail competition is introduced, various kinds of preparation should be made including, but not limited to: 1) rules for slot-allocation; 2) regulation for track-access charges; 3) a network statement for track access; 4) bidding documents (if competitive bidding is utilized); 5) rules and manuals to coordinate multiple operators; 6) transfer of some employees from Korail to KRNA for infrastructure management; and 7) safety standards for the new entrant.

Since the planned scheme in Korea appears to be partly different from the railway operation in Europe, the government of Korea would need to prepare some of the rules and regulations.

6. CONCLUSIONS

As investigated in this paper, the government of Korea has plans to introduce on-rail competition on its high-speed railway network. Since the railway reforms would have significant effects on railway management, careful planning is required. As also discussed, there are several pertinent issues to be clarified and prepared before promoting and undertaking the reforms.

There have only been a few cases of on-rail competition in the passenger railway sector, and most of the examples are in the European railway market. Until the recent case in Italy, there have not been any large-scale examples of on-rail competition on a high-speed railway network. Therefore, there remain a lot of issues to be examined regarding on-rail competition in the passenger rail sector. For example, since passenger railways generally require subsidy to provide passenger railway services in Europe, it is not clarified yet whether liberalization of the passenger railway market improves managerial efficiency and increases transport volumes. Some specialists and the ECMT (2005) insist that franchising is a more appropriate means to operate passenger railways rather than on-rail competition when the government is trying to introduce competition among operators.

Certainly, there are some industries which employ natural monopoly that have been reformed by introducing competition within the industry, by utilizing vertical separation. Nevertheless, the railway industry has different characteristics from other utility industries in that railway operation requires close coordination between infrastructure and operation. Therefore, there has been some recent research highlighting the negative effects of vertical separation promoted by the current European railway policy in last two decades, and also Kurosaki (2008) showed that many managers confessed that the European railways have been worrying about the coordination problems between infrastructure and operation after the introduction of vertical separation.

There are also research results that have shown vertical separation increases operational costs especially when infrastructure capacity is limited. In addition to potential coordination problems through vertical separation, the costs for the necessary regulation and those for competitive bidding should be taken into account. The outcomes of vertical separation should be examined carefully before promoting the reform scheme including its advantages as well as its disadvantages.

It is worth considering that: 1) the UK, which reformed its state-owned railways in 1994 by vertical separation, has been recently trying to promote alliances between infrastructure and operation; and 2) France, which reformed its railways in 1997, is trying to integrate the separated organizations again. It is also interesting to observe that the freight sector in the US and the passenger sector in Japan have achieved strong reputations in the railway sector, although both keep to an integrated structure and have not introduced on-rail competition.

From the view point of statistical transition, it is not clear whether railway policy which has promoted liberalization of the market to introduce new entrants has had positive effects in the European passenger railway market or not. In addition, the benefits of introducing on-rail competition largely depend on the circumstances of the railway market such as the existence of rolling stock leasing companies and the potential of railway demand to be developed. Since the market conditions and the planned railway operation would be different from those in Europe, it is recommended that the government of Korea should investigate whether on-rail competition will work effectively in the Korean railway market.

Introduction of on-rail competition changes railway operation and management significantly. Therefore, it is recommended to implement sufficient investigation and analysis regarding the policy and its potential results and implications in advance. Based on the above-mentioned investigation and analysis, if the government of Korea promotes the new scheme, it is also recommended that the government should take sufficient time to plan and prepare the appropriate rules and regulations for smooth operation, since it took more than two decades to establish the current regulations in Europe.

ACKNOWLEDGEMENT

We would like to thank the interviewees engaged in the railway operation and research in Korea, Japan and Europe. They have provided useful information to prepare this research work. We also express our appreciation to the Institute of Transportation Economics, Tokyo, which provided the opportunity to promote this work. We hope that this paper will contribute to discussions to plan the most appropriate scheme for future railways in Korea. We also thank Mr. Michael Chadney for his assistance with editing.

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