An Analysis of Vertical Separation of Railways

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The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

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I would like to donate this thesis supported by countless people to persons who wish to realize an environmental nation/region through the improvement of railway operation.

Abstract

A number of state railways over the world have experienced railway reform, and vertical separation has been frequently utilized during its process. This thesis investigated a variety of models of vertical separation, which the railway sector has experienced over the twenty years.

The main aims of the research are clarifying the key issues on vertical separation: aims of the reform; forms and implementation; advantages; disadvantageous effects. Based on the examination into the selected cases, this study comparatively analyzed them in terms of: 1) separation of operational factors; and 2) separation of financial responsibilities. The study also tried to examine an appropriate form of railways depending on the market structure.

There are a number of different forms of vertical separation, and the study clarified the characteristics of each type of it. It also disclosed that whether it intends to introduce within-rail competition or not largely outlines the form of railways. In case it is intended to introduce within-rail competition promoting new entry into the market, it leads to separate operational (at least slot-allocation) and financial responsibilities between infrastructure and operation, whereas without an intention to introduce it, coordination problems through vertical separation are endeavoured to be lessened through certain measures such as integrated operation, share-holding relationship, and confining the separation into the smaller market.

The study showed that vertical separation has a number of advantages, and that the unique exclusive advantage of complete separation, such as the case in UK and Sweden, is introducing within-rail competition fostering neutrality even between the passenger and the freight. It also revealed that this form raises coordination problems even in the prime market especially on condition infrastructure capacity is limited. The result of the study leads to the conclusion that full costs and benefits should be considered upon introducing a form of vertical separation, and that the appropriate form of it depends on the circumstances as well as its objectives.

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Glossary of Terms and Abbreviations Used

ACCC	The Australian Competition and Consumer Commission
ADB	The Asian Development Bank
Amtrak	the National Railroad Passenger Corporation
AN	Australian National Railways
ARTC	Australian Rail Track Corporation
ATSB	Australian Transport Safety Bureau
BR	British Railways
BV	Banverket
CER	Community of European Railway and Infrastructure Companies
CPTAs	County Public Transport Authorities
DB AG	German Railway Corporation
ECMT	European Conference of Ministers of Transport
FNM	Ferrocarriles Nacionales de Mexico
GDP	Gross Domestic Product
GOI	Government of Indonesia
HRPTC	Hanoi Railway Passenger Transport Company
IGR	Iwate Ginga Railway
IM	Infrastructure Manager
IMO	Infrastructure Maintenance and Operation
IR	Indian Railways
JNR	Japanese National Railways
JR	Japan Railways
JR East	East Japan Railway Company
JR Freight	Japan Freight Railway Company
JRTT	Japan Railway Construction, Transport and Technology Agency
OECD	Organisation for Economic Co-operation and Development
PSO	Public Services Obligations
PT.KA	Indonesian Railways
RAI	Railways of the Islamic Republic of Iran
Raja Co.	Raja Passenger Trains
RFF	French Railways Infrastructure Authority
ROSCOs	Rolling Stock Companies
SHC	Shinkansen Holding Corporation
SJ	Swedish Railways
SNCF	French National Railways
SNCFT	Tunisian National Railways
STB	Surface Transportation Board

TAC	Track Access Charge
TFM	North-eastern Railroad
TFVM	Mexico City Terminal Railway
TOCs	Train Operating Companies
UIC	International Union of Railways
UNESCAP	Economic and Social Commission for Asia and the Pacific
VNR	Vietnam Railways Corporation

CHAPTER1: INTRODUCTION

1.1 Background

During the past 20 years, in many countries railways have seen their transport market share decline sharply. This is mainly because of severe competition with other transportation modes such as road and air, despite technological development in the railway sector. (UNESCAP, 2003) As the railway is one of the most environmentally-friendly modes of transport, it should have an important role to play in the transport sector both in the passenger and the freight in order to keep and develop preferable environment through reduction of air pollution and urban congestion and so on. (UIC/CER, 2004) Nevertheless, many governments are facing difficulties in allocating adequate resources to maintain and develop their railways partly because they think railways are costly to operate. (UNESCAP, 2003)

As a result, many governments have started to introduce measures to improve the efficiency of their railways, for example by establishing contracts with government for the provision of non-commercial railway services instead of the traditional provision of subsidies to cover the deficits.

Moreover, many governments have started to examine measures to restructure their railways in order to create better managed, more commercially-responsive and market-led railways. Many countries are trying to introduce reforms in order to improve the operational and financial performance of national railways, and these structural changes in railways show little sign of abating worldwide.

In Europe, “rail policy has concentrated on the introduction of competition into the rail transport market via separation of infrastructure from operations (at least in accounting sense), by the progressive opening up of entry to the market for new operators and by rules regarding the allocation of slots and the pricing of infrastructure use, administered by an independent regulator.” (Nash, C.A. and

Trujillo, C.R., 2004 p.1)

Railway reform has also been carried out in many railways in non-European countries such as Japan, Korea, Vietnam, Indonesia, Iran, Australia, the United States, Mexico, Argentine, Russia, Tunisia and other African countries, and so forth. It is also being planned in many other railways such as Taiwan, Kazakhstan, Uzbekistan, Saudi Arabia, Bangladesh, Pakistan, Cambodia, Thailand, and so on.

Certainly, an appropriate model of railway reform is affected by the economic and social circumstances and condition of the railways. Nevertheless, unfortunately there are several railway reforms which did not improve their performance as they were originally aimed. It is essential for railway administrations and policy makers to have an opportunity to gain insights from other railway reforms and the impact of those changes.

In many of the railway reform processes, the ownership of infrastructure was transferred to separate organizations from the operators in order that railway operators can be relieved of huge amount of capital costs of infrastructure and, in some cases, its maintenance costs as well. Sometimes, the term “separation of infrastructure and operation” or “vertical separation” is used in order to indicate to a specific management model of railways, such as the model of European railway policy mentioned above. Nevertheless, as it will be explained in detail in Section 2.4.1, this thesis defines the term as a model of railway operation under the condition that owner of the infrastructure does not provide the railway service over the infrastructure itself. And the study will investigate and analyze variety of vertically separated structures, which the railway sector has experienced.

Vertical separation of railways has been implemented in many countries and its aims seem to vary. In some cases this model is utilized for introducing the external funds for investment or maintenance for infrastructure. For the railways in European Union, this model is used mainly for promoting competition among

railway operators. In many railways in South America and Africa a concession system has been introduced in order to procure efficient management by the private sector leaving the ownership of infrastructure remained to the government.

Despite some merits of vertical separation, it greatly changes the relationship between infrastructure and operation, and the appropriate relationship between the two entities is one of the most crucial factors in order that the railway can be operated efficiently. In general, introduction of vertical separation changes some factors of railway operation: investors in infrastructure; financial burdens of maintenance works; responsibilities in maintenance works; train control; timetabling, and so on. These changes influence the relationship between the two entities and also the operation of railways as a whole.

1.2 Aims of the Thesis

There are several reasons why detailed investigation and analysis into the vertical separation of railways are needed and why this research focuses on its analysis:

- Vertical separation has been introduced as a part of the railway reform process in many countries around the world;
- It seems to have a variety of aims, and these objectives appear to be important for the development of railways for the future;
- A number of further restructurings are about to be implemented, and the results and effects are so large such as a drastic impact on financial performance of the railway organization, efficiency of railway operation, and so on;
- It is argued that vertical separation has disadvantageous influences as well as advantageous effects;
- Despite having been implemented with several forms under different market conditions, sufficient analysis has not been performed on each type of them partly because of the limited opportunities to share or obtain information due to

scattered geographic locations around the world. [1]

- It greatly changes the vertical relationship which is crucial for efficient management of railways;
- Effectiveness of vertical separation has been under serious debate in EU countries and also in some other countries as the results vary so much;
- In order to improve efficiency, the government of many state-owned railways has been promoting market liberalization, private participation in transport service and privatization. And vertical separation has been utilized as a complementary policy for this universal movement.

Based on the above-mentioned background, the research aims to analyse vertical separation of railways in terms of the following four key issues:

1) aims of railway reform through vertical separation;
2) forms and implementation of vertical separation;
3) advantageous effects of vertical separation; and
4) disadvantageous effects of vertical separation.

1.3 Thesis Structure

This thesis is composed of ten chapters. Following this introduction to the subject, Chapter 2 goes on to describe the background to vertical separation of railways. Firstly, as a background of the railway industry, traditional railway structures, which have the nature of natural monopoly, will be described. Secondly, the characteristics of network industry which are traditionally considered as a ground of government's regulation are reviewed, and also they are compared with other network industries. For the discussion in the latter part of study, models of competition are also reviewed. In Section 2.3, current status and challenges in the railway sector will be studied. Firstly, it is described that a severe competition with

[1] "While much of the theoretical literature focuses on the idea of the monopoly supply of track (often by a public agency) with competition for access to that track, and this has been the favoured approach in, for example, the UK and Sweden, in practice there have been important deviations from this." (Brooks, M. and Button.K , 1995 p.244)

other transport modes has worsened the market share and the financial performance of many railways. Then the author reviews social functions of railway operations contributing for environment such as modifying traffic jams on roads and decreasing emission of carbon dioxide gas from vehicles, and will describe the opportunities for the railway sector to develop social benefit. The typical problems arising from the state-owned railways and the rationale of railway reform will be also explained. Section 2.4 reviews the background to vertical separation of railways. Firstly, the author defines the term of vertical separation of railways in this thesis, and then reviews the literature on vertical separation of railways. Section 2.5 investigates advantages and disadvantages of vertical separation through literature. Finally, the author prospects vertical separation of railways.

Chapter 3 presents survey design and methodology for this research. Firstly, the objectives of the research are set and then the research methodology is developed. As the research would be made based on case studies by means of interviews and questionnaires, this chapter outlines how studies and comparative analysis will be made in the following chapters.

Chapter 4 investigates state-owned railways without within-rail competition. Firstly, for a comparison with various forms of vertical separation the author studies an integrated railway focusing on the Indian Railways. Then the case studies for vertically separated railways are performed focusing on railways in Vietnam, Indonesia and Tunisia. In these railways, the government owns the infrastructure and supports its maintenance cost. The essential factors of railway operation are performed by the liberalized main operator. It will be also examined how the private sector has participated in a transport service by means of a joint-venture or a management contract with the state-owned railways in Vietnam and Tunisia.

Chapter 5 focuses on vertically separated railways with competition among operators, and will make studies of railways in Sweden, UK, Germany, France and

Australia. The author will examine the five railways after surveying recent transport policies which European and Australian railways are based on. In these railways vertical separation was introduced mainly in order to promote competition among operators, and below-rail functions such as slot allocation are performed by the infrastructure manager. In the freight market of these railways, competition "in" the market has become common. As most of the passenger market is unprofitable, franchising is prevailing in practice. Based on the regulation of open access and franchising, the private sector is active to participate in a transport service. But there are also coordination problems derived from the fragmented industry structure.

Chapter 6 investigates railways with vertical separation for passenger or freight traffic, and examines the railways in Iran, Japan (JR Freight) and USA (Amtrak). In these railways, essential factors of railway operation are performed by an integrated dominant railway performing in the primary railway market, passenger or freight. Another railway operating in the smaller/minor market accesses the infrastructure as a tenant. As cross-subsidy between the two markets was abolished through vertical separation, the railway in the primary market has improved significantly especially in Japan and USA.

Chapter 7 examines private railways with long-run access to infrastructure, and focuses on: 1) freight concessionaires in Mexico and the Mexico City Terminal Railway (TFVM); 2) two newly-organized lines in Japan. In the railways with long-run concessions the government retains ownership of the infrastructure, and the concessionaire can perform railway operation in an integrated manner once a concession license has been granted. Thus, except the ownership of the infrastructure the concessionaire performs its railway operation as if it were an integrated railway during the concessioning period. In the case of TFVM, the three concessionaires attained access to the tracks in the capital city as a status of the share-holder of the infrastructure manager. This chapter also focuses on the two cases in Japan: new Shinkansen lines and Aoimori Railway. New Shinkansen lines

are constructed as public works projects utilizing the finance of state and local governments. The JR Passenger Company in the region is designated as an operator, and it operates the line as if it were an integrated railway once after the usage fee is fixed. Aoimori Railway, a joint-venture between the private and public sectors, was established as an operator, and the capital cost of the infrastructure is borne by the public sector in order to sustain its management.

In Chapter 8, investigation and comparison among different groups of vertical separation are made analytically in terms of forms, operation and finance. Firstly, in terms of operational responsibilities, forms and implementation of vertical separation are compared among different types. Then, they are compared and analyzed in terms of the separation of financial responsibilities. Finally, relationship among operators is investigated to clarify the characteristics of various types of vertical separation.

In Chapter 9, advantages and disadvantages are investigated and compared among different types of vertical separation analytically. Firstly, advantages of vertical separation are examined based on this study. As the promotion of within-rail competition is one of the advantages, competition issues are also discussed from the viewpoint of vertical separation. Subsequently, disadvantages of vertical separation are investigated. Based on the above investigation into advantages and disadvantages, the relationship with each type of vertical separation will be examined in order to clarify the characteristics of it. Lastly, an appropriate form of vertical separation is examined in different types of the market structure.

Finally, based on the above analysis, Chapter 10 summarizes the findings of the research and provides the final conclusions and lessons from the investigation in this study. The author suggests several directions for further research as well.

The structure of this thesis is summarized in diagrammatic form in Figure 1.1.

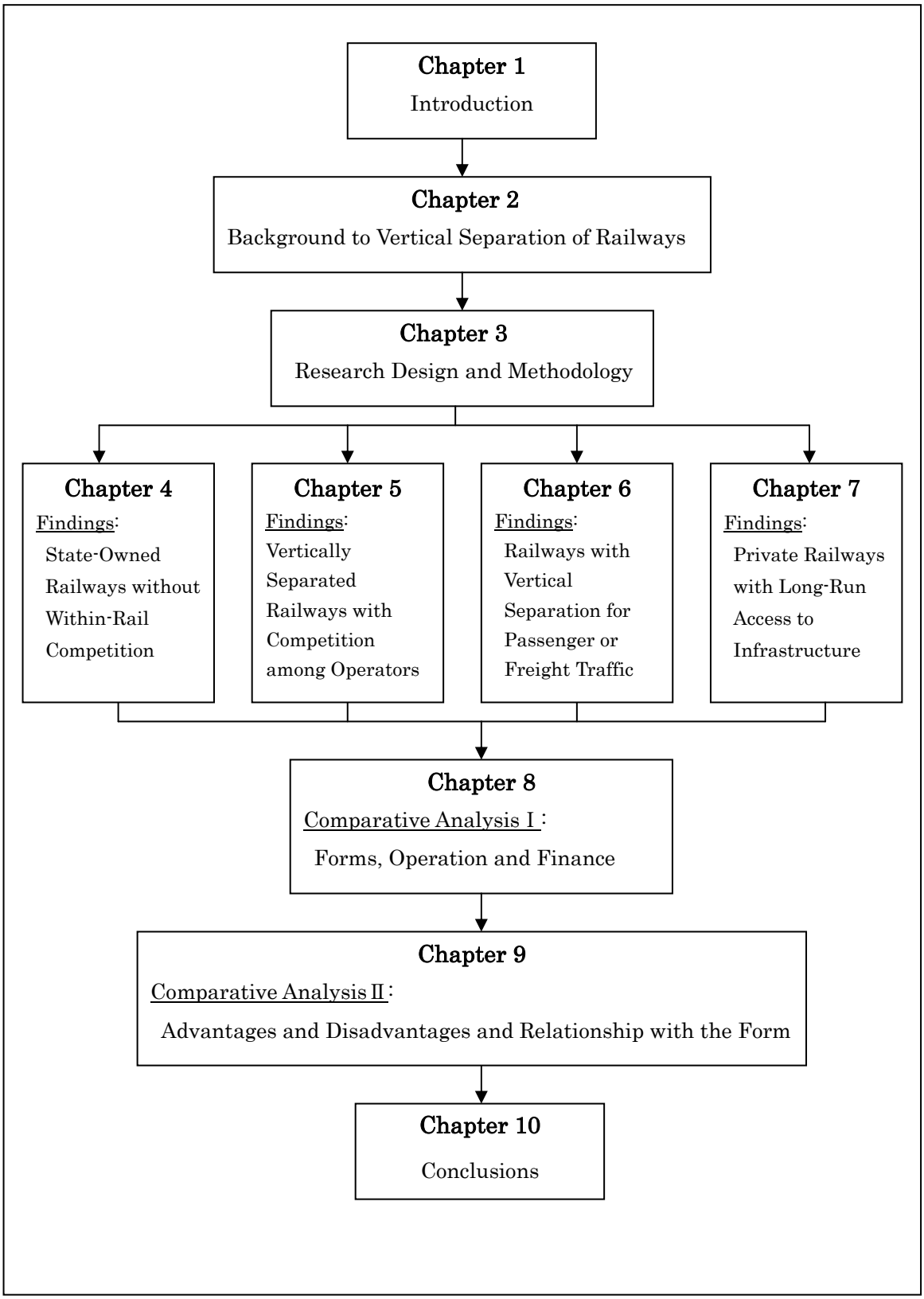

Figure 1.1 Thesis Structure

Source: Author

CHAPTER 2:
BACKGROUND TO VERTICAL SEPARATION OF RAILWAYS

2.1 Introduction

In this chapter, as a literature review for the research, the background to vertical separation of railways is investigated.

Firstly, next section examines characteristics of railways such as traditional railway structures, competition issues, a basis of transport regulation, and so on. Then, Section 2.3 surveys the current status of railways, for which competition with other transport modes has become so severe. This section also reviews the necessity to take both external costs and benefits into account at the time of investment into transport modes and discusses the opportunities for railways. Then, it investigates the problems which many state-owned railways face in common, and discusses the rationale of railway reform. Section 2.4 makes a study of vertical separation of railways, and defines the term of vertical separation in this paper. Then, literature regarding vertical separation is reviewed. Section 2.5 investigates advantages and disadvantages of vertical separation through literature, and Sections 2.6 discusses future prospects of vertical separation in the railway sector.

2.2 Characteristics of the Railway Industry

2.2.1 Traditional Railway Structures

In many countries railways were once the dominant means of land transport, and railways have developed as vertically-integrated organizations. Thus traditionally the most common structure for the rail sector, in most countries, had been that of a single state-owned firm, which was responsible for both the railway infrastructure facilities and train services.(UNESCAP, 2003) As the next section discusses, the

vertically integrated railways are characterized by large infrastructure costs, and the provision of rail transport services is typically regarded as a classic example of natural monopoly. “State-owned railways have therefore often been organized as vertically-integrated publicly owned monopolies.”(*ibid*, p.6)

State railways are not necessarily technically inefficient or lacking in investment funds.(*ibid*, p.5) For example, Japanese National Railways (JNR) dominated Japan’s post-war passenger and freight markets making profits and played an important role in its post-war economic recovery until the 1950s, when competition with other transport modes started to become severe.(Aoki, E. et al, 2000) Nevertheless, as it will be examined later, there are several problems which often arose out of state-owned railways, and the change of transport market in over the past twenty years brought about reform of the state railways.

2.2.2 Competition Issues and Regulation

2.2.2.1 Characteristics of Network Industry

Klein, M.(1998 p.43) notes that “some types of networks, such as water pipelines systems, railroad track, gas pipelines, and power transmission lines, exhibit technical characteristics which appear to make them natural monopolies. In other words, it would be a waste for society to have several parallel networks of this type compete with each other.” And because of the prominence of infrastructure costs in the railway industry, it has significant economies of scale.[1] This means that generally average costs fall as output increases in the railway industry. Thus it is

[1] *Enonomies of scale* refer to the situation when an increase in production is associated with a less than proportionate increase in cost. As the other key concept, “*economies of density* refer to the situation when average total cost decreases with increase in traffic level due to increase in capacity utilization of transportation capital, vehicles and fixed facilities.” (Yevdokimov, 2001 p.15). The two concepts should be considered simultaneously otherwise any analysis could give the impression of *economies of scale* when in fact large companies have lower unit costs due greater customer density rather than any inherent scale benefit.(Stone & Webster Consultants, 2004 p.54)

considered that competition, which may be unstable and destructive, is unsuitable in a natural monopoly. Under these circumstances, this kind of structure has been operated by a public firm, or heavily regulated in order to avoid the use of monopoly power.(Nash, C.A. and Trujillo, C.R., 2004)

Nevertheless, this traditional vertically integrated model has been challenged last decades and some countries have unbundled at least some network industries including railways. (Drew, J., 2006 p.7) One of the backgrounds of this change is the problem that "market power is greater when there are fewer firms, and monopolistic behaviour worsens allocative efficiency." (Vickers, J. and Yarrow, G., 1988 p.48) Thus, the balance between allocative efficiency and scale economies is principal issue to many problems in competition policy. (*ibid.* p.48)

Another essential ground that network industries have traditionally been vertically integrated is their economies of scope[2] arising from the needs for co-ordination, because the loss of economies of scope with vertical separation takes the form of higher transaction costs. (Drew, J., 2006)

2.2.2.2 Comparison with Other Network Industries

Gómez-Ibáñez, J.A. (2003) investigates the benefits of introducing competition and costs of unbundling comparing five network industries – electricity, natural gas, water, telecommunications, and railways.

As the benefits of unbundling stem from the introduction of competition into additional activities, he suggests that they should be roughly proportional to two factors:

1) the share of total industry costs that are in activities where competition can be

[2] Bitzan, J.D.(2003 p.204) explains that "an issue related to the cost impacts of multi-firm operation over single networks is that if economies of scale and scope exist in providing transport services, after excluding the costs of way and structures, multiple-firm operation over a single network will result in an increase in costs."

sustained; and

2) the untapped potential for productivity improvements in those potentially competitive activities.

He also suggests that the costs of unbundling are likely to depend on four factors that affect coordination:

1) the share of total industry costs absorbed by the key monopoly or bottleneck infrastructure provider;
2) the degree of heterogeneity in the industry's products or services;
3) the extent to which the flows over the infrastructure network are interdependent;
4) the prevalence of common functions or assets among vertically separate activities.

Then, he compared the benefits and costs of unbundling across the five network industries. The results are summarized in Table 2.1.

Based on the investigation, he concluded that the potential for vertical unbundling seems much greater for large electricity, gas, and water customers and telecommunications users than for railways' users.

He stresses that unbundling is least attractive particularly for passenger railway services. The infrastructure critical to coordination accounts for relatively high proportion of costs on the system, which makes the strategy of easing coordination by building excess infrastructure capacity prohibitively expensive. In addition, the services provided are much less homogeneous or standardized, which makes coordination through negotiations, congestion pricing, or auction regimes more difficult.

Comparing with passenger railways, he notes that rail freight would seem a more promising candidate for unbundling since the percentage of potentially competitive activities is much higher.

Table 2.1 Comparison of the Benefits and Costs of Unbundling across Selected Industries

	Electricity Large Consumer	**Natural gas** Large Consumer	**Water** Large Consumer	**Telecommunications**	**Railways** (Freight Only)	**Railways** (Passenger or Mixed)
Factors that affect benefits						
1) Competitive activities' share of total costs	80-90%	60-80%	Variable but high	50-60%	60-80%	50-60%
2) Opportunities for innovation in the competitive activities	Moderate	Moderate	Moderate	High	Moderate	Moderate
Overall benefit	**High**	**High**	**High**	**High**	**High**	**Moderate**
Factors that affect costs						
1) Bottleneck infrastructure share of total costs	10-20%	20-30%	Variable	40-50%	20-40%	40-60%
2) Product heterogeneity	Low	Moderate	Moderate	Moderate	Moderate	High
3) Network interdependence	High	Low	Moderate	Moderate	Moderate	Moderate
4) Common functions or assets	Low	Low	Low	Moderate	Low	Moderate
Overall cost	**Low**	**Low**	**Moderate**	**Low**	**Moderate**	**High**
Overall advantage	**High**	**High**	**High**	**High**	**Low / Moderate**	**Low**

Source: Gómez-Ibáñez, J.A. (2003)

In summary, Gómez-Ibáñez, J.A. (2003) strengthened the case against vertical separation in the railway industry since the cost increase of vertical separation appears to be more significant in rail compared with other network industries.

Gómez-Ibáñez, J.A. and Rus, G (2006 p.3) also stresses that "the quality of railroad service depends heavily on the close coordination of infrastructure and train operation, and this coordination seems much harder to achieve when the two activities are provided by separate companies."

2.2.2.3 Regulation in the Industry

Economists have also recognized that transport markets may, in practice, suffer from serious imperfections or market failures, which could adversely affect the users of transport services. In addition to the containment of monopoly power, Button, K. J. (1993) argued a basis of transport regulation such as follows.

- **The control of excessive competition**: Unregulated competition may limit the quality of service offered to customers and result in instability in the industry.
- **The regulation of externalities**: Imperfections in the market mechanism may result in transport activities imposing costs which are not directly included in the private sector's decision-making – pollution and congestion being the main causes for concern.
- **The provision of high-cost infrastructure**: The sheer cost and long pay-back period, combined with possible high levels of risk, makes it unlikely that all major pieces of infrastructure would be built without some form of government involvement.
- **The integration of transport into wider economic policies**: Land-use and transport are clearly inter-connected and some degree of coordination may be felt desirable if imperfections exist in either the transport or the land-use markets.
- **The improvement of transport co-ordination:** Because there are numerous suppliers of transport services, inefficient provision may result if their decisions are made independently. There is also the prospect of duplication of transport facilities and consequential wastage of resources, without some degree of central guidance.

Based on the characteristics of the railway and transport industry mentioned above, railway transport has been a sector which has been subjected to various forms of regulation, such as governing maximum fares and both entry into and exit from the services. (Sharkey, W.W., 1982)

2.2.2.4 Models of Competition

Based on the above discussions on the characteristics of the railway and transport industry, there are common views that competition is unsuitable in the traditional rail industry. Nevertheless, there are numerous models of competition in the railway sector (Velde,V. 1999 p.359):

- **Type 1:** competition *for* the tracks (concession / franchising);
- **Type 2:** competition *on* the tracks (intra-modal competition on the same tracks);
- **Type 3:** competition *between* the tracks (intra-modal competition on different tracks – parallel lines serving the same main cities);
- **Type 4:** competition *beside and above* the tracks (inter-modal competition with car, bus and plane); and
- **Type 5:** competition *between companies* on their own tracks (yardstick competition by the authority).

As the next section investigates, it appears that competition with other modes, which is listed in Type 4, is the most intense in majority of the countries in common.

Velde,V.(1999 p.360) notes the following regarding competition in the railway sector:

- Pure models do not exist in reality;
- It would be wrong to think that there is one single better model that can be developed as a blueprint and then implemented once and for all. Each model will need adjustments in the future;
- It will be necessary to take account of the specific local situation and aim to design an appropriate model.

The next section focuses on the most serious competition, which the railway industry faces at present.

2.3 Current Status and Challenges of Railways

2.3.1 Competition with Other Modes

Railways were, for a period of time, the most technologically-advanced and dominant means of land transport, but their market share has declined sharply in many countries over the past thirty years. In addition to market circumstances, various constraints on state railways led to growing operating deficits during the 1970s and 1980s. Changes in the transport market have diminished the competitive advantages of railways in many countries simultaneously. (UNESCAP, 2003)

For example, due to the lack of other means of transport, the railways dominated post-war passenger and freight markets in Japan. In 1950, Japanese railways had 92 percent of the passenger market (passenger-km) and 52 percent of the freight market (tonne-km), and they continued making profits through the 1950s and early 1960s. Nevertheless, 1964 was the first of many subsequent years that Japanese National Railways (JNR) ran a deficit. (Aoki, E. et al., 2000 p.181) Figure 2.1 shows the trends of the passenger and the freight transport in Japan. It reveals that, despite the steady performance especially after the reform of JNR in 1987, the modal share of the railway has been decreasing by degrees as the traffic volume and share by road have been increasing both in the passenger and freight sectors. UIC (2004) indicates that, as one of the backgrounds of these trends, the road infrastructure in Japan has been developed largely in the last fifty years.

Figure 2.2 represents the trends of each sector in EU-15 countries[3]. Despite the steady modal share of the railways in the last decade, similar to the above-mentioned case in Japan, the road traffic has been increasing both in the passenger and the freight sectors. Thus the rapid increase of the road traffic is the same trends in both sectors in the two cases.

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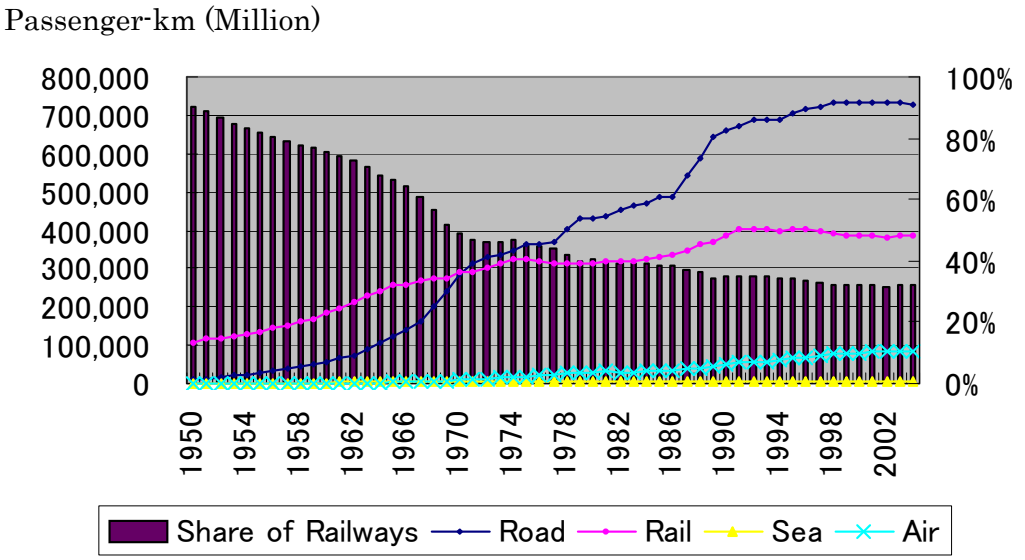
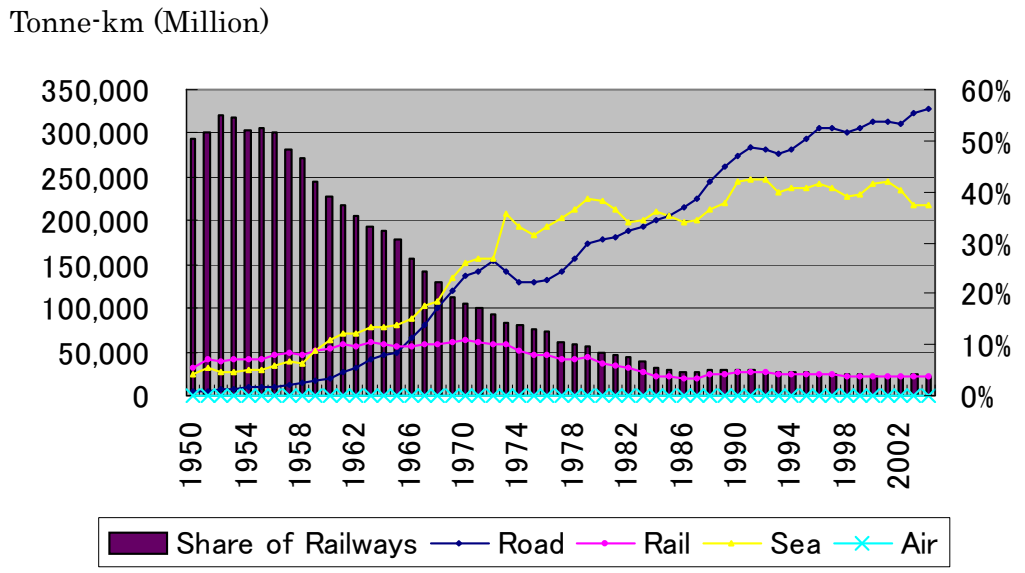
[3] EU-15 countries are those Members that joined the EU before 2004.



Passenger Transport in Japan since 1950



Freight Transport in Japan since1950

Figure 2.1 Trends of Transport in Japan with Respect of Different Modes

Source: Ministry of Land and Transport (1990-2006)

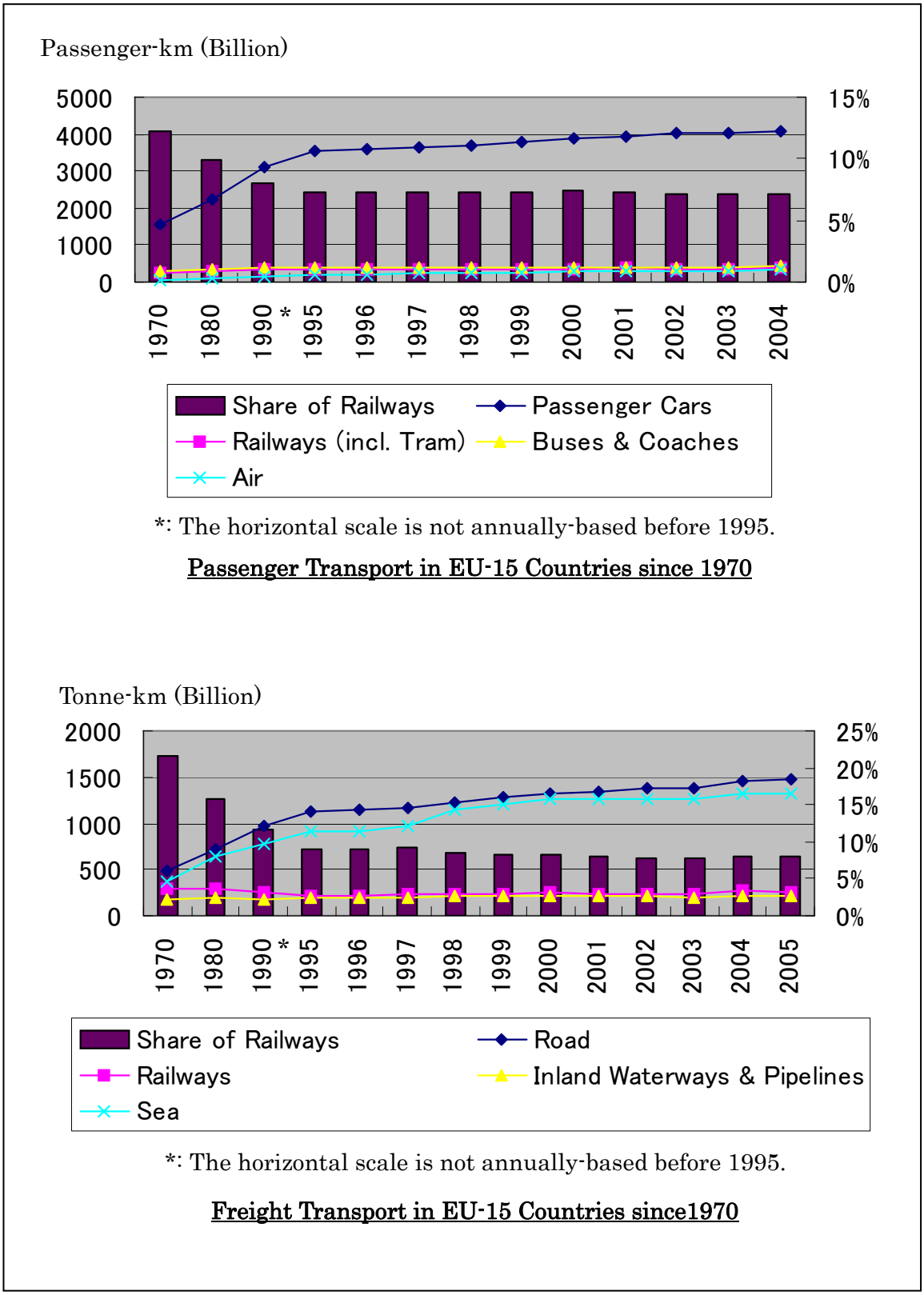


Figure 2.2 Trends of Transport in EU-15 with Respect of Different Modes

Source: European Union (2006)

2.3.2 Opportunities for Railways

2.3.2.1 External Costs of Railways

Severe competition from other transport modes has raised the basic issue of the continued viability of railways in many countries. Nevertheless, there are reasons why public transport operators may not be given a purely commercial remit (Nash, C.A., 1982 p.9):

- the social need for some level of service;
- the existence of economies of scale and monopoly power; and
- the relative levels of externalities produced by public and private transport.

With respect to the third factor, he divided these externalities into four main categories (Nash, C.A., 1982 p.9):

1. Delay to other vehicles and pedestrians;
2. Environmental degradation, of which the most significant factors appear to be noise, air pollution, visual intrusion and destruction of facilities to provide new transport infrastructure;
3. Accidents; and
4. Depletion of non-renewable natural resources.

To make investment decisions, it is important to trace through the effects using techniques such as social cost-benefit analysis. Figure 2.3 is taken directly from the INFRAS/IWW report commissioned by UIC/CER. They show the external cost representing an average across Western Europe, while congestion costs are excluded.[4] As they are shown, external costs of railways are considered to be relatively lower than those of other modes of transport both in the freight and in the passenger sectors. Therefore, railways can contribute to the environment, and the decision taker has to weigh up these external costs.

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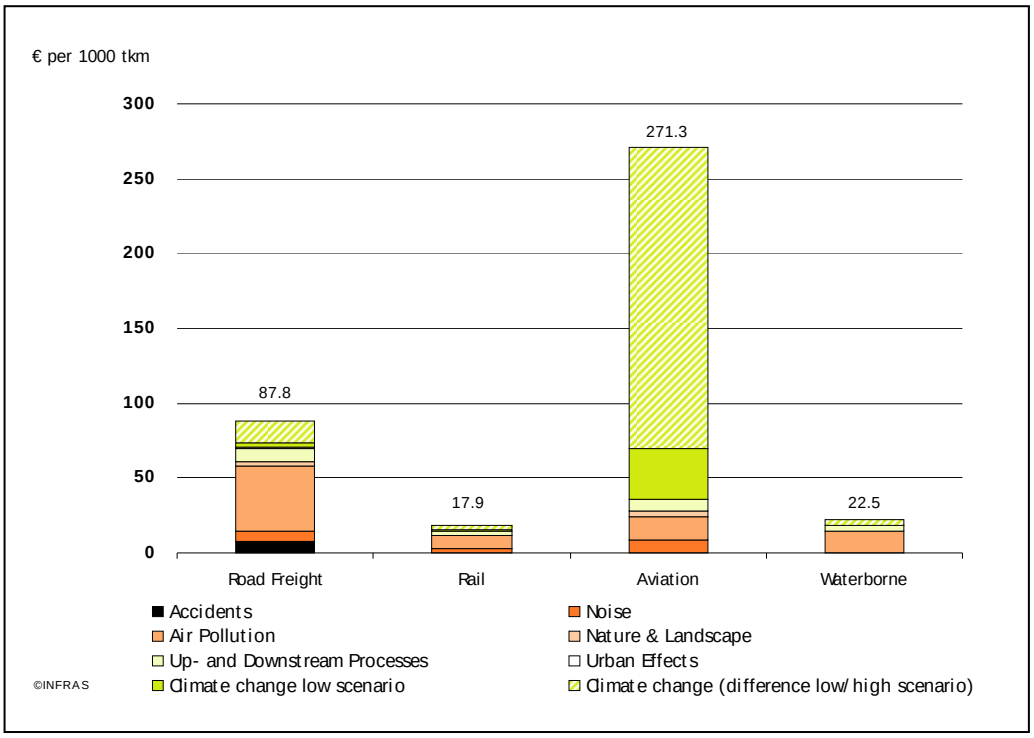
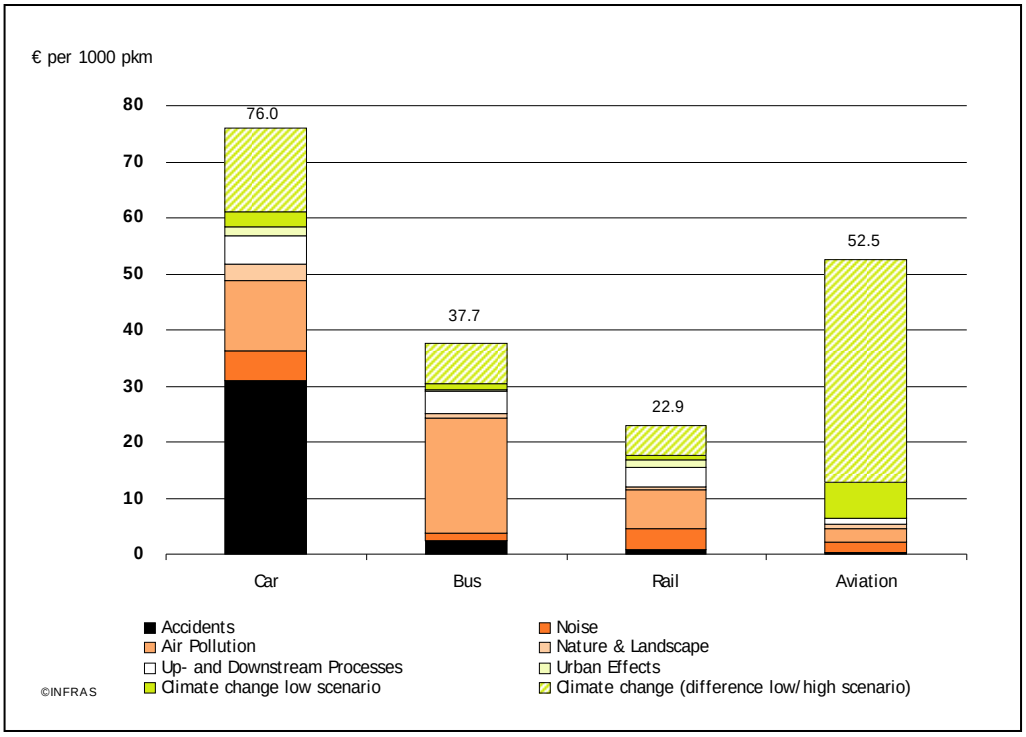
[4] EU funded research project "UNITE". As the external effects, UNITE also covers congestion costs in addition to external accident costs, and environmental costs. (Nash.C.A., 2003)



Average External Costs in 2000 by Freight Transport



Average External Costs in 2000 by Passenger Transport

Figure 2.3 Average External Costs of Transport in 2000 by Transport Modes

Source: European Environment Agency (2002), INFRAS/IWW, 2000

2.3.2.2 Social Demand for Railways

In many countries, railways are suffering from declining market share and deteriorating financial performance, and many railway managers believe that construction and fundamental improvement of infrastructure has to be financed mainly by the state or local government. This view is based on the fact that undertaking a major rail project by the private sector or a railway operator is not generally financially viable in many cases, and also on the fact that a project should be justified by taking both external benefits and user benefits into account compared with the total cost.

As it is mentioned in the previous section, the problem of transport externalities is one example of market failure which should be resolved by "valuing them in money terms and charging a tax which will lead decision takers to place appropriate weight on them when making transport decisions."(Nash.C.A. and Rus.G., 1997 p.253) Nevertheless, "environmental costs and other externalities are systematically neglected or underestimated in transport prices. As a result, the individual transport user receives distorted price signals, … because users perceive [these social costs] only indirectly."(ECMT, 1998 p.19) Based on this background there have been often criticisms that current transport policies are not necessarily environmentally friendly in some countries. Thus, despite the difficult status of the railway, at a time of growing concern about congestion and the environment, the railway sector is widely seen as having an increasingly important role in the future transport market by permitting energy-efficient, low-pollution, safe mass transport.

For example, rail investment is now running at high levels in Western Europe. The total investment in the network from 1998 to 2001 was around 129 billion Euros, and in line with Community policy, twice as much was invested in rail than on roads. Accordingly, the total length of high-speed sections in operation increased from 6,800km in 1996 to 10,000km in 2001.(Commission of the European Communities, 2004)

There are also efforts to realize welfare gains by adjusting regulations, charges and taxes to provide incentives for reducing the external costs of transport. For example, the Polish government has decided that 20 percent of fuel tax would be utilized to promote modal shift and to finance the development of rail infrastructure as a means for reducing the environmental and safety problems arising from motor transport. (Akiyama, Y., 2005)

2.3.3 Problems of State-Owned Railways

As mentioned in Section 2.2.1, state enterprises are not necessarily technically inefficient or lacking in investment funds. However, UNESCAP (2003 p.5) indicates that "the problem is that as long as they have recourse to deficit financing to maintain supply, railways have little incentive to be cost-effective or to respond flexibly to changes in user demand. Interference, from the government on matters relating to day-to-day operations, has often led to the railway enterprises having poorly defined goals and relatively passive management unlikely to respond to changing market conditions." It is also likely that the objectives are not in a commercial focus but in a social basis. In addition, because of frequent changes in government policy and government's single-year budget process, a long-term capital expenditure programme is difficult to achieve. (Matsuda, M., 2002 p.135)

For example, in Japan, JNR, a public corporation owned by the government, was separated into several railway companies in April 1987. In 1986, JNR's deficits amounted to 15.5 trillion Yen with loans of over 25 trillion Yen, which was larger than Mexico's external debts.(Hosoya, E, 1994 p.12) Besides a substantial fall in the modal share of national railways caused by rapid motorization and development of air transportation, JR East (2000) described the reasons of the failure of JNR as follows.

Firstly, the administrative format of the public corporation rose following three problems, which limited freedom of JNR:

1. **The philosophy and organization was not built on the premise of competition.**
   Despite the fact that an era of intense competition with other modes had begun, the administration was not oriented to compete with them;
2. **The administration was not autonomous.**
   The budget, personnel and fares were regulated by the Diet or cabinet. Politicians also exerted strong pressure for the construction of unprofitable new lines;
3. **Business scope was severely limited.**
   There were very rigid regulations preventing JNR from expanding its business scope to outside of the railway sector.

Secondly, its unified organizational structure throughout the country caused the following two issues:

1. **The management was standardized.**
   Local conditions could not be reflected in train schedules, fares, employee wages, and so on;
2. **Labor unions lost awareness of costs.**
   Labour unions demanded improved benefits without any consideration of competitive conditions and they did so with the attitude of being civil servants.

Changes in the transport market have led many railways into financial difficulties, and UNESCAP (2003 p.7) regarded the reasons for the failure of state-owned railways as following factors, all of which are quite similar to those of JNR:

1) misguided intervention from a government;
2) excessive operating costs;
3) perverse management incentives; and
4) lack of dynamism.

Because of severe competition with other transport modes and the background of

centralized control of publicly owned railways, nowadays profitable integrated state-owned railways are limited to a few such as Chinese Railways, Indian Railways (freight sector), where the transport market is relatively advantageous to the sector.

Many other state-owned railways receive subsidy from the government by some means. Nevertheless, Oum, T.H. and Yu,C. (1994), investigating into nineteen OECD countries, found: 1) direct subsidies reduce rail efficiency; and 2) greater managerial autonomy leads to higher levels of efficiency. Although the above-mentioned evidence itself does not necessarily provide a case for vertical separation, it does suggest that the efficiency of a part of rail activities is likely to improve in case it is freed from high degrees of regulatory intervention. For example, vertical separation can contribute toward balanced financial management of an operator and realization of the higher managerial autonomy in its activities. Thus vertical separation provides more scope for achieving the improvement of certain rail activities.(Brooks, M. and Button, K, 1995 p.242)

2.3.4 Rationale of Railway Reform

Kopicki, R and Thompson, L.S.(1995 p.9) note that "railways, like other service providers, are in the business of creating value for their customers. As the needs of customers change, or as customers discover new ways to satisfy their needs, the railways must redefine their services, trim their cost structure, and reach customers more effectively in order to increase the value that they are able to deliver and thereby regain their customers' service commitment." In consequence, many countries have introduced structural reforms designed to improve the operational efficiency and the financial performance of their state-owned railways.

On the other hand, in Japan there are many private railways, which have developed as a vertically-integrated structure. Until a few years ago, many of them had been

successful in independent management making active efforts with sufficient incentive to improve their efficiency. However, in addition to the change in the transport market, social changes such as the rapid decrease in population and transition into aging society especially in local districts have seriously worsened the financial performance of many private Japanese railways. (Study Group for the Problem in Rural Railways, 2003) Based on the above background, the government has started to support regional public transport by various policies such as enforcing new laws.

Different rail markets are likely to require different forms of regulation to maximize efficiency of the railways. ECMT (2001 p.10) put forward the following objectives, which should be considered in designing regulatory frameworks for most rail markets:

- preventing pricing abuses in captive markets;
- ensuring transparency in the provision and use of public subsidies;
- providing for an adequate level of investment in rail infrastructure and rolling stock;
- ensuring fair conditions for inter-modal competition;
- encouraging intra-modal competition, where feasible; and
- minimizing potential losses from reduced competition arising from mergers.

2.4 Vertical Separation of Railways

2.4.1 Definition of Vertical Separation

OECD (1998 p.9) explains that “separation of infrastructure ownership from the operation of services over the infrastructure has been advocated by economists for many network industries, such as telecommunications, electricity and gas distribution and, latterly, railways. The view has been that such an approach partly overcomes the problems generated by the fact that infrastructure costs are largely

sunk and infrastructure provision exhibits natural monopoly characteristics."

Vertical separation has been introduced into the railway sector in various forms in many countries in recent years. As a result, the terms "separation of infrastructure and operation" or "vertical separation" are utilized in various ways, and sometimes they imply only a specific type of it in the railway sector. For example, Kessides, I.N. and Willig, R.D. (1995) discussed the generic options for vertical railway structuring, and referred to the options that separate ownership of facilities from other rail functions such as train operation and marketing. Hearsch.J (2001 p.15) mentions that "vertical separation requires that train operations, including the businesses of providing passenger and freight services to customers (i.e. the "above rail" functions) be organizationally separate from the provision and maintenance of infrastructure (the "below rail" functions)." And, OECD (2005 p.6) explains that the term "vertical separation" refers to "the situation where the owner of the infrastructure *is not* allowed to provide the given rail service over the given piece of infrastructure itself."

As mentioned above, there have been a range of definitions for vertical separation of railways. There again, Hori.M (2000) defined "separation of infrastructure and operation" as follows:

1) It is in a public service industry, which has the nature of a natural monopoly because of its network infrastructure provision;
2) There are legally and financially independent institutions in order to provide final public services for customers;
3) One independent institution owns[5] the infrastructure, which is the essential facility for the final public services for customers; and
4) Another independent institution utilizes the infrastructure and performs productive activities for providing the final public services for customers.

[5] In the literature, Hori, M. (2000) described "owns *or* occupies" by using a Japanese word "senyu". However, the meaning of "senyu" in railway infrastructure is so ambiguous that it is not certain what it contains such as maintenance, signalling, daily control or safety responsibility of infrastructure. Therefore, the author narrowed his definition and confined it to "ownership" only.

In order to discuss vertical separation of railways it is essential to define the scope of research in this thesis. Therefore, the author defines “separation of infrastructure and operation” and “vertical separation” by utilizing above-mentioned Dr Hori’s explanation.

In other words, in this thesis the terms “separation of infrastructure and operation” and “vertical separation” refer to the situation where the owner of the infrastructure[6] does not provide the given rail service over the given piece of infrastructure itself.

2.4.2 Structure of Vertical Separation

As opposed to the road for motor vehicles, infrastructure of the railway is also its traffic operating system and an essential production element. And the historical model of railway operations is the monolithic organization, whereby a single entity controls all facilities, train operation and administrative functions. Nevertheless, the production of railway services can be divided into several factors:

1) investment and ownership of infrastructure;
2) maintenance of tracks and infrastructure;
3) capacity allocations and timetabling;
4) route setting (daily traffic controlling and signalling);
5) investment and ownership of rolling stock;
6) maintenance of rolling stock;
7) daily operation of trains (train service running and crew rostering);
8) service marketing and ticket sales;
9) administrative regulations on safety, technology, entry and retirement of services, fares, conflict settlement and so on.

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[6] In this paper, “infrastructure” refers to essential facilities for railway networks such as civil engineering structures and tracks.

An integrated railway, where the owner of the infrastructure provides the rail service itself over its infrastructure, generally performs these productive activities, the factors 1) to 8), within an integrated entity.

On the other hand, in vertically separated railways the owner of the infrastructure is different from the provider of the rail service over the infrastructure. Therefore, the "above rail" functions, which generally indicate the factors 5), 6), 7) and 8), are performed by a different independent entity from the owner of the infrastructure. As the entity which carries out the other factors varies according to the railway, various models of vertical separation exist in the railway sector.

As we will see in the cases in latter chapters, there are a variety of forms and implementation of vertical separation in the railway sector. In some models infrastructure and operations are managed by completely different independent entities, as it is shown in the case of Sweden, UK and Australia (ARTC). On the other hand, in the case of long-run concessions in Mexico, a railway operator also controls the infrastructure as if it were an integrated railway.

As the author considers that, among the above, the following factors are especially essential for *daily* operation of trains. Thus, this thesis defines these factors as "essential factors of daily operation"[7]:

2) maintenance of tracks and infrastructure;

3) capacity allocations and timetabling;

4) route setting (daily traffic controlling and signalling);

6) maintenance of rolling stock;

7) daily operation of trains (train service running and crew rostering);

8) service marketing and ticket sales.

The author refers the term "essential factors of daily operation" in order to

[7] The author considered that investment and ownership of infrastructure and rolling stock are not necessarily essential for "daily" operation because an operator can perform railway operation by leasing them from other entities. Thus author excluded the factors 1) and 5) from the "essential factors of daily operation".

investigate forms and implementation of vertical separation in the latter chapters.

2.4.3 Literature Review of Vertical Separation

Quite a few countries have experienced railway reform through vertical separation. Despite the fact that each country introduced vertical separation against the background of its own market conditions and the government's intention to the sector, most research focused on a specific type of vertical separation in certain countries mainly from the viewpoint of introduction of within-mode competition into the railway transport.

Ivaldi, M. and McCullough, G.J. (2001 p.1) found "strong cost complementarities among operational outputs, but not between operations and infrastructure" in the US freight railroads. The latter result implied that at the levels of output that characterize freight rail operations in the US, there may be no inherent technological advantages from vertical integration. The former suggests though that competitive access alone will not necessarily lead to competitive outcomes in rail freight markets.

On the other hand, there is also another study which reverses the above view. For example, Bitzan, J.D (2003) examined the cost implications of competitions over existing US freight rail lines by testing for the condition of cost subadditivity. The study found: "1) there are economies associated with vertically integrated roadway maintenance and transport, suggesting that separating the two would result in increased resource costs; and 2) railroads are natural monopolies in providing transport services over their own network, suggesting that multiple-firm competition over such a network would result in increased resource costs."(*ibid*, p.222) The study found the above by mentioning that "the findings do not necessarily apply to railroads in other countries with smaller railroad networks and a mix of passenger and freight services."(*ibid* p.224)

Although both of the above studies focused on the integrated freight railroads in the US, their results with regard to vertical separation vary. As these examples imply, there are heated arguments whether intra-modal competition among railway operators through vertical separation makes benefits or losses in the sector.

The debate over integration versus separation is still lively in Europe as well. (CER, 2005) Trujillo, C.R. (2004) examined, evaluating 14 Western European railways, the effect of separation and open access on productive efficiency. He concludes that vertical separation contributes negatively to the technical efficiency but new entry to the rail market contributes positively.[8] Nevertheless, to make issues difficult, it is discussed that complete vertical separation, such as the model adopted in UK and Sweden, makes "new entry easiest by removing all incentives for the infrastructure manager to favour one operator over another, but also leads to problems in coordination between the infrastructure manager and the train operating companies in terms of planning, investment, timetabling and day to day operations." (Nash, C.A., 2007 p.75)

Frequently, opinions against vertical separation are expressed. For example, a number of train operating companies in Britain have called for a return to vertical integration.(Nash, C.A., 2007 p.76) CER (2005 p20) quoted the view of CEO of the Swiss Federal Railways that "the recent substantial improvement in service – increasing the number of passenger trains by 12% on one of the already most densely used networks in Europe – would have been simply impossible in a separated structure, as it required an extremely high degree of coordination between operating services and infrastructure use."

Campos, J. and Cantos, P. (2000 p.192) also noted that "the problem associated with managing capacity is easily eliminated in the case of vertically integrated companies, although this is not so simple for systems of competitive access or

8 He stresses that consistency of his data is incomplete.

separation. In this case, the problem is increased for companies with high traffic densities and conflicting capacity demands." Drew, J. (2006) also stresses that density and scarcity of the infrastructure capacity are key factors to consider whether the railway can be vertically separated or not.

As the above examples show, several studies have discussed for and against vertical separation. Partly because the European Union intends to promote competition within railways, the most of studies about vertical separation, especially those about European railways, have analyzed railway efficiency in terms of introduction of competition into the rail sector.

Nevertheless, a number of different forms of separation have already been put in place in the railway sector internationally. And, in several cases the separation between infrastructure and operations has been utilized as complementary policies of private sector participation into the railway sector.[9] (Brooks, M. and Button, K., 1995 p.236) Thus, in the following section, various kinds of advantages and disadvantages of vertical separation will be investigated through literature available.

2.5 Advantages and Disadvantages of Vertical Separation

2.5.1 Investigation into Advantages through Literature

There are several reasons for introducing vertical separation. Thompson, L.(1997; 2001), Nash, C.A. and Toner, J.P. (1999), ECMT (2005b), Hori.M.(2000), and others explain various advantages of vertical separation of railways.

Based on the examination, the author categorized them into the following main

[9] Brooks, M. and Button, K.(1995 p.242) notes that "not all of the recent interest in vertical separation of rail functions has involved debates over privatisation but many have embraced at least a degree of interest in privatisation."

aims:

A.1) to facilitate public investment into infrastructure;

A.2) to permit private sector involvement;

A.3) to introduce competition;

A.4) to promote specialization; and

A.5) financial arrangement among different entities.

In the followings, more specific objectives in each aim would be examined mainly through the literature.

A.1) To Facilitate Public Investment into Infrastructure

A.1-1. Putting different modes on an equal footing within the transport industry.

In Sweden the government decided in 1988 to separate the national railway in two parts, infrastructure and operation. Berggrund, L.(1997 p.126) explains that "full responsibility for the maintenance and upgrading of the rail infrastructure was assumed by the State. Train operators pay charges for using the tracks similar to road taxes in the road sector. Resulting total cost coverage is about 30 % of the total cost of infrastructure maintenance."

It has also contributed to clarifying the fairness of the public expenditures combined with the transport policy. "Prior to separation, Swedish Railways (SJ) suffered from trying to perform services on a network that was under-capitalized. Once a line started to make losses, infrastructure investments typically came to halt. For the state, it was difficult to grant more money to SJ, partly because it could be seen as unfair from the view of other transportation companies, and partly because it was difficult to monitor how SJ actually spent the money. Setting up the national authority Banverket made it much easier to increase public spending on the railways, since all the money was channelled to a national authority rather than to a specific operator in the transportation industry." (Alexandersson, G. and Hulten, S., 2005 p.11)

A.1-2. Utilization of external financial support for improving railway infrastructure through voluntary negotiation.

Generally, it is difficult for private railway companies to invest sufficiently for the improvement of railway infrastructure because of managerial risks. Nevertheless, a third party such as a local government, frequently, agrees to develop the railway service investing a part of the infrastructure, and also agrees the current operator would continue providing railway services. Accordingly, sometimes, a new entity, such as a joint-venture who owns the infrastructure, would be established in order to achieve this aim.

In the case of Yamagata Shinkansen in Japan, JR East provides the railway services while the infrastructure and the rolling stock are invested and owned by the joint-venture among JR East, Yamagata Prefecture, and so on. The agreement of this project was reached not by a law but by voluntary negotiation between the railway operator and the entities concerned.

A.2) To Permit Private Sector Involvement

A.2-1. Utilization of ability of the private sector through monopoly concession for achieving efficient controlling both infrastructure and operation.

Concessioning has been introduced in many railways especially in Latin America and Africa. “In general, the governments involved decided to withdraw from public operation and delivery of rail services, … [and] chose [this] model because the operating concessionaire was without exception the sole or heavily predominant operator on the infrastructure and none of the normal reasons for considering infrastructure management separation applied.”(Thompson, L., 2003a p.338)

A.2-2. Facilitating a private entry into a part of railway system separating sunk costs.

Under vertically separated railway a new operator can be free from the infrastructure costs which are largely sunk. As the cost structure also can be

clarified by introducing access charges, vertical separation facilitates private entry into a part of the railway system, and opportunities for attraction of private investment into a certain part of the system should also increase. (ECMT, 2005b p.1)

A.2-3. Track-access based on voluntary agreement for economy of enhanced density.

"A railway can often allow a new operator on a line at a charge higher than its added costs, but far lower than the cost to the tenant operator of providing its own facilities. This was the impetus for the voluntary, private trackage rights agreements that arose in the United States." (Thompson, L., 1997 p.1)

A.2-4. Promoting convenience with through-trains.

In some cases, vertical separation of railways is effective for promoting track access on the infrastructure owned by different entities, improving convenience of customers. (The Association of Japanese Private Railways, 2003)

For example, Orient Express, the international passenger trains crossing European borders, had this kind of advantage as the passengers could enjoy crossing several infrastructures owned by different entities without changing trains operated by a single operator. (Hori, M., 2000)

A.3) To Introduce Competition

A.3-1. Encouraging intra-modal competition permitting track-age access to more than one operator.

A vertically integrated railway has a substantial barrier to introduce competition among operators because "infrastructure costs are largely sunk and infrastructure provision exhibits natural monopoly characteristics. [Therefore,] separation of infrastructure ownership from the operation of services over the infrastructure has been advocated by economists for many network industries." (Nash, C.A. and Toner, J.P., 1999 p.200)

The European Commission set about opening up the market for new entrants to come into rail freight transport, particularly to create genuine competition for cross-border freight rail transport.(Nash, C.A., 2007) In the US, "the Interstate Commerce Commission often gave one railway the right to operate over another in order to create competition between the two."(Thompson, L., 1997 p.1) These are examples that vertical separation has been utilized for encouraging intra-modal competition permitting track-age rights to more than one operator.

A.3-2. Creating competition among train operators by franchising out operational services.

For example, in UK the railway industry has been radically reformed since 1994, and the right to run the ex-BR passenger trains was franchised to 25 private TOCs. In general, the number of passenger operator on the same track is limited to only one except overlapping franchisees on a certain line.

A.4) To Promote Specialization

A.4-1. Specialization of technical and managerial knowledge either infrastructure or operation.

In case the operation is vertically separated, the member of staff belongs to "highly specialized firms whose range of activities is more limited." (ECMT, 1996 p.2) For example, a railway operator concentrates on efficient train operation and the infrastructure manger devotes its management efforts to the efficient track maintenance, and so on.

A.5) Financial Arrangement among Different Entities

A.5-1. Dealing financial settlements among several companies.

In the case of splitting up the Japanese National Railways (JNR) in 1987, Shinkansen network was divided into the three Honshu JR Passenger Companies: JR Central; JR East; and JR West. It was prospected that profit adjustment among them is indispensable for privatization of JNR. Accordingly, Shinkansen Holding Corporation (SHC), who owned the assets of the Shinkansen network and

also the same amount of debits as a market-based revaluation of them, was established. Each line would then be leased for operation to the three JR Companies, and the above-mentioned profit adjustment was realized through the amount of lease charges paid by them.[10] (Sumita, S., 2005)

A.5-2. Common ownership/management of the infrastructure for sharing accesses.

In case more than one operator can access the commonly owned/managed infrastructure under smooth coordination, each operator can attain the services with far lower costs than providing their own infrastructure. (Thompson, L., 1997)

In Japan, Kobe Kosoku Railway has only infrastructure and does not own any rolling stock, and was established, as a joint-venture among the four private operators and the local government, etc. in order to make it possible that the four operators in the region access its infrastructure. (Mizutani, F., 1999 p.288)

As it is investigated a number of advantages have been indicated regarding vertical separation of railways.

2.5.2 Investigation into Disadvantages through Literature

Despite a number of advantages of vertical separation studied in the former section, significant changes are brought about in the railway sector once infrastructure and operation are separated. Of course, the disadvantages differ according to the form of separation and other factors such as regulatory mechanisms. Nevertheless, Pfund, C. (2002; 2003), ECMT (1996), White, P. (2003), Trujillo, C.R. (2004) and others explain various disadvantages of vertical separation of railways.

Based on the examination, the author classified them into the following problems:

D.1) coordination problems due to vertical separation of entities performing

[10] On 1st October 1991, the SHC was disbanded, and its assets and liabilities were allocated to the three JR Companies.

railway operation;

D.2) coordination problems due to separation of finance; and

D.3) coordination problems due to multiple operators.

In the following, more specific disadvantages in each coordination problem would be examined mainly through the literature.

D.1) Coordination Problems due to Vertical Separation of Entities Performing Railway Operation

D.1-1. Increase of the transaction cost between infrastructure and operation.

Vertical separation of railways generally replaces centrally coordinated structure of the railways by a series of contracts between the train operators and the infrastructure manager. Nevertheless, in order to coordinate independent organizations avoiding confrontation they have to negotiate, transmit various kinds of information until enforcing the contracts. Thus the cost of such contracts, the transaction cost, may be considerable in vertically separated railways. (Quinet, E. and Vickerman, R., 2004)

D.1-2. Difficulty in clearly identifying the respective responsibilities of the different parties.

Under vertically separated railways, especially in case operational responsibilities are also separated into different entities, they suffer "the difficulties of clearly identifying the respective responsibilities of the parties. (if a train is late, for example, both the infrastructure manager and the operator can be held responsible, depending on the circumstances)"(ECMT, 1996 p.2) Furthermore, there are also possibilities that two entities, an operator and infrastructure, do not cooperate even with inspecting regulator for finding out the cause of an accident because each entity is reluctant to bear the liability. (Wolmar, C., 2001).

D.1-3. Difficulties in acquiring broad knowledge for operation and safety measures.

In operationally vertically separated railways each player is confined to a more

limited field of activity (track or rolling stock maintenance, etc.), and players manage inter-dependence on a contractual basis. Thus, there are serious concerns that members of the staff find it more difficult to acquire broad knowledge, experiences for efficient operations and sufficient skills for implementing safety measures because of fragmentation of the responsibilities. (ECMT, 1996 p.2)

D.1-4. Difficulties to harmonize the technologies and to optimize train operation on the network.

Different from the road, the railway infrastructure is also an essential traffic control system. As railway operation is based on rolling stock, infrastructure, and operation control technology, harmonization of these technologies is essential for realizing better train service such as train speed, headways, punctuality and more reliable operation. Nevertheless, this technical harmonization would be more difficult in vertically separated railways. (Pfund, C., 2002)

D.1-5. Difficulties to achieve further technical development of the comprehensive railway system.

Most of the railway technologies need close inter-action between the infrastructure and rolling stock. This inter-action is essential for the harmonized railway technologies, and it can be performed efficiently within one entity, an operationally integrated railway. Once they are managed by different organizations under an operationally separated railway, it will be more difficult to develop technical innovations smoothly. (Pfund, C., 2002 p.6)

D.2) Coordination Problems due to Separation of Finance

D.2-1. Difficulties in planning and performing adequate investment in a railway system.

Pfund, C. (2002 p.5) indicates that an efficient cost management, which is necessary for competing with other transportation modes, would be difficult without harmonized links between the two.

D.2-2. Poor economic performance arising from monopolistic status of the infrastructure manager.

ECMT (1996 p.3) indicates that "it is possible that the infrastructure manager will charge the highest possible price when 'selling' timetable slots, thereby concealing inefficiencies. … There will always be a tendency for the infrastructure manager to over-estimate his investment requirements, which will have to be submitted to the authorities for approval."

D.3) Coordination Problems due to Multiple Operators

D.3-1. Difficulty in slot allocation, timetabling and coordination among operators.

In the event of separation, especially when more than one operator accesses the same track, capacity management such as the allocation of time-slots must be based on negotiation.(ECMT, 1996) Moreover, "settlement of conflicts (i.e. if a train is late or if traffic is disrupted for various reasons) may prove to be extremely complicated. [Additionally,] in unforeseen situations, the solution to a conflict may be difficult to establish in a fragmented railway system, particularly if the network is saturated, and in all probability will be interpreted differently by the various parties involved."(*ibid.* p.2)

D.3-2. Lack of integration of prices and services.

Where a large network is covered with the same operator, it can promote passenger benefits through coordinating timetables, offering common fare structures, and so on. (White, P., 2003) In case there is no regulation or mutual agreement, introduction of on-track competition in the passenger sector can have undesirable results such as disruption of connections, biased passenger information, tickets not inter-changeable with other firms, discontinuance of regular headway services, and so on. (ECMT, 1996 p.3)

As examined above, a number of disadvantages are also pointed out concerning vertical separation of railways.

2.6 Prospects of Vertical Separation of Railways

Due to severe competition with other modes, nowadays, there are only a few profit-making integrated major railways without subsidy from the government.

Some of the Japanese passenger railways and the US freight railways are the typical examples of profit-making railways which own the infrastructure. These railways are operated as private companies, and investments are performed based on a financial appraisal on each investment project. In principle, they do not invest in projects which do not contribute to their management financially. Nevertheless, as mentioned in Section 2.3.2, investments in the railway sector are recommended to be made based on social cost-benefit analysis including external costs and benefits for realizing better environment.

Based on this background some railway investments have been performed by the public sector in Japan as well. As the first example, after the privatization of JNR, the public sector invests in new Shinkansen lines as Chapter 7 investigates. Secondly, in August 2005 a new law which can promote public investments for private urban railways' infrastructure was established in order to exploit the potential of the current urban rail network. Thirdly, the number of railways which transfer their infrastructure to the local government is increasing in Japan as Chapter 7 discusses in the case of Aoimori Railway. Fourthly, another law which also allows public investment into regional public transport including railways based on the agreement of the regional committee was established in May 2007.

In other countries many state-owned railways have been suffering from accumulating deficits. In order to deal with these problems various types of railway reform have been introduced. For example, some state-owned railways, such as the case in Vietnam, Indonesia and Tunisia, have transferred their infrastructure to the government. In Europe and Australia vertical separation (at least in accounting

basis) was introduced mainly for promoting competition among operators. In some countries in Latin America and Africa, the government has introduced concessioning in order to utilize market mechanism and the ability of the private sector retaining ownership of the infrastructure.

Vertical separation is expected to be utilized in the railway sector in coming years as well, since there are good reasons for its introduction in various circumstances as shown in the above cases.

2.7 Conclusion

This chapter reviewed the background to vertical separation of railways. It was reviewed that railways were traditionally developed as vertically-integrated organizations, which are characterized by large infrastructure costs. In general, railways have been operated by a public firm, or heavily regulated for avoiding monopoly power partly because transport markets suffer from serious imperfections or market failures.

Nevertheless, with the growing concern for the failure of state-owned railways and severe competition with other transport modes, many state-owned railways have performed restructuring. Through the reform process, the railway sector has experienced various forms of vertical separation based on different market conditions and the state's own intention. For example, most of the discussions in Europe have been performed in terms of introducing competition into the railway sector, whereas the other countries have introduced the different form of vertical separation for the different reasons.

Several studies have discussed for and against vertical separation, but they are not sufficient to understand the forms and characteristics of the various types of vertical separation. Some studies discuss advantages and disadvantages of vertical

separation, but their relationship with the type of separation is not clear enough either. It is because there are various types of it in the railway sector. In addition, owing to the geographical conditions, enough analysis comparing the varied forms in different conditions has not been performed yet.

Therefore, this thesis aims to examine and analyze various types of vertical separation that the railway sector has experienced so far. The study identifies the characteristics of each type of vertical separation, especially by focusing on the following key issues:

1) aims of railway reform through vertical separation;
2) forms and implementation of vertical separation;
3) advantageous effects of vertical separation; and
4) disadvantageous effects of vertical separation.

The next chapter develops the appropriate methodology for the research in order to attain the aims to identify and analyze the characteristics of each type of vertical separation of railways.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

The primary aim of this chapter is to identify the appropriate research structure and methodology for the work. Section 3.2 describes that the case study technique mainly based on interviews to several railways is selected as an appropriate way of the research. In Section 3.3, in order to establish a firm research focus over the course of the case study, the research aims are reviewed and its objectives are established. The methodology for the research is outlined in Section 3.4. Then the detail process of the interviews/questionnaires is represented as the main method to gather the large part of essential data and information necessary for gaining the insights to achieve the aims and objectives of the research.

3.2 Selection of Research Methodology

This section provides academic justification for the use of a case study method underpinned by the interviews for the research methodology.

Yin, R.K. (2003 p.5) explains:

> the case study is but one of several ways of doing social science research. Other ways include experiments, surveys, histories, and the analysis of archival information. Each strategy has peculiar advantages and disadvantages, depending on three conditions:
> (a) the type of research question posed;
> (b) the extent of control an investigator has over actual behavioural events; and
> (c) the degree of focus on contemporary as opposed to historical events.

Table 3.1 shows these three conditions and explains how each is related to the five major research strategies. “In general, case studies are the preferred strategy when

'how' or 'why' questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context."(*ibid.* p.1)

Table 3.1 Relevant Situations for Different Research Strategies

Strategy	Form of Research Question	Requires Control of Behavioural Events	Focuses on Contemporary Events
Experiment	how, why?	Yes	Yes
Survey	who, what, where, how many, how much?	No	Yes
Archival analysis	who, what, where, how many, how much?	No	Yes / No
History	how, why?	No	No
Case study	*how, why?*	*No*	*Yes*

Source: Yin, R.K. (2003), Case Study Research: Design and Methods

This research work needs to gain a sharpened understanding of the issues of vertical separation in the railway sector in order to clarify the research questions. In this research, investigations and explanations of the research aims are especially important indicated as follows:

1) "why" vertical separation was introduced to the railway during the restructuring process;
2) "how" vertical separation is formed and implemented;
3) "how" the aims and advantageous effects of vertical separation resulted, and "why" they did so; and
4) "how" the disadvantageous effects of vertical separation resulted, and "why" they did so.

In addition to the above forms of research questions, this research has the following characteristics:

- an investigator does not have control over actual behavioural events; and
- the research focuses on contemporary as opposed to historical events.

Thus the above-mentioned characteristics in this research lead to the adoption of case studies as the preferred research strategies. And it is justified that case study through an in-depth examination into a limited number of cases using a variety of data is an appropriate methodology for this research.

3.3 Focus and Objectives of the Research

In a case study research method it is important to establish a firm research focus to which the researcher can refer over the course of study of a complex phenomenon or object.(Soy, Susan K., 1997) Thus this section reviews the focus of the study, and also investigates the objectives of the case study to produce evidence that leads to understanding of the case and answers the research aims.

The main aims of the research are clarifying the four key issues:

1. **Aims of railway reform through vertical separation**

   The aims and reasons for introducing vertical separation vary depending on the background of the railway reform. Thus the research clarifies the aims of introducing vertical separation in each case of the reform.

2. **Forms and implementation of vertical separation**

   The forms of vertical separation are to be identified in each case. The research finds out how each factor of railway operation is implemented under vertically separated structure.

3. **Advantageous effects of vertical separation**

   In addition to the results of the above aims, the study clarifies the advantageous effects as a result of introducing vertical separation and finds out the background behind the results.

4. **Disadvantageous effects of vertical separation**

   Vertical separation frequently raises various disadvantageous effects as well. The research identifies these effects and examines the background behind these

negative results.

In order to attain the aims of the research, as objectives of the research, the study performs investigation into the cases and analyzes them using a variety of data and interviews/questionnaires. Specifically, the study is performed in terms of the following viewpoints:

1) The study examines which entity performs each essential factor of daily operation, and identifies the form of vertical separation in terms of operational responsibility for *below rail* functions and *above rail* functions. Followed by the case studies, the different types of vertical separation are compared in order to distinguish the degree of operational separation between infrastructure and operation;

2) Vertical separation can be analyzed in terms of separation of the financial responsibility as well. Thus the study examines the forms of financial separation of the railway into the two divisions:
   - the division which the railway performs the services with its own financial responsibility (the commercial division);
   - the division that the public sector has assumed the financial responsibility (the social division).

   Followed by the study into each case, the comparative analysis among different types of financial separation is performed to distinguish the characteristics of each type;

3) The study examines the way of entry into the rail market and its results. Investigation is made in terms of regulation for a new entry into a transport service, relationship with the incumbent operator, and other related issues, and finds out the characteristics of each form of entry to a railway transport service;

4) Under vertically separated railways, the entity which performs railway operation

and owner of the infrastructure are separated. In addition, in many cases more than one operator performs railway operation. Thus the study investigates into the relationship between different entities in vertical separation and examines:

- relationship between infrastructure and the main operator;
- relationship among different operators.

The study also identifies the coordination problems among different entities;

5) The case study investigates into a change of management and operation through the introduction of vertical separation. It also examines the transition in railway performance comparing before and after the reform through the statistical data such as change of traffic output. In order to distinguish the impact of reform through vertical separation on system performance from the effect of other exogenous factors, transition of the traffic output would be compared with the trend of real-term Gross Domestic Product (GDP). The study also tries to identify how the change of management and operation affected the performance of the railways;

6) Investigations into advantages and disadvantages of vertical separation are key issues among the main aims. Thus, the study also examines the backgrounds of the positive and negative results of vertical separation, and tries to find out the reasons for them.

The next section describes the appropriate methodology of the research in order to attain the above-mentioned aims and objectives.

3.4 Methodology for the Research

This research is performed mainly based on:

1) data collection on literature;

2) investigation through interviews/questionnaires; and

3) comparative analysis.

This section describes how in practice the above-mentioned works are performed.

3.4.1 Data Collection on Literature

The author reviews and synthesizes the results of the previous research based on available literature, and a part of this work is performed in Chapter 2. The corroborating data and statistics are utilized in order to provide the ground for the investigations, arguments and analyses in the latter chapters as well.

In order to obtain corroborating data and statistics the author utilizes a variety of reliable literature sources:

- Annual reports and corporate information of each railway;
- Published industry analysis and academic journals;
- Database and working papers by the World Bank;
- Papers of related international organizations such as ECMT and OECD;
- International Railways Statistics of UIC[1]; and
- Other published sources.

In general, the study investigates vertical separation of railways mainly in terms of qualitative aspects as described in the former section. In addition, although the study covers the railways whose size varies to a large extent, there are some difficulties to collect certain consistent data for the correct estimation of railway performance which can be compared among the cases. Thus the study examines the trends of traffic output (passenger-km and freight tonne-km) in each case in order to support the argument and analysis.

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[1] The official name of UIC is Union Internationale des Chemins de fer (International Union of Railways). It is a worldwide organization for railways that provides detailed world-wide statistics.

3.4.2 Investigation through Interviews/Questionnaires

In the case studies the author generates a range of information. Especially, a substantial part of the material required to underpin the analysis is formed through the interviews/questionnaires to each railway.

As far as possible, the author performs interviews in a meeting. Nevertheless, in case it is not possible to perform the interviews because of geographical distance, the author makes investigation by means of questionnaires. In this case, in advance of sending the questionnaire, the author explains the intention of the questionnaire to the subject by e-mails and/or phone. Furthermore, even after receiving the answers of the questionnaire, the author keeps contacts with the subject so that the author can obtain the detailed information equivalent to the railways which a direct interview has performed. In addition to the answers to the questionnaire, close interaction after receiving them is so useful for the author to gain detailed information and to deepen the investigation as it is aimed. The detail procedure for the interviews/questionnaires is described in Section 3.5.

3.4.3 Comparative Analysis

It is expected that there are some differences in the four key issues even within the similar type of vertical separation. Thus, firstly, the author compares the key issues among the railways which have similar characteristics in terms of vertical separation. This investigation is made within the same chapter, from Chapter 4 to Chapter 7.

Based on the above studies, investigation and analysis are made comparatively among different types of vertical separation. The investigation is performed focusing on the four key issues so as to clarify the differences among each type of vertical separation, and to distinguish its characteristics. This work is performed

mainly in Chapter 8 and Chapter 9.

3.5 Interviews/Questionnaires to the Railways

3.5.1 Railways to be Investigated

In order to achieve the aims of the research, the railways for the study are carefully selected based on the following conditions:

- The state-railways have already experienced a reform through vertical separation and the results have become clear to some extent;
- The railways cover different motives for introducing vertical separation;
- The railways cover different forms and implementation of vertical separation;
- The railways have different sorts of results through vertical separation;
- The state railways are large enough and have sufficient transport volume to investigate the transition[2];
- The cases of reform are confined to those within past decades of years since competition with other transport modes had become severe.

In the case study, various types of vertical separation are divided into four categories based on their characteristics. The railways selected and chapters discussed are shown in Table 3.2.

[2] Exceptionally, Chapter 7 focuses on the case of TFVM in Mexico and the two cases of newly-organized vertically separated lines after the JNR Reform in Japan. Although these are small railways, they are selected for discussing and comparing various forms of vertical separation.

Table 3.2 Group of Railways by the Type of Vertical Separation

Group	Title of the Chapter	
	Chapter	Country (Railway)
Group 1	State-owned railways without within-rail competition	
	Chapter 4	India (IR) *1 Vietnam(VNR), Indonesia (PT.KA), Tunisia (SNCFT)
Group 2	Vertically separated railways with competition among operators	
	Chapter 5	Sweden, UK, Germany, France, Australia (ARTC)
Group 3	Railways with vertical separation for passenger or freight traffic	
	Chapter 6	Iran, Japan (JR Freight), USA (Amtrak)
Group 4	Private railways with long-run access to infrastructure	
	Chapter 7	Mexico (Freight Concessionaires, TFVM) Japan (New Shinkansen Lines, Aoimori Railway)

*1: As a basis for comparison with vertically separated railways, the Indian Railways (IR) is investigated as an integrated railway.
Source: Author

3.5.2 Subjects of the Interviews/Questionnaires

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The data collected through the interviews/questionnaires are essential for the study, and the characteristics of the data are heavily dependent on the subjects of the works. Thus, a research interview must be performed to a subject who is identified to have sufficient information and knowledge about vertical separation of the railway. In principle, the author makes interviews/questionnaires with managers with enough working experience in the railways concerned and an intimate knowledge about vertical separation of the railways. As far as possible the author interviews with managers who were engaged in planning of the railway reform. In the cases of UK, Australia, the US and Mexico, the author interviews or asks a questionnaire to a retired expert or to a consultant who was deeply engaged in the railway reform process.

In case the author can not directly contact an official who has good knowledge about

the reform, the author sends questionnaires to the railway in advance of the interview and asks to have a meeting with an appropriate member of staff in the railway. As the questionnaire covers a variety of issues regarding railway operation and management, in some interviews such as the case in Sweden, meetings are performed with multi-attendance from different departments.

The outline of the interviews/questionnaires such as the country, railway organization, biographical details of the subjects, and the first date of inquiry, is summarized in Appendix 1.

As it is listed, the author could perform an interview/questionnaire at one organization in each country because of the limited research schedule.[3] In particular, the author could not perform it to both the infrastructure manager and an operator in European countries and Australia, in which the railway industry has been operationally separated into infrastructure and operation. It might be possible that the relatively small number of interviews/questionnaires during the study biases the findings through the research. Nevertheless, wherever it is possible, the author attempted to cross-check the acquired information with the reliable literature sources[4], and made efforts to verify the facts and the expressed information.

3.5.3 Structure of Questionnaires

The structure of questionnaires is listed in Appendix 2.

The questionnaire not only covers extensive questions sufficient to comprehend the management of the railways but also contains investigative ones which contribute to analyze how and why management has changed through vertical separation.

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[3] The author's term in UIC World Department was fixed to terminate in March 2006. It was expected that, after his return to Japan, it would be practically difficult for the author to perform the interview except that for railways in Japan.

[4] The examples of available literature are listed in Section 3.4.1.

The questionnaire contains relevant questions to attain the aims and objectives of the research, and it covers the items:

1) outline of the vertical separation and aims of the reform;
2) ownership, investment and way of planning the infrastructure;
3) maintenance works of the infrastructure and tracks;
4) ownership, investment, maintenance of the rolling stock;
5) timetabling and daily operation;
6) operators on the track including those of new entrants;
7) relationship between infrastructure and operation;
8) relationship among operators;
9) safety issues;
10) transition of management and operation through vertical separation;
11) advantageous effects of vertical separation and their background; and
12) disadvantageous effects of vertical separation and their background.

3.5.4 Methods of Interviews

In general, interviews are based on the questionnaire listed in Appendix 2.

Among various questions the interviewer puts emphasis on investigating the four key issues so that they can be analyzed providing the necessary grounds later. The interviewer asks questions in a reactive way. Even if a discourse with the interviewee enters into a topic slightly peripheral to the agenda, it is continued as this kind of discourse, sometimes, contributes to generate material useful to gain comprehensive views to clarify the key issues.

In order to gain the interviewee's frank opinion and to reveal the essence of the background of the key issues, the interview is held after explaining that the report would be written preserving the interviewees' anonymity.

In some interviews such as the case in UK, the discourse has lasted a day. The other interviews have been held spending a half day. Because of a time limit of the interviews, in most cases the author keeps close contact with the interviewees mainly through E-mails even after the meeting, and follows up the related issues and seeks sufficient data and evidence to deepen the investigation and analysis. In addition to the close interaction with the interviewees, the author also endeavours to support the findings from the interviews through the literature sources.

3.6 Summary and Critique of the Method

Yin, R.K. (2003) defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used. In adition, Soy, Susan K. (1997 p.1) notes that "case study research excels at bringing us to an understanding of a complex issue or object and can extend experience or add strength to what is already known through previous research."

This chapter explained that the case study technique is selected as the most appropriate form to reach the aims and objectives of the research. The outline of the research methodology and detail processes of interviews/questionnaires are also represented.

There are also potential weaknesses of the case study method. Soy, Susan K., (1997) indicates that the study of a small number of cases might be insufficient for establishing reliability or generality of findings, and the intense exposure to study of the case biases the findings. There are also possibilities for subjectivity on the part of the interviewer. Roberts, C.C. (2003) notes that qualitative data obtained through the interviews/questionnaires in the study would not necessarily provide

full evidence in support of the arguments and analysis either. In order to lessen the above-mentioned potential weakness, the author endeavours to investigate the object of the case study using a variety of data and information to produce evidence to attain the aims.

CHAPTER 4:
STATE-OWNED RAILWAYS WITHOUT WITHIN-RAIL COMPETITION
- INDIA, VIETNAM, INDONESIA AND TUNISIA -

4.1 Introduction

For the comparison with vertically separated railways, firstly, this chapter studies a vertically integrated railway focusing on the Indian Railways (IR).

Then, the author investigates vertically separated state-owned railways without within-rail competition, specifically, Vietnam Railways Corporation (VNR) [1], Indonesian Railways (PT.KA)[2] and Tunisian National Railways (SNCFT). After surveying the background and outline of the recent reform, the three railways are examined in terms of the four key issues to find out characteristics of vertical separation in the cases.

4.2 A Model of Vertically Integrated Railways -A Case in India-

4.2.1 Outline of the Indian Railways

Indian Railways (IR) is completely owned by the Central Government. It is what is called as a departmental undertaking i.e. an organization owned by the

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[1] After the author's interview to VNR in July 2005, Vietnam passed a new railway law in January 2006. The new registration stipulates access right by an operator other than VNR. (GTZ, 2006) As the results of this new law are not apparent yet, this paper does not discuss the new law and the transition after the establishment of the law.

[2] After the interviews to PT.KA in July 2005, the Director General of Railways (DGR), a Government body in Indonesia, was established. It was decided that other entities such as local governments and the private sector are permitted to operate railways accessing the existing tracks, and a new railway law has passed in March 2007. Despite its stipulation, there has not been any new participant to the railway services in Indonesia as of December 2007, and only PT.KA operates the railway. Thus this paper does not discuss the new law in Indonesia either.

Government of India. The highest decision making authority is therefore, the Minister of Railways who is a senior member of the cabinet, but the budget of IR is separate from the Central budget. The Government helps IR with funds for capital expenditure and modernization but expects it to cover the expenditure by the revenue from its internal generation. In general, IR enjoys autonomy i.e. independence from the Government in its daily railway operation. The Ministry of Railways, also called the Railway Board, is the decision making as well as regulatory body. [1/IN]

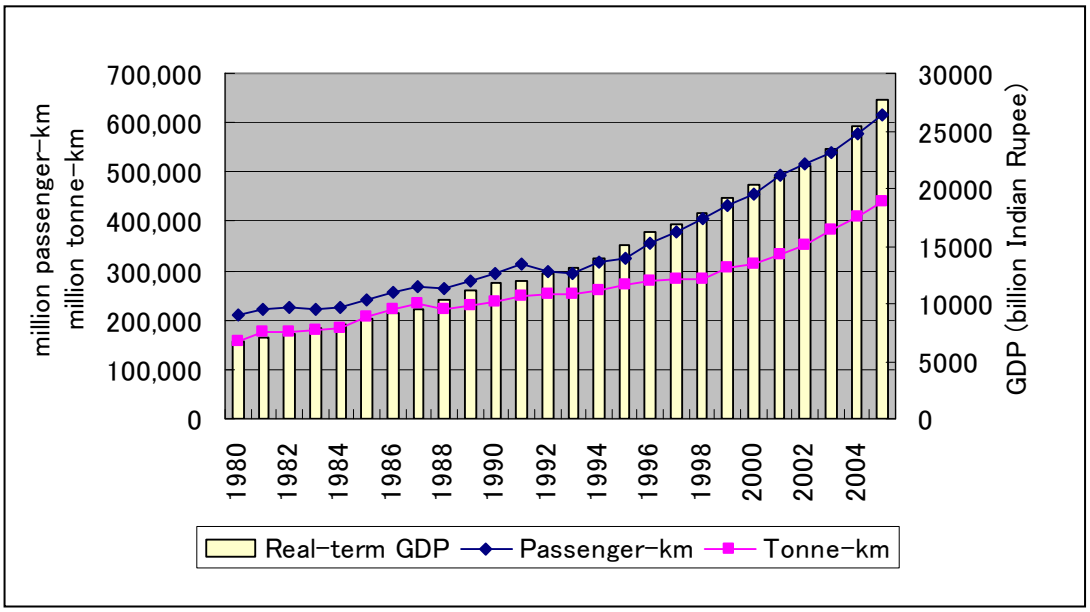


Figure 4.1 Traffic Trends of IR

Source: The World Bank's Railway Database
UIC Statistics 2006, UIC
International Monetary Fund (2008)

Figure 4.1 shows the traffic trends of IR over the last twenty years. ADB (2002) explains that "in the face of increasing competition from roads, the railways' share of the transport market has dropped over the last two decades. Worsening financial performance, congested routes, lack of resources for investment and a high level of accidents hamper the sector. Between 1997 and 2001, the annual number of derailments, which account for the majority of accidents, rose from 282 to 344."

Nevertheless, the figure also shows that the traffic performance of IR has been improving remarkably these few years tracking the rapid growth of the real-term

GDP. The year of 2007 sees IR enter its 11th five-year plan period, and "over the next five years IR expects freight traffic to grow at 8% to 9% a year while passenger traffic is forecast to increase by 6% a year" (Garg., S. 2007 p.6)

4.2.2 Management and Administration of the Indian Railways

Through the questionnaire to IR, its management and administration of railway operation are clarified as Appendix 3.

These years, the railway sector in India is active in managerial transition. For example, the Ministry of Railways signed concession agreements with 15 private and public sector operators in January 2007, and licensed for container train services.(Dayal, R., 2007) Nevertheless, for the most part of its operation, IR is a monopoly organisation and enjoys advantages of integrated system like lower transaction costs, easier decision making in capital budgeting and easier day to day operational control. [1/IN]

Nevertheless, according to IR, the major disadvantage of integrated system is that there is little pressure to improve efficiency and for cost reduction.[1/IN] "Batra notes that 'at present IR gets 67% of its earnings from freight traffic and 33% from passengers.' As the railway is still an integral part of central government, it therefore has 'social responsibilities to discharge', which means using freight revenues to cross-subsidise un-remunerative local passenger services."(RGI, 2007b) Rakesh Mohan Committee Report, which was submitted to the Railway Minister in 2001, regards the root of the financial problem confronting IR as "the lack of adequate productivity increases that are commensurate with the real wage increases over time." (Mohan, R., 2001)

"The Rakesh Mohan Committee recommends that IR should be separated from the Government and turned into a free standing corporation."(Bringinshaw, D., 2002

p.17) The committee also notes that “if IR is to survive as an ongoing transportation organisation it has to modernize and expand its capacity to serve the emerging needs of a growing economy. This will require substantial investment on a regular basis for the foreseeable future.”(Mohan, R., 2001) At present, the Railway Sector Improvement Project, which is supported by the Asian Development Bank (ADB), focuses on “carrying out institutional and policy reforms to put the railways on a more commercial footing and finance priority investments in capacity expansion.” (ADB, 2002)

4.3 The Background and Outline of the Recent Reform

The sections hereafter investigate vertically separated state-owned railways without within-rail competition. Firstly, the author surveys the background and outline of the recent reform in the three railways, Vietnam Railways Corporation (VNR), Indonesian Railways (PT.KA) and Tunisian National Railways (SNCFT).

4.3.1 Vietnam

Since the return of peace and reunification of Vietnam in 1976, the railways have been owned, financed and centrally managed by the State with all revenue and expenditure reflecting government-assigned traffic tasks fulfilled at government-imposed rates with little concern for economic efficiency or customer requirements. (Harris, K., 2003)

In 1986, with the introduction of the “Doi Moi (Renovation)” policy to move from a subsidized centrally-planned economy into a market-led economy, Government decided to modernize the country’s transport sector and expand its capacity to serve the developing economy. In this changing context of deregulation and with the resulting emergence of competition from other modes of transport, especially road, renovation of Vietnam Railways has been implemented since 1989 as follows.

- March 1989 Decentralization and establishment of 3 Regional Headquarters.
- May 1990 Re-organising and establishment of Vietnam Railways (VR).
- March 2003 Establishment of Vietnam Railways Corporation (VNR).

On 1 January 1995, Vietnamese Government decided to separate the ownership and financial responsibility of rail infrastructure from rail operations. Since then, Government owns the infrastructure and finances its maintenance, renewal and development investments, which used to be covered by Vietnam Railways. (Bang, N.H., 1999)

4.3.2 Indonesia

The main concern of the railway sector in Indonesia was to make up for past shortfalls in investment so as to satisfy rising demand for its services. According to Indonesian Railways (2002 p.4) the main reasons behind the urgent need for reform and restructuring were:

- the insignificant role of rail transport;
- the insignificant role of the private sector;
- the great need for maintenance as well as development;
- the need to lessen the dependence on the government as regulator.

In 1992 Government decided to accept ownership and financial responsibility for investment and maintenance of the railway infrastructure. The corporate restructuring was also performed by means of the conversion from a public corporation into a limited liability corporation on 1st June 1999, under Government Regulation. Through this restructuring Indonesian Railways (PT.KA) were released from full government control. In this liberalisation PT.KA gained commercial freedom in all but fixing economy class passenger fares, which remain under control of Government. It also obtained freedom to borrow in the domestic banking market. (Indonesian Railways, 2005b)

4.3.3 Tunisia

The five year-term Contract Programmes were established between the Tunisian Government and SNCFT in compliance with Economic and Social Development Plans. In order to attain the aims of the plan, SNCFT implemented a diversified and flexible tariff policy, with customer-oriented services. The laws, which have passed in 1998, regulate the railway reform and stipulate that Government owns infrastructure of railway networks and finances its maintenance, renewal and development investment. (Harris, K., 2005)

4.4 Aims of the Reform through Vertical Separation

The three state railways have introduced vertical separation as a part of their reform, and their aims of reform through vertical separation are listed in Table 4.1.

Table 4.1 Aims of the Reform through Vertical Separation in the Three State-Owned Railways

Country (Railway)	Aims of the reform through vertical separation
Vietnam (VNR)	(1) to place the government's special emphasis on infrastructure investment for railway network. (2) to encourage other organizations including the private sector to participate in railway operation and to invest in the railway infrastructure. (3) to clarify the responsibilities of the state and those of the railway operator.
Indonesia (PT.KA)	(1) to involve the private sector and to promote private investment for the development of rail services. (2) to modernize the maintenance system and to make rail operations more efficient so that the transport volume and revenues will increase accordingly. (3) to make the rail as the backbone of land transportation.
Tunisia (SNCFT)	(1) to manage the railway under strictly commercial terms. (2) to achieve a balanced financial result after state subsidies are taken into account. (3) to improve service quality, comfort, punctuality, safety levels, and so on.

Source: ▪ Interviews to VNR, PT.KA and SNCFT [2/VN, 3/IN, 4/TN]
▪ Vietnam Railways (2005a)
▪ Indonesian Railways (2002)
▪ Harris, K.(2003)

These three state-owned railways have common directions to improve the railways through the following policies:

- Improving the efficiency of the railways allowing more freedom for the management;
- Reducing the high degree of regulatory intervention and direct subsidies from the government.

In order to attain the above, vertical separation in these railways aimed to discriminate the role of the government and that of the railway. Instead of covering the deficit of the state-owned railways as a whole, the financial responsibility of the government has been clearly stipulated. This clear definition of the government's ownership and financial responsibility for the railway infrastructure is the distinctive characteristic of this type of vertical separation.

4.5 Forms and Implementation of the Vertical Separation

4.5.1 Forms of the Vertical Separation

The forms of the vertical separation between the main operator and the infrastructure are summarised in Table 4.2.

Table 4.2 Forms of the Vertical Separation in the Three State-owned Railways

Country	Infrastructure Owner	The Main Railway Operator
Vietnam	Government	Vietnam Railways Corporation (VNR)
Indonesia	Government	Indonesian Railways (PT.KA)
Tunisia	Government	Tunisian National Railways (SNCFT)

Source: Author, based on the interviews to VNR, PT.KA and SNCFT. [2/VN, 3/IN, 4/TN]

As it is shown in the above table, ownership of the infrastructure and financial responsibility for it was transferred to the government in the process of the reform. The scope of state's responsibility on the infrastructure varies depending on the country. For example, Government of Vietnam has become responsible for the ownership and financial responsibility for most of the infrastructure including land, civil structures, track, stations, signalling and telecommunication systems. On the other hand, in Indonesia, although most of the infrastructure has transferred to Government, the state-railway (PT.KA) retains the ownership of stations, depots, workshops and land for them.

Whereas vertical separation clearly defined that Government owns the infrastructure and has become responsible for it financially, the liberalized state-owned railways operate railway services in both the freight and passenger sectors.

Despite the fact that the government owns the shares of the main railway, the state-owned railway retains a legally and financially independent status. Moreover,

since expenditure of the government is accounted as the annual expenditures of the state, it is considered that the financial responsibility for the infrastructure has become also independent. Thus in addition to the separation of infrastructure ownership, which is essential for the definition of vertical separation stipulated in Section 2.4.1, in these cases, financial responsibility for the railway has been also separated into different entities, the government and the state-owned railway.

4.5.2 Implementation of the Vertical Separation

4.5.2.1 Organizational Structure and Management with Vertical Separation

The results of investigation about the organizational structure and its management are summarised in Appendix 3.

The three railways follow a similar type of vertical separation. The government is committed ownership and financial responsibility in investment and maintenance of the infrastructure, and the main operator performs the essential factors of daily operation such as maintenance of the infrastructure and rolling stock, timetabling, route setting, daily operation of trains, and ticket sales.

Through vertical separation the railway was separated into the government and the main railway, which has a legally and financially independent status. Since the introduction of vertical separation, the financial flow between the two entities, the government and the independent railway, has been drastically changed. Instead of former subsidy from the government to the railway, financial responsibility has been clearly stipulated under vertically separated structure. Different from the type of “separation of accounts” which is investigated in the next chapter, the separated entities do not belong to the sole legally and financially independent institution any more, and the government started to take primary financial responsibility for planning infrastructure work including its maintenance. Nevertheless, despite the

separation of infrastructure ownership and its financial responsibility, the government interacts and negotiates closely with the railway operator in order to operate and maintain the railway system as efficiently as it is planned.

In the three countries, the government has its principle to pay much attention to the investment of the railway network, and the principle in each country is declared in the long/medium term plans shown in Table 4.3.

Table 4.3 Long/Medium Term Plans for the Railway Sector

Country (Railway)	Long/Medium Term Plans
Vietnam (VNR)	▪ Master Plan in 2002: "Master Plan on the Development of Vietnamese Railway Transport Sector Till 2020"
Indonesia (PT.KA)	▪ Long-term plan : "Master Plan from 2006 to 2030" ▪ 5 year-term plan
Tunisia (SNCFT)	▪ 5 year-term Economic and Social Development Plans. (The contract program between Government and SNCFT)

Source: Author, based on the interviews to VNR, PT.KA and SNCFT. [2/VN, 3/IN, 4/TN]

Some of these plans specifically stipulate future target of upgrading railway technologies, estimated investment, railway infrastructure development projects, and so on.[3] Based on these long/medium term plans, the railway operators make efforts to promote smooth negotiation with the government for efficient construction and maintenance of the infrastructure. And, negotiation based on these plans largely contributes to a mutual understanding between the government and the railway operator. For example, in Vietnam when full amount of the fee is not

[3] For example, the master plan in Vietnam titled "the Master Plan on the Development of Vietnamese Railway Transport Sector Till 2020" was approved on 7 January 2002 by the Prime Minister, and this is considered to be very important future landmark for the development of VNR. In this master plan the target of the railway sector in the transport market is clearly noted such as follows: "The railway transport shall take a share of 25% - 30% in terms of tons and ton-kms and of 20% - 25% in terms of passengers and passenger-kms in the total transport volume of the sector as a whole. By the year of 2020, the rail share in urban passenger transport shall reach at least 20% of the passenger volumes in Hanoi and Ho Chi Minh city."

In order to achieve the target more specific plans are also stipulated. These plans cover the estimated investment amount needed for railway infrastructure up to 2010 and 2020, and also list railway infrastructure development project plans respectively. (Socialist Republic of Vietnam, 2002)

approved by Government, VNR revises the maintenance program of the year and makes re-calculation for further negotiation with Government.[2/VN] Like this example, these railways make efforts for reducing coordination problems raised by vertical separation.

In Vietnam and Tunisia the negotiation between the two separated entities seems to have been working well based on these plans. Stipulated amount of funds for investment and maintenance of the infrastructure has been paid by the government by and large, and the railways have carried out the planned work both in construction works and railway operation.

In Indonesia, the railway sector follows almost the same model as the above two countries. They have long-term and 5 year-term plans, and they have also established the payment schemes between Government and PT.KA. In construction process, different from the cases in Vietnam and Tunisia, the government is responsible for the practical construction works as well as the financial responsibilities for them.[3/ID] Nevertheless, in the operational processes after the completion of the project, the stipulated amount of financial flow has not been realized because of lack of resources in the government of Indonesia, and this has resulted in poor maintenance of the infrastructure.

4.5.2.2 Relationship among Different Parties and Relevant Issues

The investigation clarified the current railway operation in terms of relationship among different parties and relevant issues as shown in Appendix 4.

Results of the investigation into these railways are summarized:

- The state-owned main railway performs essential factors of daily operation such as maintenance of tracks and rolling stock, timetabling, route setting, daily operation of trains, ticket sales, and so on. It also takes responsibility for the

safety of train operation;

- The government owns the infrastructure and finances for it both in investments and in maintenance. In case the stipulated amount is financed by the government, there is no particular dispute between the government and the main railway;
- In case the stipulated amount of finance can not be paid by the government, serious problems are raised such as lack of the infrastructure maintenance. (This issue is closely investigated in Section 4.7.2);
- In Vietnam and Tunisia, a new operator has entered into the passenger market through mutual agreement with the main railway by way of establishing a joint-venture or making a contract with the main railway. (This issue is closely investigated in Section 4.6.2);
- As a result of the above new entry to the market, there has been no particular dispute between the main railway and a new entrant as the main railway coordinates most of the essential factors of daily operation of the new entrant as well.

4.6 Transition of Management of the Railways

4.6.1 Transition of the Main Railways

This section investigates transition of the management of the main railways through introduction of vertical separation. In order to examine the transition of the management in depth, especially, the case of VNR is scrutinized among the three railways.

4.6.1.1 Vietnam

1) Management of VNR

On 4th March 2003, Vietnam Railways was re-organized into a state-owned corporation, Vietnam Railway Corporation (VNR), and became more autonomous in

the planning and management of its business activities. VNR is a 100% Government capital enterprise, and performs the tasks of managing, exploiting and maintaining the State-assigned railway infrastructure system. VNR also has its legal status, civil obligations, and rights prescribed by law. It takes a responsibility for its whole business operation within the capital. The organization chart of VNR after the re-organization is shown in Figure 4.2.

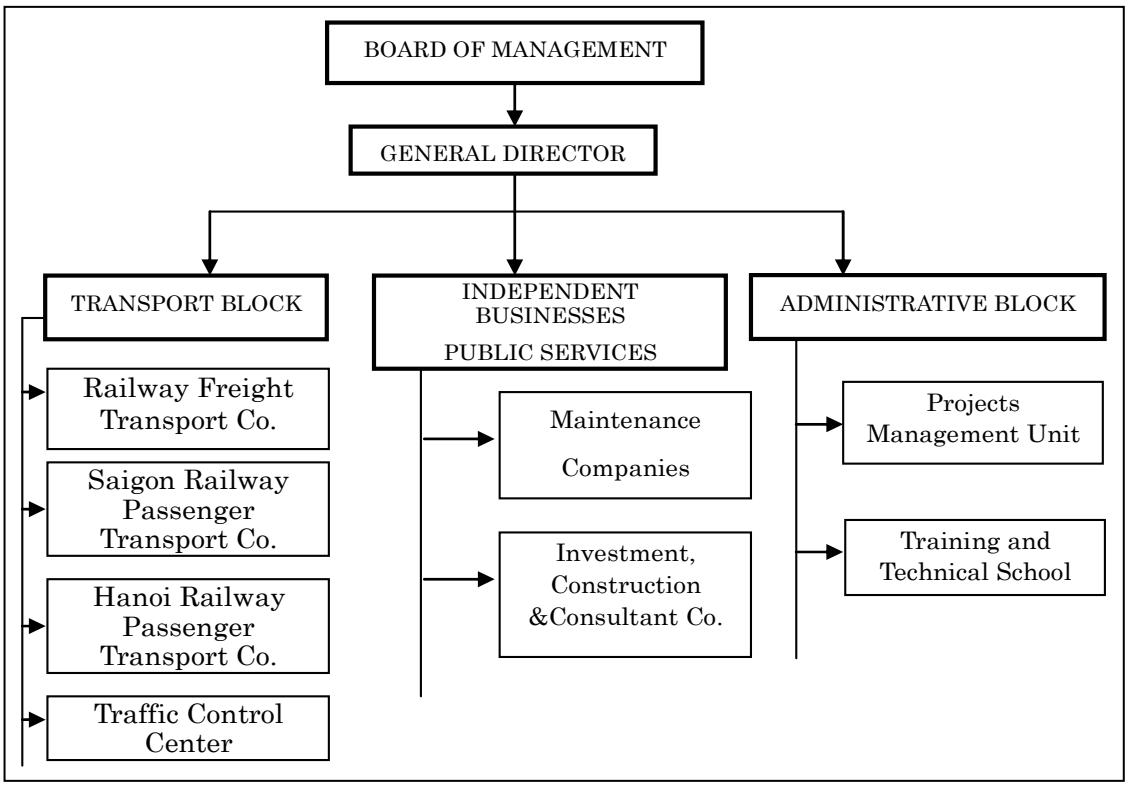


Figure 4.2 Organization Chart of Vietnam Railways Corporation

Source: Revise from Vietnam Railways (2005a)

As the above figure shows, VNR is a multi-member company, and functions as follows:

- Railway transport is operated by two passenger transport companies and one freight transport company. Each company is separately accountable and generates its own profits and losses internally;
- The Traffic Control Centre is the body which coordinates all train operations in Vietnam. Therefore, the three transport companies and new operators have to follow the directions of the Traffic Control Centre;
- Maintenance of railway infrastructure is performed through a different

department, and the works are carried out with Government funding. The Investment, Construction & Consultant Company also has an independent accounting, and its accounting is independent from the other two blocks.

Renovation of Vietnam Railways, which has been undertaken since 1989, has made a remarkable change in the financial performance of VNR. The absolute amount of investment from Government for infrastructure maintenance has increased since 1995[4], and it has contributed to improving the performance of the railway remarkably. [2/VN]

2) Performance of VNR

Figure 4.3 shows traffic trends of VNR, and Table 4.4 shows travel time by limited-stop express from Hanoi to Ho Chi Minh city. While VNR improves its performance, the number of employees has decreased as Table 4.5.

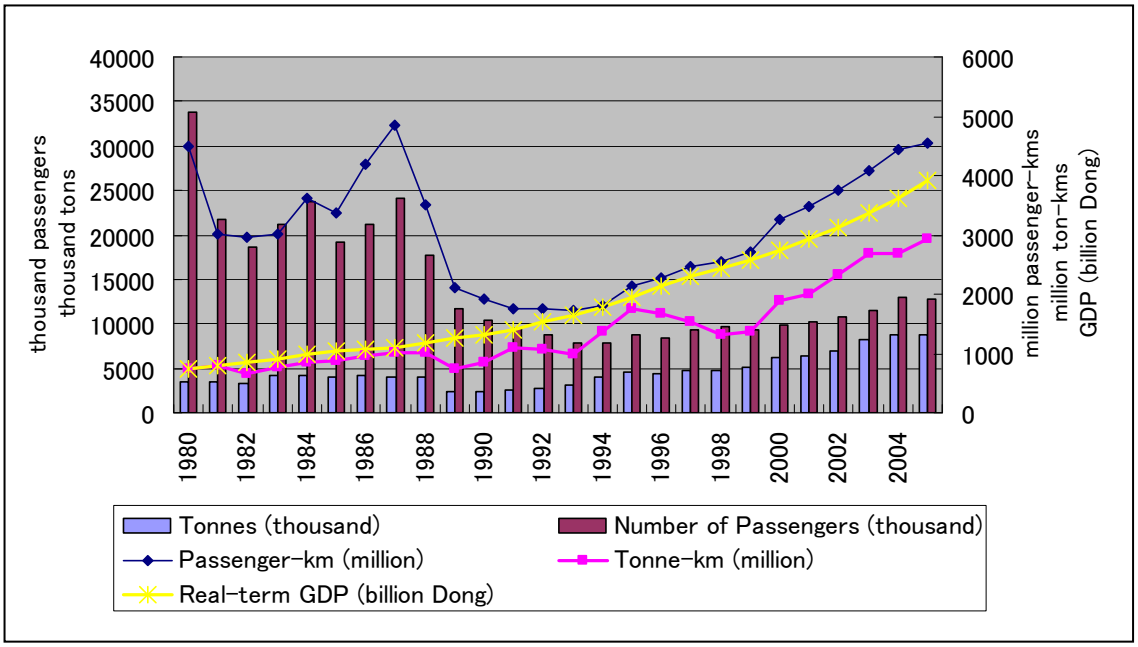


Figure 4.3 Traffic Trends of VNR

Source: ・ Bang,N.H.(1999)
・ Vietnam Railways (2004)
・ ASEAN Railways (2005)
・ The World Bank Database
・ International Monetary Fund (2008)

[4] The investment from Government has still not met VNR's requirements for proper maintenance of railway infrastructure due to factors such as inflation, price fluctuation of materials, salary to the engineering staff, and so on.[2/VN]

Table 4.4 Travel Time by Limited-Stop Express from Hanoi to Ho Chi Minh City

Year	1980	1988	1989	1991	1993	1994	1997	1999	2002	2004
Travel Time (Hours)	72	58	48	42	38	36	34	32	30	29
Max. Speed (Km/h)	60	60	60	70	70	80	80	90	90	90
Average Speed (Km/h)	24	33	36	41	45	48	51	54	58	60

Source: Revise of Bang, N.H.(1999)

Table 4.5 Number of Railway Employees in VNR

Year	1988	1994	2000	2002	2004
Total Staff	65,000	44,000	42,810	46,167	45,131

Source: ▪ Bang,N.H.(1999)

▪ ASEAN Railways Benchmarks, Report to 27thASEAN Railways CEO Meeting

Figure 4.3 shows the unit of output especially in the passenger rail sector had decreased in the late 1980s.[5] Nevertheless, it clearly shows that VNR has been successful in improving railway performance since the reform through vertical separation in 1995. Despite the fact that growth has occurred from a low absolute base, VNR has increased traffic with a 67 per cent in ton-kilometres and a 114 per cent in passenger-kilometres during the period from 1995 to 2005. These increases have been achieved in almost the same length of tracks without building new lines, and these figures are much higher than those of other railways in ASEAN countries, most of which are stable or steady increase.

In order to distinguish the impact of the reform from the effect of other exogenous

[5] This was mainly caused by reform of the economic management system of Vietnam. Since the introduction of the "Doi Moi" policy in 1986, the centralized planning mechanism of the country has changed into market-oriented mechanism. As a result, all sectors including the transport sector have been encouraged to promote private participation, thus railways started to face serious competition with other transport modes and lost its market share.

The other reason is the limitation of Government investment into the railways in those years. Behind the background of economic conditions of the country during the period, the government's investments into railways were forced to be limited. This led a lot of difficulties in maintaining the infrastructure, rolling stock and other facilities. Accordingly, it was difficult for the railway sector to compete with other transport modes, especially with the road which was paid more attention and investment by the government.[2/VN]

factors, Figure 4.3 also compared the transition of the traffic output with that of real-term GDP. It shows that, despite the steady growth of the GDP, the traffic output had been general down-turn trend especially in the passenger sector before the reform, and the traffic output has been clearly changed into upturn trend since the period of the railway reform. This statistical transition suggests the favourable managerial change through the railway reform, which is indicated also in the interview to VNR.

Introduction of vertical separation in 1995 also had a great impact on the finances of VNR, and it made VNR profitable. The audited data, which is shown in nominal terms, on revenue and expenditure of VNR is listed in Table 4.6.

Table 4.6 Revenue and Expenditure of VNR (million VN Dong)

Year	1989	1993	1995	1997	2000	2002	2004
Revenue	89,591	469,835	808,679	948,008	1,196,619	1,460,930	1,850,060
Expenditure	95,488	530,407	803,912	943,724	1,194,870	1,453,219	1,849,910
Balance	-5,897	-60,572	4,767	4,284	1,749	7,711	150

Source: ・Interview to VNR [2/VN]

As vertical separation was introduced in 1995, expenditure after that date does not include the maintenance costs of infrastructure, and includes track charges, 10% of the operation revenue. This had contributed to reducing the infrastructure expenditure. Nevertheless, both the revenue and the expenditure have been increasing in total amount. The following factors contributed to the large increase of those amounts [2/VN]:

1. The increase of traffic volume through market-oriented operation;
2. Revise of the tariff structure for passenger fares and freight rates so as to reflect cost-recovery, competitiveness against other modes, service standard, and the need to optimize profit;
3. Increase of foreign investment;
4. Increase in domestic transport investment including locomotives, rolling stock, spare parts, station equipment and others;

5. Improvement of non-rail business such as tourism, construction, affiliated services, consulting services, and so on.

The Railway Act in 2005 stipulates that the aim of the re-organization of VNR is to create favourable conditions for independent, self-controlled and market-oriented operation. Establishing transparent financial relationship with Government through vertical separation has been also contributing to attain this aim.[2/VN] VNR has been trying to develop as a corporation, in which state enterprises operate railway infrastructure business, railway transport operation and, where feasible, utilizing the ability of other organizations by establishing joint-ventures.

4.6.1.2 Indonesia

Although PT.KA has been generating profits since the introduction of vertical separation, performance has still not improved significantly in the last 10 years. The railway is still frequently facing daily operational and engineering problems such as delays, accidents, lack of maintenance, deteriorating condition of rolling stock, and so on.(Indonesian Railways, 2002) In 2001 passenger trains were delayed on average 36 minutes for departures and 59 minutes for arrivals. The average delays for freight trains were more than those for passenger trains. (Indonesian Railways, 2005c)

Figure 4.4 shows transition of the railway performance in comparison with the real-term GDP. As the trend of the traffic shows, despite the separation of financial responsibility of the infrastructure in 1999, PT.KA has been facing some difficulties to improve its traffic performance. Even though the absolute transport volumes are the highest among ASEAN railways, the rate of increase is not better than other ASEAN railways, most of which are stable or steady increase.

Indonesian Railways (2002 p.8) concludes that “policy reform and corporate

restructuring are basically directed towards a better national role of rail transport, healthy and efficient business, and higher quality of rail transport provision."

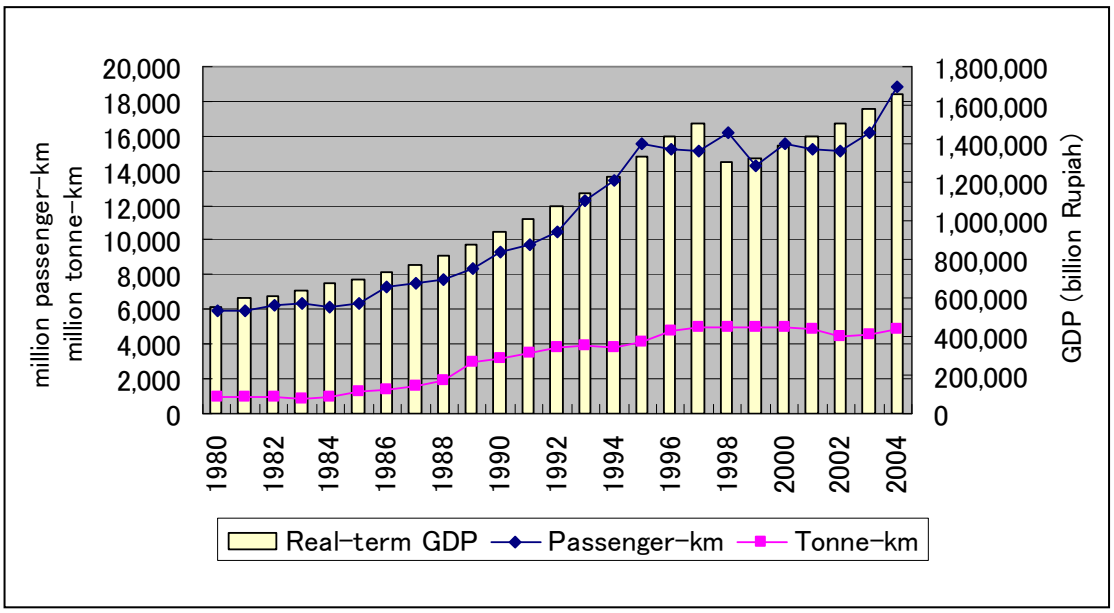


Figure 4.4 Traffic Trends of PT.KA
Source: The World Bank's Railway Database
Indonesian Railways (2005b)
International Monetary Fund (2008)

Nevertheless, some challenges remained to activate the management of the railway further-more. In terms of the organizational structure, PT.KA has been corporatized. But all of the shares are owned by Government, and PT.KA must get an approval of Government in each important managerial decision such as investment for upgrading, and so on. It has been pointed out that the lack of managerial autonomy hinders PT.KA from active and liberalized management responsive to the market's demand. [3/ID]

In addition, although the government attached very high priority for initiatives to improve performance and to expand the capacity of rail transport, the development of the railway sector relies heavily on limited government funding in this type of vertical separation. As Section 4.7.2 investigates, lack of the financial abilities of the government to fulfil the payment of the stipulated amount of compensation has been regarded as the main cause of the failure to perform the smooth railway operation. Apparently, although financial flow has not been sufficient even before

the reform, this non-fulfilment of the payment resulted in coordination problems due to separation of finance between the different entities.

4.6.1.3 Tunisia

In 1998 SNCFT underwent a reform of its institutional framework, aiming to provide more commercially-oriented rail services by establishing five independent transport divisions: 1) Grandes Lignes (Main Lines); 2) Banlieue de Tunis (Tunis Suburbs); 3) Banlieue de Sahel (Sahel Suburbs); 4) Fret (Freight); and 5) Phosphate.

Each division has independent accounting, and reports its own annual financial results as well as transport results in the annual report of SNCFT. This style of the report characterizes SNCFT's distinctive ways of financial management.

The financial management by the five divisions made cost controlling clearer and tightened up compared with the former monolithic organisation. Each division has become keener to earn the income than before, and started to make efforts to increase train speeds and improve services pursuing the profit. [4/TN]

Each division has started seriously considering where investment should be made. They also started to decrease unnecessary costs as all maintenance costs are allocated according to the usage of the infrastructure by each division. If more than one division' trains use the same track, the maintenance costs of the track are divided among the divisions according to their access. This internal financial management has resulted in focussing on necessary investment and maintenance, and decreasing unnecessary maintenance costs as no division requests needless maintenance any more. [4/TN]

The transport performance after 1970 is shown in Figure 4.5 comparing with the

real-term GDP. Faced by the severe competition from other transport modes, SNCFT faces difficulties to improve its traffic performance for the last decade, and has not succeeded in improving its traffic tracking the growth of the real-term GDP statistically.

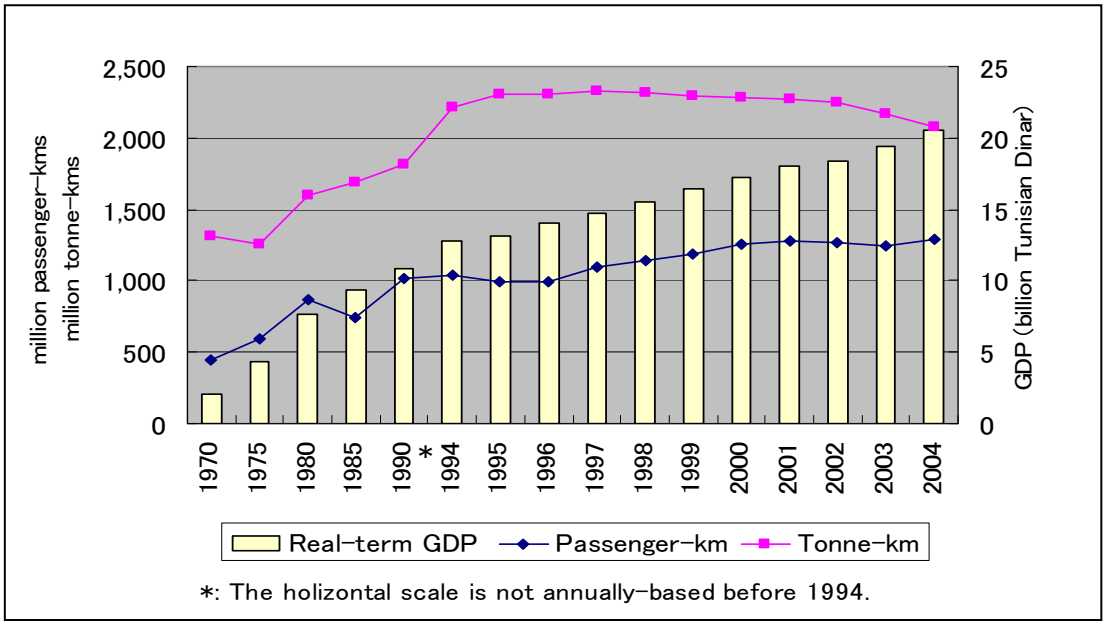


Figure 4.5 Traffic Trends of SNCFT
Source: UIC(2005), International Railway Statistics
International Monetary Fund (2008)

4.6.1.4 Summary

This section examined transition of management of the three state-owned railways in terms of how vertical separation influenced their rail operation and management. The reults are summarised:

- The government's financial contribution to the infrastructure through vertical separation greatly affected the financial result of the railways, and made it balanced. Vertical separation has also contributed to establish transparent relationship with the government through stipulating the payment of access charges;
- Along with the introduction of vertical separation, conversion of corporate status was undertaken in VNR and PT.KA. They have gained more freedom for management and more autonomy with self-responsibility;

- In order to achieve more commercially-oriented rail services, the reform of organisation structure was also experienced. For example, VNR became a multi-member company; PT.KA established several regional divisions; SNCFT established five independent transport divisions;
- Traffic output of VNR has improved favourably since the reform. This transition of the traffic performance can not be explained by growth of the real-term GDP in the country. It was indicated during the interview that the above reform had a large influence on the improvement of the management.[2/VN] Nevertheless, other railways such as PT.KA still suffer some difficulties mainly due to lack of the stipulated amount of compensation by the government. (Explained closely in Section 4.7.2)

4.6.2 Forms of Private Entry to a Transport Service

As private participation into the railway sector is one of the main aims of the reform of these railways, this section investigates how the private sector has entered into the rail transport market.

4.6.2.1 Vietnam

1) Regulation for an Entry to the Railway Market

According to the State-owned Enterprise Law, VNR is authorized to operate the railway infrastructure which is assigned by Government, and to perform the following main businesses (Vietnam Railways, 2005a p.1):

1) Providing railway transport and multi-modal transport services, undertaking joint-ventures with domestic and international organizations in railway business and other businesses;
2) Managing and making best use of the capital, natural resources, land and other resources authorized by the State to operate and develop businesses;
3) Doing joint-ventures, investing in stocks and shares, buying part of the asset

of other enterprises.

The items 1) and 3) declare that VNR can establish joint-ventures in order to utilize the management abilities of other enterprises. Thus other enterprises can enter the railway market accessing the State's network, and the private sector already entered the market establishing a joint-venture with VNR. A typical example is examined in the following section.

2) Operation by a New Operator in the Passenger Market

The new company was established in 1999 in order to run passenger transport on the Hanoi – Lao Cai 296km length line, in north-west Vietnam. Hanoi Railway Passenger Transport Company (HRPTC), which belongs to VNR, signed a contract with a foreign investment company, Victoria Sapa, which operates hotels in the region. The coaches are owned by HRPTC, and are leased to the new company. Victoria Sapa can invest and upgrade these leased coaches with its own funds for its tourism business running on the line for seven years, but these upgraded coaches must be returned to HRPTC after the lease period expires. In practice, Victoria Sapa invested in the coaches, and has been promoting tourism rail transport under the name of Victoria Express Train. The new company operates the train service on the line between Hanoi and Lao Cai, and promotes sightseeing tours in conjunction with its hotels. [2/VN]

The drivers are dispatched from VNR, and the Traffic Control Centre of VNR controls the new operator's trains as well. Thus VNR is practically responsible for railway operation and safety of the new company as well. [2/VN]

4.6.2.2 Indonesia

One of the main objectives of railway restructuring was the private participation to the railway market as mentioned in Section 4.4. Even though the policy issued by Government in 1995 stipulates enhancing private sector participation, there is no

new entrant as a railway operator. The private participation still concentrated in non-core business especially in property.

4.6.2.3 Tunisia

1) Regulation for an Entry to the Market

Under the law established in 1998, SNCFT has concessioning rights for the railway network owned by Government. This means that other entities, including private companies, need to make a contract with SNCFT in order to access the railway networks.

In the passenger sector, one private operator has entered the market under the regulation above, and its operation is described in the following section.

In the freight sector, SNCFT is the sole operator, and locomotives are owned by SNCFT. Private freight companies can own wagons, and have to make a contract with SNCFT for the traction.

2) Operation by a New Entrant in the Passenger Market

Taking advantages of the new regulations, a new passenger operator, Galilee Travel, has entered the market. Galilee Travel is a private company, which is active in tourism around Maghreb region. It has made a contract with SNCFT for the operation of tourist passenger trains between Metlaoui and Tebadit, both of which are in south Tunisia. The trains are named “Lezard Rouge” and the passengers can enjoy sightseeing in scene, Selja Gorges, between the two stations.

The new operator rents rolling stock from SNCFT and the drivers are also dispatched from SNCFT as shown in Figure 4.6. The new passenger operator promotes sale of passenger railway transport and receives the fares from customers. It pays a rent for the rolling stock, salaries of the drivers, and a commission to

SNCFT.[6] [4/TN]

Thus SNCFT is responsible for the new entrant's essential factors of daily operation except service marketing and ticket sales, and the new entrant focuses its efforts mainly on marketing and sales promotion.

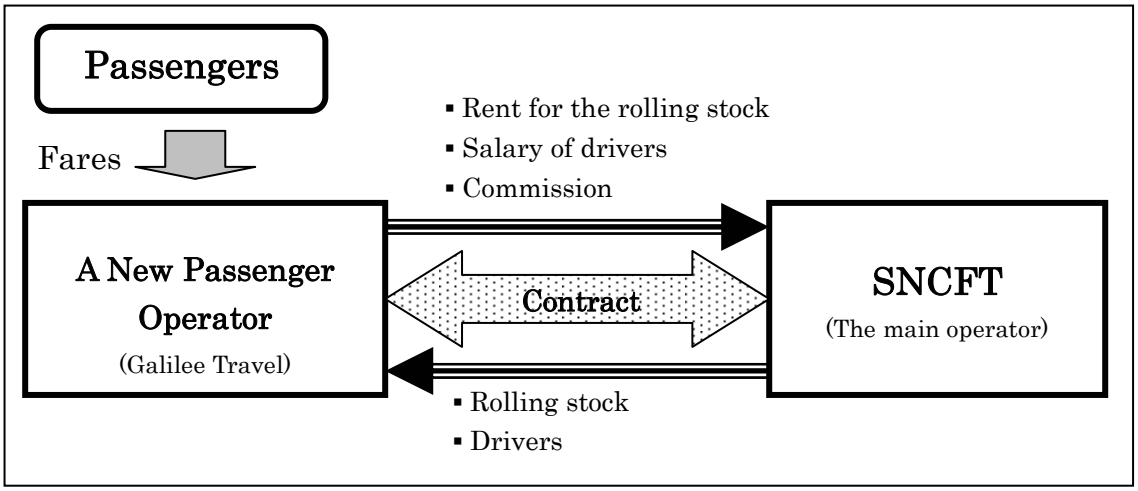


Figure 4.6 Operations by a New Entrant in the Passenger Market in Tunisia
Source: Author, based on the interviews to SNCFT [4/TN]

4.6.2.4 Summary

The methods of entry to the passenger market as an operator have similarities in Vietnam and Tunisia. It has been achieved by way of mutual agreement between a private company and the main railway. It takes the form of establishing a joint-venture or making a contract with the main railway. Different from European railway reform discussed in the next chapter, these methods are not likely to promote competition with the main railway. For example, SNCFT receives commission and cooperates to promote the sales of the new passenger operator. On the other hand, these systems have been working well in order to retain coordination between the main railway and the new operator as the main railway practically performs the most of the essential factors of daily operation, and they

[6] At present, neither SNCFT nor a new passenger operator pays track access charges to Government based on the transit scheme.[4/TN]

raise little conflicts in between. The interviewees in the two railways did not indicate any particular coordination problems between the different entities in this type of private participation. [2/VN, 4/TN]

4.7 Advantages, Disadvantages and Results

4.7.1 Advantages

Besides the aims of the reform through vertical separation studied in Section 4.4, the interview found the following advantages in this type of vertical separation.

1. Improvement of the accounting system and financial management

The accounting system in VNR has improved and has become clearer through vertical separation. It is clearly defined, within the framework of the State-owned Enterprise and Regulations of the Corporation, that all Public Service Obligations (PSO) which their income can not cover the costs shall be subsidized by Government. In fact, VNR has not received any subsidy as the required proven formalities have not been settled yet. Therefore, VNR has been trying to improve its accounting system in order to clarify the costs of each transport service and submit to Government for approval to receive PSO. VNR is aiming to establish a better relationship with Government based on the exact accounting. [2/VN]

As described in Section 4.6.1.3, SNCFT has succeeded in tightening its cost control by way of establishing five independent transport divisions with their own accounts. It was indicated that this kind of line of business organization is effective for market-oriented management and internal cost controlling. The improvement of financial management and accounting resulted in each division's more active efforts for increasing revenue and decreasing costs. Access charges have become the cost for each division, and it has also contributed to decreasing unnecessary maintenance costs. [4/TN]

2. Development of infrastructure with authority of the state

In Tunisia, it has become easier to promote infrastructure development projects taking up land with authority of the state as the responsibility has been transferred from the state-owned railway to the government. [4/TN]

4.7.2 Disadvantages

1. Conflicts raised by non-payment of the stipulated amount of compensation

PT.KA indicated that lack of the stipulated amount of compensation from Government was a serious problem for smooth operation of the railway. In Indonesia, regulations implementing Public Service Obligations (PSO), Infrastructure Maintenance and Operation (IMO), and Track Access Charge (TAC) have been established by the Decrees in 1999 issued jointly by the three Ministers, Minister of Communications, Minister of Finance, and State Minister of National Development Planning.

Thus the Government of Indonesia (GOI) ought to pay the railway for a compensation of the PSO, i.e. to operate economy-class passenger trains, which tariffs were set by GOI cheaper level than the actually incurred unit costs. GOI, as the owner of the rail infrastructure, should also pay the railway for the costs of IMO[7] conducted by PT.KA. And PT.KA, as an operator and a user of the GOI's rail infrastructure, ought to pay to GOI for the TAC.

These payment schemes have been implemented since fiscal year of 2000. The railway would in total receive the following Net Value, which is normally paid in a quarterly schedule.

Net Value = PSO + IMO – TAC

PSO: Public Service Obligations

[7] IMO also includes salaries of engineers in PT.KA working for maintenance of the infrastructure.

IMO: Infrastructure Maintenance and Operation

TAC: Track Access Charge

For detail calculations of PSO, IMO and TAC, Inter-Echelon Decree was issued, which involves Director General of Land Communications and the Director General of National Budget.

Figure 4.7 shows financial flows in the railways in Indonesia, expressing the PSO, IMO and TAC. While the mechanism itself has been quite well implemented, however, the actual amount paid from year to year was much less than it was supposed to be.

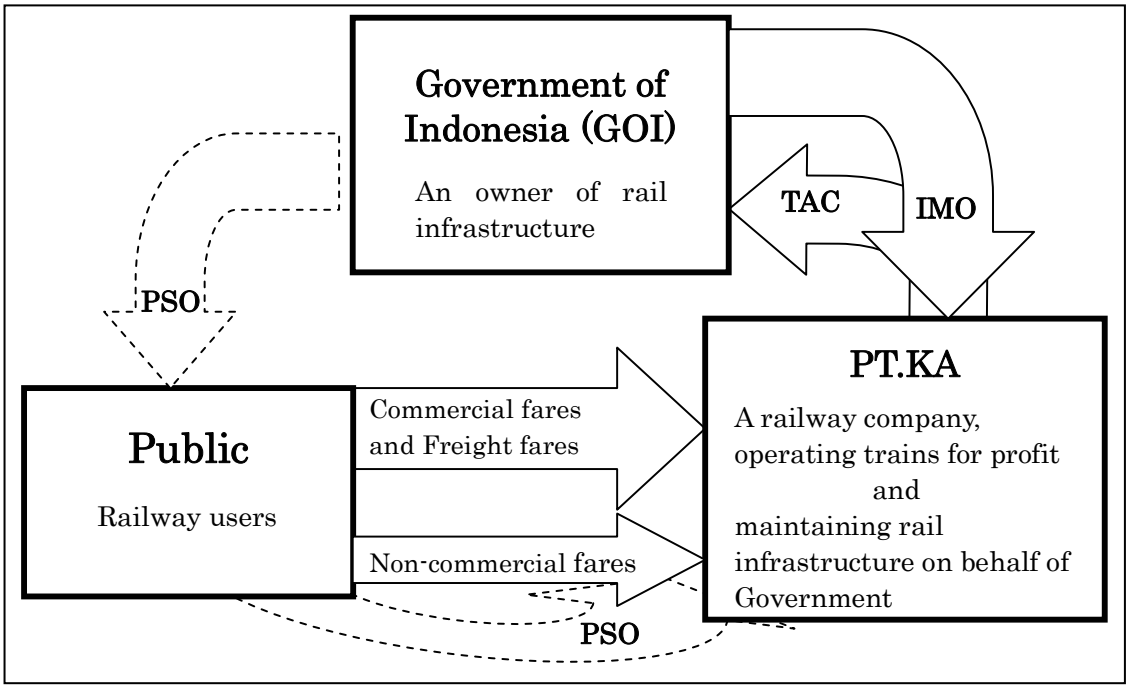


Figure 4.7 Flow of Finance in the Restructured Railways in Indonesia

Source: Revise from Arifin, S.J. (2004)

Despite agreement on the Decrees by the three Ministers, Government could not fulfil payment of the stipulated amount of PSO and IMO to PT.KA because of lack of resources in GOI. According to Arifin, S.J. (2004 p.158), political change every five year period in Indonesia is also regarded as an obstacle to this process. Thus, the

funding schemes of PSO, IMO and TAC have not yet been implemented consistently, as records are listed in Table 4.7.

Table 4.7 The Proposed and Approved Amount of the Net Value

(Unit: thousands IDR)

Year	Proposed Amount (by the Ministry of Communications)	Approved Amount (by the Directorate General of Budget)	Deficit
2000	241,595	59,184	(182,411)
2001	147,049	59,999	(87,050)
2002	222,827	161,912	(60,915)
2003	506,427	354,595	(151,832)
2004	289,582	140,000	(149,582)

Source: Indonesian Railways (2005c), Company Profile

As Table 4.7 shows, the approved amount by GOI varies from 24 to 72 percentage of the calculation by the Ministry of Communications. This results in lack of stable allocation of funds for maintenance of the infrastructure, and is considered as one of the most serious problems, which the railway sector in Indonesia has faced after the restructuring through vertical separation. [3/ID]

4.7.3 Results of the Aims

This section investigates the results of the aims of the reform studied in Table 4.1.

4.7.3.1 Vietnam

(1) As mentioned in the Master Plan in 2020 and Railway Act in 2005, Government put an emphasis on infrastructure investment for national network, and the investment into the railway sector has improved.

(2)Private companies already entered the railway market establishing a joint-venture with VNR and invested in the railway sector.

(3) Infrastructure is owned by the state, and responsibilities of the state and VNR have been clearly distinguished as it is stipulated in the Railway Act.

Thus the aims of the reform through vertical separation were achieved in Vietnam in general.

4.7.3.2 Indonesia

(1) Private participation has been attained only in non-core business especially in property.
(2) Despite Government's priority for improving the railway transport, lack of compensation from Government resulted in shortage of stable allocation of funds for the infrastructure maintenance.
(3) Infrastructure is owned by Government, and a number of Decrees clarified the responsibility of Government and that for PT.KA. Government started to control the construction projects for the development of the railway.

The reform through vertical separation basically directed towards achieving the aims. Nevertheless, several issues, particularly non-fulfilment of the compensation by Government, remained in order to achieve the aims of the reform in Indonesia.

4.7.3.3 Tunisia

(1) The management of SNCFT has become more commercially-oriented through the re-organisation, and SNCFT is able to implement a diversified and flexible tariff policy.
(2) Infrastructure is owned by Government, and the financial responsibilities of Government and SNCFT were clarified in a contract programme between them.
(3) Government made investments based on the five-year term plan, and SNCFT kept stable traffic performance despite severe competition from other transport modes.

Thus, the railway reform through vertical separation has taken effect for achieving the aims in Tunisia in general.

4.8 Conclusion

Compared with other types, the three state-owned railways have similar characteristics of vertical separation. In these railways the government owns the infrastructure and is responsible for the investment and maintenance of it financially, and the main operator performs essential factors of daily operation. In brief, vertical separation in these railways is characterized by separation of financial responsibilities between the government and the railway. Instead of covering the deficit of the railway as a whole, vertical separation clearly stipulated the responsibilities of the government and those of the railway.

Despite the separation of the financial responsibilities of the two entities, close relationship between the government and the state-owned railway is a specific characteristic of this type of vertical separation. The government retains a will to revitalize the state-owned railways through commissioning more autonomous rights of the management. Different from European railways which are discussed in the next chapter, the government has no intention to introduce within-rail competition among operators. Instead, it expects the incumbent state-owned railway to compete with other transport modes making the most of its engineering and operational abilities, and this is the background of introducing vertical separation in these countries.

In order to attain the government's expectation, long/medium-term plans were stipulated and the government and the state-owned railway have been trying to promote smooth negotiation based on them. These efforts contribute toward decreasing some expected coordination problems of financial separation between

two parties such as difficulties in planning investment and maintenance of infrastructure. Despite these expected coordination problems through separation of financial responsibilities, the interviewees did not indicate any serious conflict between the government and the state-owned railway except the case in Indonesia, where Government has failed to provide stipulated amount of compensation for the railway.

In Vietnam and Tunisia, new operators entered the passenger market under an agreement with the main operator. These cases are of value to introduce private investment into the railway sector as well. In these cases the main operator dispatches its drivers, controls trains and makes a timetable taking almost all responsibilities of train operation within its networks. They do not have competitive relationship each other, and there is no particular dispute between the main operator and the new entrant.

In general, the recent reforms in these railways, reinforced by the change of the legal status and restructuring of the organization, have made them more active even though practically a sole state-owned railway performs the railway operation without within-rail competition. The management of the railway has become more market-oriented and active through stipulating more flexible tariffs and establishing a joint-venture with the private sector. Along with the government's positive financial contribution, these commercial efforts have, in general, resulted in the favourable traffic performance as typically shown in the case of Vietnam statistically. As the results of the study show, the principal advantage of this type of reform is to revitalize the stagnated state-owned railways by means of distinguishing the government's role and the railway's role mainly in terms of financial responsibilities. This kind of reform appears to be applicable to the state-owned railway, which can not cover the infrastructure cost by the revenue and lost sufficient incentive for attaining efficient operation despite its engineering and management capabilities.

CHAPTER 5:
VERTICALLY SEPARATED RAILWAYS WITH COMPETITION AMONG OPERATORS
- SWEDEN, UK, GERMANY, FRANCE AND AUSTRALIA -

5.1 Introduction

This chapter investigates the railway reform with vertical separation in European and Australian Railways. In these railways, several operators started to compete each other without discrimination. Specifically, the author examines the reform in Swedish Railways (SJ), British Railways (BR), German Railway Corporation (DB AG), French National Railways (SNCF) and Australian National Railways (AN).

Firstly, the next section surveys recent EU and Australian policies which reforms of the railways in these regions are based on. Then, after reviewing the background and outline of the recent reform, the author examines the key issues in each railway.

5.2 Recent Transport Policy in EU and Australia

5.2.1 Recent Transport Policy in EU

This section reviews recent EU transport policy, which regulates the railway reform in European countries, and its principles are studied from the viewpoint of vertical separation.

In response to the changes in the transport market and the decline of rail's share of land transport, the European Commission issued a number of Directives as follows.

In July 1991 EC Directive 91/440 was issued for encouraging competition between

European's national rail systems. Specifically, the Directive governs the policy for railways for the following key demands (UIC, 2005b):

- to ensure the management independence of railway undertakings;
- to create and operate separate accounts for infrastructure and operations;
- to ensure that infrastructure accounts balance, including government grants for specific social obligations;
- to allow open access to each national network for certain types of international transport operator (licensed railway undertakings) and for railway undertakings from other member states.

The succeeding Directive 95/18 stipulates licensing of railway undertakings. It sets common criteria for the issue of licenses to railway undertakings established in the European Union. The next Directive 95/19 regulates infrastructure capacity and charging. The intention of these Directives was to create genuine competition for cross-border rail operations. The background is that "it was thought that the failure of the railway in international traffic was partly due to the structure of the industry – separate national companies simply passed international traffic from one to another at the border with the quality of service determined by the weakest link in the chain."(Nash, C.A., 2007 p.75) "Thus the European Commission set about opening up the market for new entrants to come into rail freight transport, particularly for international freight, where they might offer through service from origin to destination." (*ibid.*)

The European Commission has been moving forward to regulate the European railway systems further. In 2001, the first so-called railway package was passed, designed to extend and increase the effectiveness of the policy of open access. Specifically it required that (Nash,C.A., 2005a):

- the body responsible for path allocation and the setting of charges must be independent of any transport operator;
- where infrastructure, passenger operations and freight operations are part of the same organisation, they must be in separate divisions with separate

accounts;

- in each Member State there must be a regulator, to hear appeals and regulate access charges, who is independent of the infrastructure manager;
- charges to train operating companies for access to infrastructure must be based on direct cost although non-discriminatory mark-ups are allowed in cases where a higher level of cost recovery is necessary.

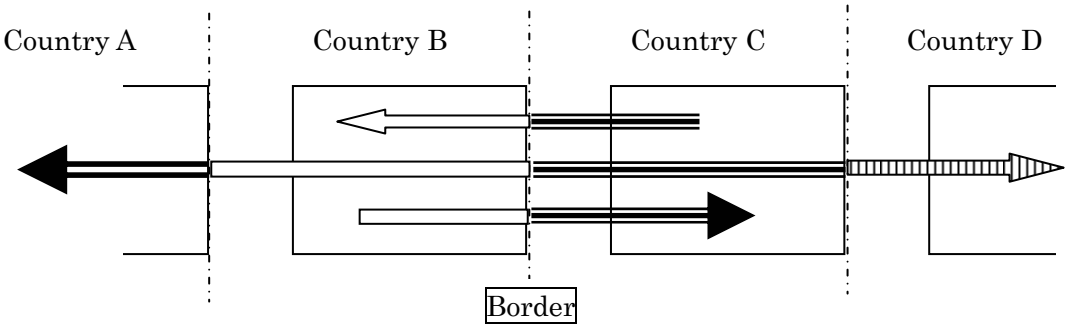
It also demands the infrastructure manager to compile the network statement explaining price structure and the conditions for access to the network, to set the rules for capacity allocation and so on. Thus it requests the infrastructure manager to be responsible for allocating railway infrastructure capacity fairly and without discrimination. (UIC, 2005b)

In the Second Railway Package, Directive 2004/51 requires to extend infrastructure access rights to rail freight services within a Member State and accelerate the opening up of the market.(UIC, 2005b) Thus there is a legal requirement for complete open access for international and domestic rail freight throughout the European Union since 1st January 2007. Furthermore, in October 2007 the Third Railway Package was adopted, and the necessary legal basis was created for opening up the market for international rail passenger transport service by 1st January 2010. (European Parliament, 2007)

In essence, European Directives do not stipulate about ownership of either the operator or the infrastructure. Instead, they ensure that the account for transport service and one for railway infrastructure kept separate to secure non-discrimination among operators, and prohibit that state aids paid to one of two areas transferred to the other.

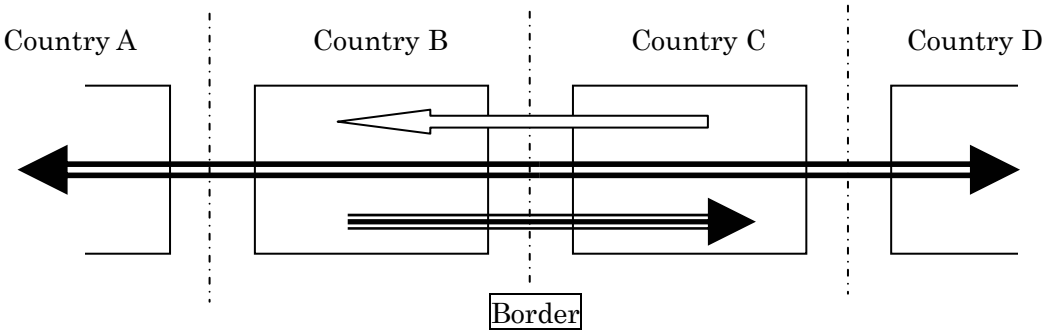
European international trains had performed their operation following the regulations of each State and Railways until the issue of the 1991 Directive. Usually, the drivers and conductors had exchanged at the border stations, and each railway

had been in responsible for the train operation on its railway networks. To liberalize the market, the Directive proposes to allow the international railway undertakings to operate railway services in other Member States as it is shown in Figure 5.1.



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

Model A: Traditional international railway transportation



International railway undertakings are allowed to operate railway services on routes inside a Member State (cabotage).

Model B: Liberalized international railway transportation including cabotage requested by European Directive

Figure 5.1 Change of Access Models Requested by the European Directive
Source: Revise from Hori, M. (2000)

Article 1 of EC Directive 91/440 refers to separation between infrastructure management and transport operations as separation of accounts being compulsory and organizational or institutional separation being optional. Thus, the three types of vertical separation which the EC Directive provides are shown in Figure 5.2.

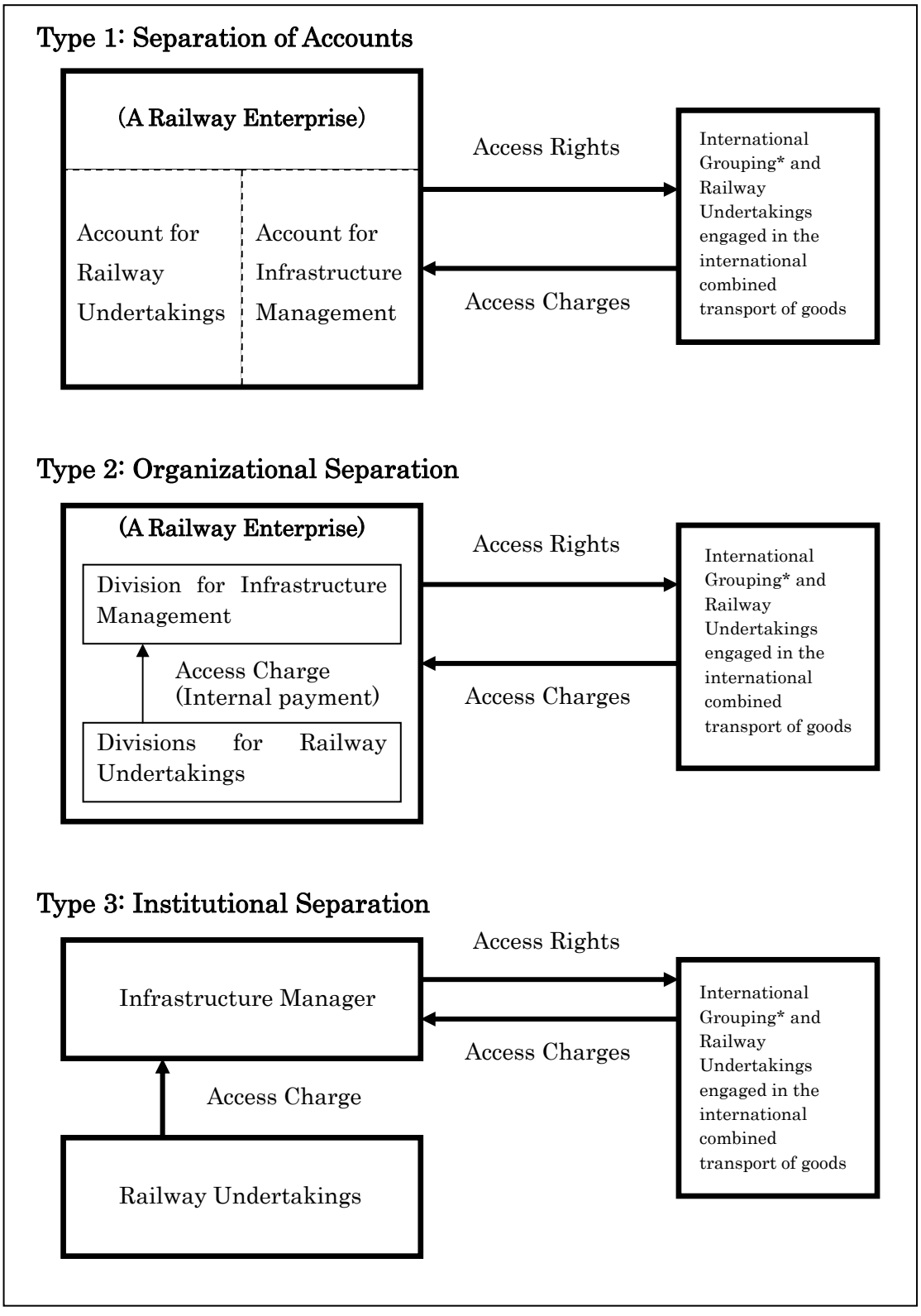


Figure 5.2 The Three Separation Types Stipulated by EC Directives

*: 'International grouping' shall mean an association established by at least two railway undertakings in different Member States for the purpose of providing international transport services between Member States.

Source: ▪ Author's Revision from Hori, M. (2000)
▪ European Commission (1991)

The author defined “vertical separation” in Section 2.4.1, and briefly explained as the situation where the owner of the infrastructure does not provide the given rail service over the given piece of infrastructure itself. Type 1, separation of accounts, means that the owner of infrastructure also provides the railway service. Thus the author regards this type as vertical integration.[1]

It is arguable whether Type 2, organizational separation, is within the scope of the author’s definition of vertical separation or not. Certainly, many published papers regard this type as an integrated structure. This is because two divisions, infrastructure and operation, work together within a common holding structure, and this holding structure, rather than each division, can be regarded as the sole legally and financially independent railway enterprise.[2] Nevertheless, it also has characteristics of vertical separation in the respect that one division practically holds and operates track network and it accepts access charges from internal divisions of the railway undertakings as well as from other railway undertakings. In order to discuss variety models of railway structure and to compare with other types, the author investigates this type in the case of Germany.

In Type 3, infrastructure manger and railway undertakings are legally and financially independent institutions. Thus the structure follows the definition of vertical separation explained in Section 2.4.1.

5.2.2 Recent Transport Policy in Australia

Since 1995 the policy reform task in the rail sector has been pursued by Australian

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[1] The relationship between the main railway which owns infrastructure and other railway undertakings accessing the infrastructure forms vertical separation.

[2] Vertical separation, defined in Section 2.4.1, presupposes that: 1) there are legally and financially independent institutions for providing the services; and 2) the institution which owns the infrastructure and the one which provides services should be separated.

Governments through the application of the general provision of the National Competition Policy agreements and a series of inter-governmental agreements designed to address institutional and regulatory barriers to competition.

The major competition policy reforms which were demanded in the rail sector include (OECD, 2005 p.3):

- Application of competitive neutrality principles through the commercialisation, corporatisation, and in many cases subsequent privatisation of government rail businesses;
- The enacting of access regimes to provide third party access to essential rail facilities in all mainland jurisdictions through State-based rail access legislation;
- Establishing regulatory pricing and rail access oversight institutions; and
- Introduction of specific policies to promote competition "for" and "in" the market including franchise arrangements.

Thus, all railways (whether state or privately-owned) are subjected to the Commonwealth Act, which sets out the rules prohibiting certain anti-competitive conduct. They may be regulated under an access regime, and most Australian States have also developed their own access regimes.

5.2.3 Summary

As the next section investigates, the background of the railways in these two regions, Europe and Australia, have several similarities:

- 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 signalling systems, electrification and safety rules exist around Europe;
- Because of the above background, it has not been easy for a specific railway

operator to access smoothly to the track which is owned by a different organization;

- Because of the barrier for mutual access, railway transport has lost its competitiveness gradually, especially in the freight sector;
- Smooth cross-border transport in the railway sector has been required to compete with road transport in recent years.

The current transport policies in Europe and Australia aim to resolve the above similar problems. It can be expected that this background had resulted in adopting the transport policies, which have quite similar characteristics:

- ensuring the 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.

5.3 The Background and Outline of the Recent Reform

This section investigates the background and outline of the recent reform through vertical separation in the four European railways and Australian National Railways.

5.3.1 Sweden

Sweden was the first country in Europe to introduce vertical separation into state-railways. Until 1988 the Swedish State Railways (SJ) was a state-owned business administration with a monopoly position by means of laws and regulations. The majority of passenger services were unprofitable, but were considered important for socio-economic and political reasons. (CER, 2005) “SJ suffered from

trying to perform services on a network that was under-capitalised. Once a line started to make losses, infrastructure investments typically came to a halt, eventually influencing the traffic and making things even worse. For the state, it was difficult to grant more money to SJ, partly because it could be seen as unfair from the view of other transportation companies, and partly because it was difficult to monitor how SJ actually spent the money. Setting up the national authority Banverket (BV) made it much easier to increase public spending on the railways, since the all the money was channelled to a national authority rather than to a specific operator in the transportation industry." (*ibid.* p.51)

In 1988 management of infrastructure became the responsibility of BV. "It implemented a systematic reform of its rail system … with the apparent aim of putting rail infrastructure on a comparable basis to road in terms of the pricing, planning and funding of investment. But at the same time, regional governments became responsible for planning and funding regional services, and received the right to use competitive tendering to procure such services." (Nash, C.A., 2005a p.6) New freight operators were allowed to enter the market where the state-owned operator no longer wished to run services, and since 1996 the principal model in use for the railway freight sector is on-track competition through "open access". SJ AB, formerly the passenger division of SJ, still holds legal monopoly in profitable inter-regional passenger services, but over the succeeding years competitive tendering has been expanded to cover the passenger services that are unprofitable. A new state authority, Rikstrafiken, has become responsible for competitive tendering of these commercially unviable inter-regional passenger services since January 2000.(CER, 2005)

Following afore-mentioned EC's first railway package, in July 2004, a new railway law and regulation took effect and a new Swedish Railway Agency was established. Besides the tasks regarding safety, it is responsible for monitoring the track access charges, capacity allocation, service provision so that they are determined securing non-discrimination among operators. It also issues a license to an operator who

wishes to operate rail services on the network. (CER, 2005 p.46)

5.3.2 UK

British Railways (BR) was radically reformed during the period 1994-1997. It was still owned by the government in 1994, but the railway operation had been transferred to the private sector by 1997.(Pollitt, M.G. and Smith, A.S.J., 2002) BR was divided into a number of entities and the process is outlined as follows (Kain, P., 1998 p.248):

- Railtrack became the sole owner and manager for the entire railway infrastructure, and was sold in 1996 to the private sector through flotation on the stock market;
- The right to run the ex-BR passenger trains was franchised to 25 private sector train operating companies (TOCs), through the newly created (passenger) Franchising Director;
- BR's freight train operations (including rolling stock) were split into six companies, and two companies bought them;
- BR's passenger rolling stock was sold to three rolling stock leasing companies (ROSCOs), and these companies lease vehicles to train operators;
- Many subcontracting companies were created, mainly to maintain and improve infrastructure.

Behind the reform of BR, in addition to the government's strong intention to perform privatization of BR, it was aimed to promote competitions within the railway sector. It was intended that new operators are able to enter the railway market with low amount of initial costs (sunk costs), and designed so that they do not need to buy neither infrastructure nor rolling stock. After the reform new entrants need to pay only running costs of the railway operation in practice. [6/UK]

The restructuring of BR represents one of the most extreme cases of vertical

separation, which fragmented the state railway, and the outline of the reformed industry structure is shown in Figure 5.3.

The infrastructure was transferred to a separate company, Railtrack, which was subsequently privatised. Nevertheless, the crash at Hatfield highlighted the worsening maintenance condition of the network and the following year, in October 2001, the government withdrew support for Railtrack and placed it in administration. Then, Railtrack was replaced by Network Rail, a new 'not-for dividend' organization limited by guarantee. (Rail Freight Group, 2007 p.6)

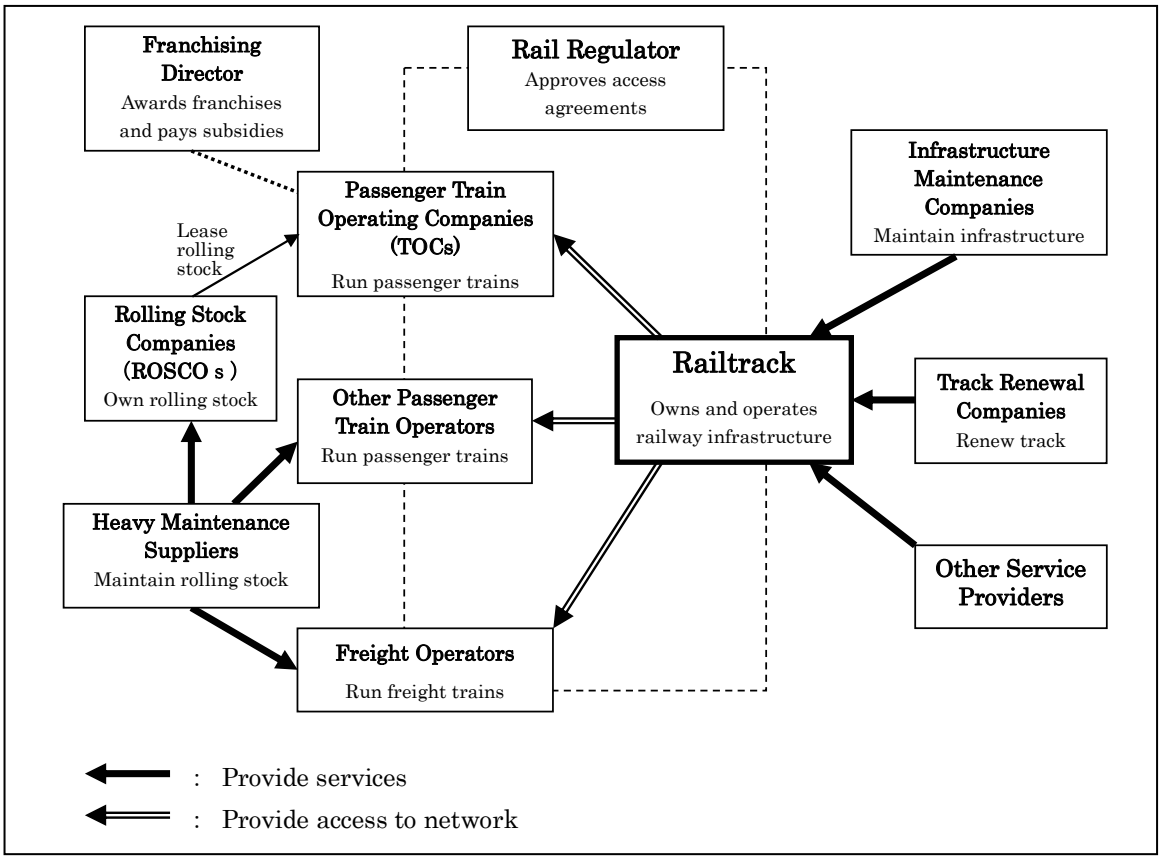

Figure 5.3 The British New Rail Industry in 1996-7

Source: Kain, P. (1998)

Through the reforms, the following two regulatory bodies were established: 1) the independent regulator, named the Office of the Rail Regulator (ORR), set up by the government as an independent statutory office principally to regulate Railtrack; 2) Franchising Director, named the Office of Passenger Rail Franchising (OPRAF),

which was mainly responsible for awarding franchises, paying subsidies, and regulating the TOCs. (Pollitt, M.G. and Smith, A.S.J., 2002) These two regulatory bodies were responsible for overseeing the fragmented companies. Especially, the ORR played a role "to promote competition and prevent anti-competitive behaviour, to protect the interests of customers and rail operators, and to preserve the benefits of a national rail network."(Montagu. N. 1994 p.5) It had a role "to ensure that monopoly power [of Railtrack] is not abused and to settle disputes which may arise between Railtrack and train operators. For example, while timetable disputes should be resolved based on negotiation among the parties, the ORR had the important role to settle such disputes on appeal.(*ibid.*) Its other functions included "ensuring that Railtrack achieves infrastructure 'stewardship' objectives of timely maintenance, timely renewal and replacement, and enhancement of the network." (Kain, P. 2006 p.252) Thus the ORR independently reviewed Railtrack's investment levels in order that the government shall appropriate funds for the railway sector.

In the case of UK, the author investigates the vertical separation which a privatized infrastructure manager, Railtrack, had owned and managed the infrastructure in order to contrast with other cases, where it is owned and managed by a State Corporation/Administration.

5.3.3 Germany

Germany undertook a different fundamental reform, and DB AG was established in January 1994 absorbing the former West German DB and East German DR.

In 1999 DB AG was converted into a holding company with shares owned by the state, and it still has the right to manage the rail infrastructure as Figure 5.4 shows. But it must grant third parties access without discrimination and under control of a neutral authority. (Häfner, P.,1996 p.27)

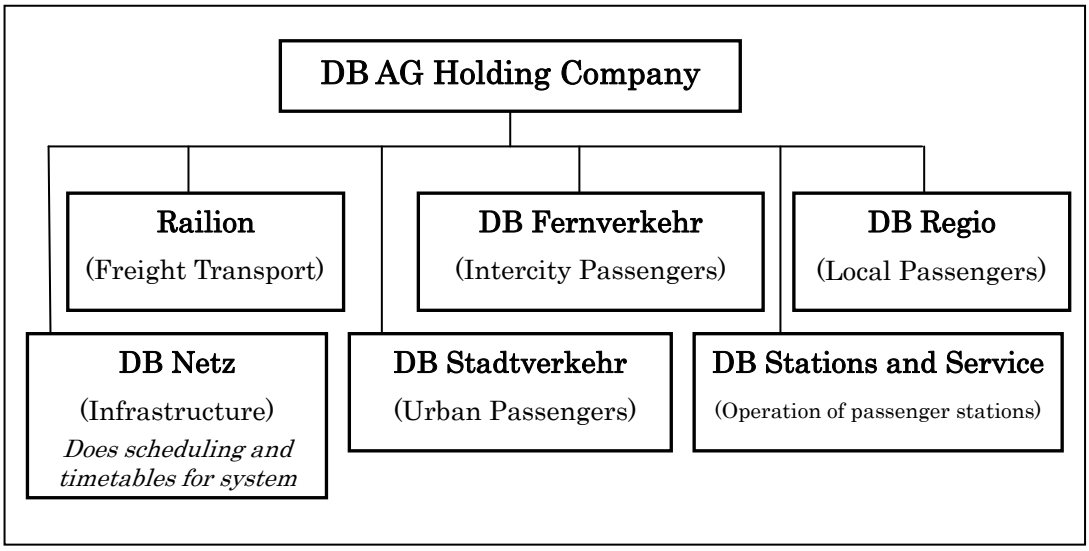

Figure 5.4 The Deutsche Bahn Structure in 2007
Source: Revised from Thompson, L. (2001)

Another major change in 1996 was the 'regionalisation' which brought a shift of organisational and financial responsibilities for regional passenger services from the Federal government to the 16 individual states. It is investigated in Section 5.6.2.

The railway reform was originally planned to achieve institutional separation between infrastructure and operation in the future as Figure 5.5 shows. But the strategy committee considered that splitting off DB network will bring considerable risk and loss of synergies, and also go against the aims of German railway reform. The agreement in November 2006 chose the approach which would give DB AG the possibility to operate rail services and infrastructure as a financial unit.(RGI, 2006)

As it is similar to the former two countries, in 1994, Germany also established a regulator, named the Federal Railway Authority, and operators retain rights to appeal. In 2006, though technical approval and regulation is still covered by Federal Railway Authority, the task of the regulator for railway infrastructure access and possibility to appeal has been transferred to the Federal Network Agency. In 2006,

there have been 73 appeals.[3] However, the task of the Agency is to avoid conflicts on the network in advance, and works pro-active such as changing rules in Network Statement for non-discrimination. [7/DE]

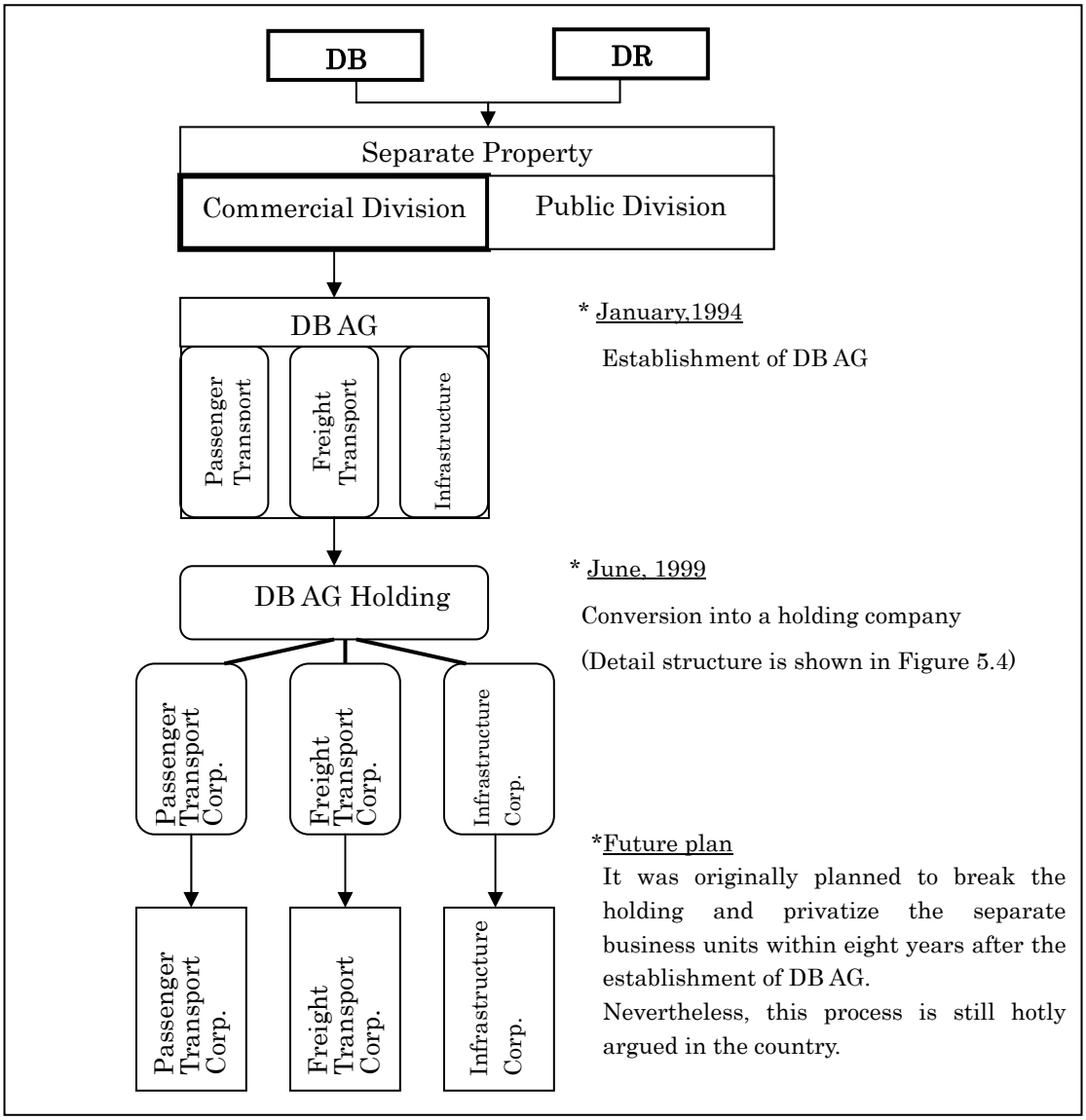

Figure 5.5 Steps in German Railway Reform

Source: Revise of Link,H.(1994)

Despite the insistence by DB AG[4], the strong criticisms are expressed against the above-mentioned approach through organizational separation on the basis that "it

[3] The author could not perform interviews to new entrants in the rail market in order to get a clear view about this issue.

[4] The interviewee explains that: 1) very few operators appeal to the Authority due to "bad access"; 2) there is nearly no space for discrimination due to the very strict and detailed laws in Germany.[7/DE]

is inadequate to ensure fair on-rail competition, arguing strongly in favour of a complete separation of operations and infrastructure."(RGI, 2007a p.338) As these different opinions show, the future direction has been hotly argued in the country.

5.3.4 France

The French Law of February 1997 created a state-owned enterprise the French Railways Infrastructure Authority (RFF) to assume the management and development of, and investment in, the national rail infrastructure. The ownership of the assets making up the infrastructure was transferred to RFF. (Harris, K., 2005)

"The 1998 agreement between RFF and SNCF on traffic management on the national network and network maintenance specifies that SNCF receives an annual lump sum payment in consideration of the following three missions" (CER, 2005 p.98):

- Setting out the organizational system for all the traffic on the railway network, the working timetable, also termed the "graphic train diagram";
- Management of the traffic control and safety systems, and of train operations;
- Monitoring, regular maintenance, repairing and other trouble-shooting and measures necessary for the network's functioning and safety.

Thus, France established an independent state-owned infrastructure manager but SNCF also performs the above-mentioned "below-rail" functions operationally. This relationship is a distinct characteristic of vertical separation in France.

In the freight sector, although it is regarded access barriers are high[5], the transposition of the EU First Railway Package into French law was accomplished by a Decree in 2003, and then the EU regulation required full opening of the rail

[5] IBM Business Consulting Service and Kirchner (2004) notes that France offers restrictive market access conditions for new RUs.

freight market since 2007. France is also planning to establish an independent regulator in order to ensure non-discriminatory access to the national network in 2009. (RGI, 2008)

In the passenger sector, though regionalization has been implemented since 2002, the Regions, transport organizing authorities for regional services, must deal with SNCF at present. (CER, 2005)

5.3.5 Australia

Since early 1990s, the most railway industry had been vertically integrated modal monopolies, covering both the passenger and the freight operations. Each Australian state railway retained responsibilities for the rail network within its borders. Australian National Railways (AN) was one of the vertically integrated statutory corporations owned by the Australian Federal Government and responsible for operating both passenger and freight services. (Greig, D. et al, 2005)

In 1997, the Australian Federal Government offered AN for sale to the private sector, and AN was unbundled into several separate components. However, AN's interstate infrastructure was not sold and this residual portion of AN was renamed AN Access Corporation and continued to provide access to other operators. In the same year, the Federal Government and States reached agreement to establish national arrangements for access by all operators to the interstate rail network. It was further agreed that the Commonwealth establish the Australian Rail Track Corporation (ARTC) as a Commonwealth owned company under Corporation Law. ARTC was incorporated in February 1998 and its foundation asset was the residual AN Access Corporation which had remained in Government ownership. (*ibid.*)

The policy of the Australian Competition and Consumer Commission (ACCC) addresses the institutional and regulatory barriers in the rail sector to competition.

Based on this policy ACCC approved the access regime of ARTC for the interstate freight track in 2002, and national arrangements for access by all operators to the interstate rail network were established. (OECD, 2005)

5.3.6 Summary

Certainly, each of the railways discussed in this chapter is obliged to follow the similar transport policies, which are described in Section 5.2. Nevertheless, the outline of the reform through vertical separation and the approaches to adapt to the policies vary so much.

Germany adopted organizational separation placing infrastructure and operation under the holding company. Other four countries adopted institutional separation. Nevertheless, in France, Gallois, L. (2002) notes that he aimed to keep vertically integrated control to achieve efficient operation and safety. Based on this intention SNCF performs most of the essential factors of railway operation including making working timetable, traffic control, regular maintenance of infrastructure and other related works.[8/FR] In Sweden, UK, Australia (ARTC), infrastructure and operation have been completely separated into different institutions in order to promote new entry into the railway services without discrimination.

Although the above-mentioned different models have different implications for fair access, as a safeguard in the system, it is stipulated that there must be a regulator of track access and a right of appeal.

5.4 Aims of the Reform through Vertical Separation

Aims of the reform through vertical separation in the four European railways and AN are summarised as Table 5.1.

Table 5.1 Aims of the Reform through Vertical Separation in the Four European Railways and AN

Country (Railway)	Aims of the reform through vertical separation
Sweden (SJ)	(1) To put railways on an equal footing with roads by institutionally separating infrastructure from service operations. This is one reason why Banverket was made a government agency, operated in the same way as the national Road Administration. (2) To continue financial support to the sector, as railway is regarded as a uniquely safe and environmentally friendly means of transport. Especially, it was intended to arrange for subsidies to secondary, low-density lines, by way of transferring the responsibility for commercially unviable traffic over these lines to regional transport authorities.
UK (BR)	(1) To create many new opportunities for private sector involvement for the following objectives: ▪ greater responsiveness to the customer; ▪ higher quality of railway services; ▪ better value for money for the public who travel by rail. (2) To introduce competition through greater involvement of the private sector and to end BR's monopoly in the operation of services.
Germany (DB AG)	(1) To shift more traffic to rail. (2) To limit the financial burden caused by rail transport for the tax payer to a tolerable level. (3) To achieve the economic viability of DB AG by entrepreneurial management.
France (SNCF)	The following two intentions were indicated behind the railway reform of SNCF. [8/FR] (1) To follow EC Directives. (2) To realize integrated control.
Australia (AN)	ARTC was created for the following aims. (1) to enact access regimes to provide third party access to the National interstate rail network promoting competition "in" the market. (2) to improve the interstate rail infrastructure to increase the share of interstate freight carried by rail.

Source:
- Interviews/questionnaires to the railways. [5/SE, 6/UK, 7/DE, 8/FR, 9/AU]
- Sweden: Nilsson, J.E. (2002)
- UK: Department of Transport, UK (1992)
- Germany: Nagel, R. (2005)
- Australia: ARTC (2005)

As the table shows, these railways adopted various approaches to EC Directive and Australian competition policies for achieving their own aims of the reform.

5.5 Forms and Implementation of the Vertical Separation

5.5.1 Forms of the Vertical Separation

The forms of the vertical separation in the four European Railways and ARTC are summarised as Table 5.2.

Table 5.2 Forms of the Vertical Separation in the Four European Railways and ARTC

Country (Type of Vertical Separation)	*Infrastructure Manager (IM)* : Type of IM Relationship between freight and passenger services
Sweden (Institutional Separation)	*Banverket (BV)* : the National Rail Administration Freight and passenger operations are performed by different operators.
UK (Institutional Separation)	*Railtrack*: a privatized company Freight and passenger operations were performed by different operators.
Germany (Organizational Separation)	*DB Netz* : A corporation under the holding company DB AG Freight and passenger operations are performed by separated organization under the holding of DB AG with other new entrants.
France (Institutional Separation)	*French Railways Infrastructure Authority (RFF)* : A state-owned enterprise Freight and passenger operations are performed by different divisions of the dominant operator (SNCF) with a few new entrants in the freight sector.
Australia (ARTC) (Institutional Separation)	*Australian Rail Track Corporation (ARTC)* : : A Commonwealth-owned company Freight and passenger operations are performed by different operators.

Source: Author

As Table 5.2 shows, following EC Directive and Australian transport policy, these railways have introduced vertical separation at least in terms of organizational independence.

5.5.2 Implementation of the Vertical Separation

5.5.2.1 Organizational Structure and Management with Vertical Separation

The implementation form of the vertical separation and its management are shown in Appendix 3. From the viewpoint of vertical separation, characteristics of each factor of railway operation are summarized as follows.

(Infrastructure)

- The process of the investment varies even though the most of its finance comes from the public sector. For example, in Sweden, France and Australia, the government actively provided the state-owned infrastructure manager with the resources to carry out the enhancement programme needed to fulfil the transport objectives.[5/SE, 8/FR, 9/AU] In Germany the infrastructure manager negotiated with the concerned parties for the project as an independent company. [7/DE]
- At the planning stage of a project, close negotiation between the infrastructure manager and the investor, such as the government or local governments, are at least required. In addition to the above entities, the train operator also joins in the negotiation in some cases such as in France and Australia.[8/FR, 9/AU] It is for confirming the train operation plan after the completion of the project. Thus, the number of concerned parties has increased, and negotiation for the planning has become more complicated and takes longer time than an integrated railway. [8/FR]

(Maintenance Works of Infrastructure and Tracks)

- In Sweden, UK, Germany and Australia the infrastructure manager plans and orders the maintenance works, and other engineering contactors perform the works. The infrastructure manager takes responsibility of the works, and inspects or examines the engineering works performed by the contractors.

- In France, RFF only stipulates the quality of the works, and contracts out all of the maintenance works to SNCF. As SNCF plans and performs all of the maintenance works, fundamentally, SNCF takes responsibility of the works. The above process is intended to decrease coordination problems between the two. Nevertheless, sometimes, there are conflicts between SNCF and RFF. For example, RFF thinks that SNCF does not need additional funds to carry out sufficient maintenance if SNCF uses it wisely, whereas SNCF insists that it is necessary to increase the amount of track maintenance for keeping the track condition.[6] (Le Monde, 2004)
- Interviewees think that track condition largely depends on the quantity of engineering works, and that vertical separation does not have much direct influence on the condition of the infrastructure. [6/UK, 9/AU]

(Rolling Stock)

- In Sweden and UK (the passenger sector), the owners of rolling stock were shifted from the former monolithic railways to other independent entities such as the local transport authorities, and leasing companies. This is because it is intended that new operators should easily enter the rail transport market. In Australia a rolling stock leasing industry has developed according as new operators enter the rail market. [9/AU]

(Timetable and Operation)

- In France, SNCF controls daily train operation. In other four countries the infrastructure manager performs train control and signalling.
- In the process of timetabling, each operator applies for time-slots and the infrastructure manager allocates infrastructure capacity fairly and without discrimination. This is based on the EC Directive or the Australian transport policy, and this process is common in all the five railways.
- In the case of complete separation (Sweden, UK and Australia), based on the application for the slots, the infrastructure manager does slot allocation and also makes timetable. Nevertheless, the data must be exchanged between the

[6] This issue was striking at the time of speed restriction of 1500km additional track in 2004, and the two entities blamed each other facing the problem. (Le Monde, 2004)

infrastructure manager and a number of operators as shown in Figure 5.6. This procedure has become more complicated compared with an integrated railway, where those information exchanges and every operational decision such as slot allocation and timetabling can be done within an organisation flexibly. [6/UK]

- In these cases the infrastructure manager has difficulties to coordinate the operators' application especially in the following cases [5/SE, 6/UK, 7/DE, 9/AU]:
  1) in a case infrastructure capacity is limited;
  2) in a case several operators apply for the same time-slots;
  3) in a case time schedule for maintenance works are difficult to be secured.

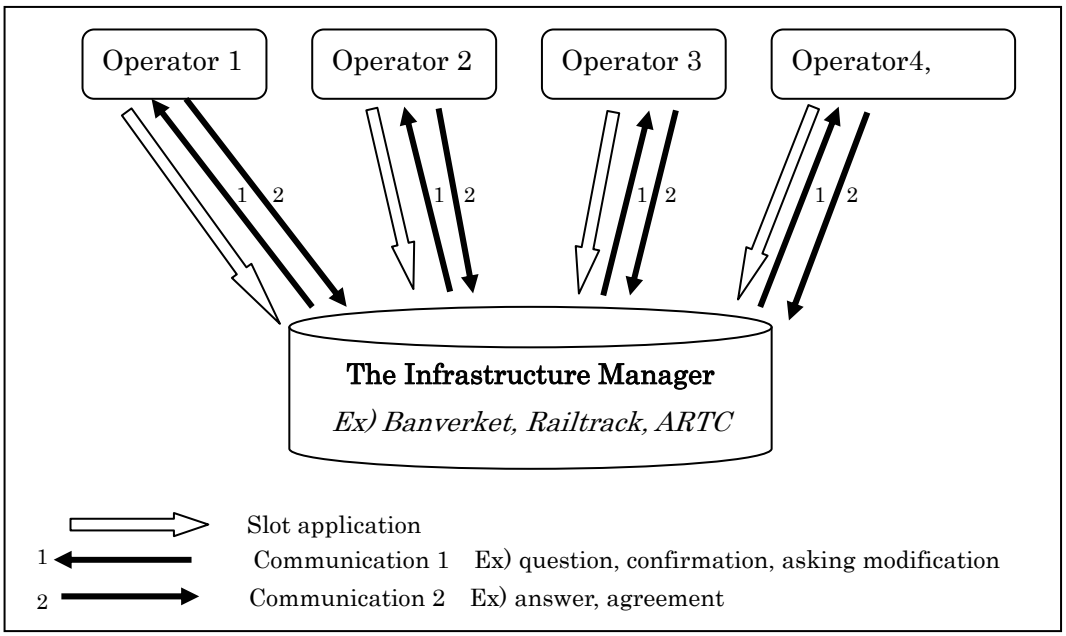

Figure 5.6 Procedure for Making a Timetable in Sweden, UK and ARTC

Source: Author,
based on interviews/questionnaire to the three railways [5/SE, 6/UK, 9/AU]

- In Germany, all operators have to stay in relation with DB Netz, as they have to apply for time slots on DBs network. This is a standardized process, being the same for DBs own operational companies, and the freight organization of DB (named "Railion") also has to follow the same procedure as any other operator to get a time slot. DB Netz is not allowed to communicate any information on private operators to DBs own operators for competition reasons.[7] German Federal Agency

[7] Some private, small freight operators have cooperation agreements with DBs freight operator (Railion). DB transports the goods via long distances whereas the

ensures that DBs infrastructure is independent. [7/DE]

- In France, SNCF makes working timetable based on the slot allocation by RFF since 2003. Figure 5.7 shows the procedure of timetabling by the two entities.

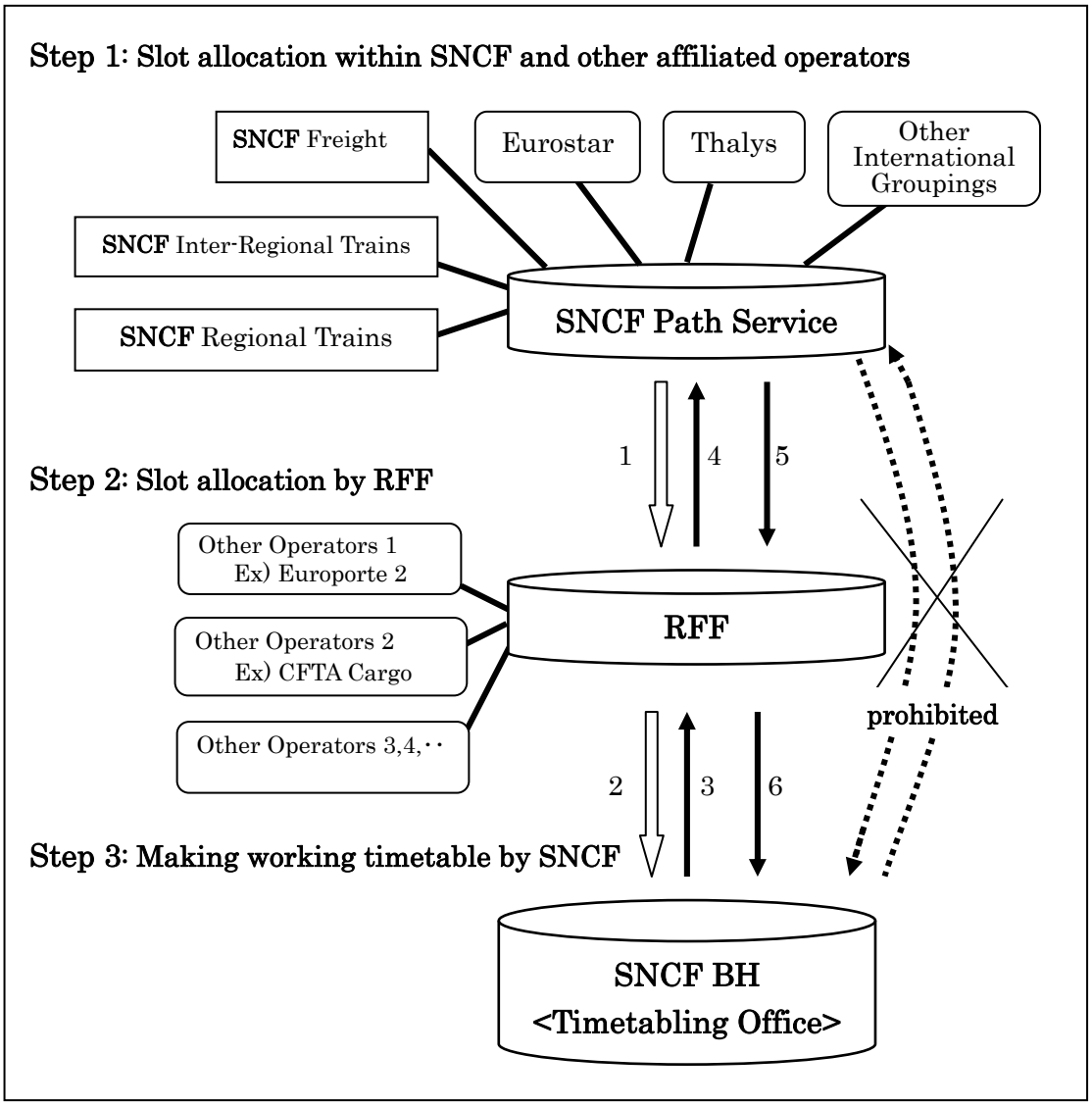

Figure 5.7 Procedure for Making a Timetable in France

Source: Author, based on interview to SNCF [8/FR]

As Step 1, 'SNCF Path Service', one of the divisions of SNCF, coordinates the slot application not only from train service divisions of SNCF but also from other joint-venture companies such as Eurostar and Thalys International SC. After

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cooperation partner is distributing it into the regions. Other operators are completely independent and in competition with Railion. As a consequence, their contract with DB is limited to the infrastructure. [7/DE]

coordinating the slot application within 'SNCF Path Service', the coordinated data is transferred to RFF, the infrastructure manager.

As Step 2, RFF coordinates slot applications including those from other operators, which have entered to the freight rail market. Then, RFF transfers the combined time slot data to 'SNCF BH', timetabling office of SNCF, to ask to make working timetable, which is a detail timetable for train operation.

As Step 3, 'SNCF BH' makes working timetable. Nevertheless, frequently 'SNCF BH' finds questions about the combined time slot data, or sometimes find some incorrect data. Before the reform, within one organisation 'SNCF BH' could confirm the questions or could ask to modify the data by contacting 'SNCF Path Service' very easily, for example by direct phone. Nevertheless, as it has been regulated that slot allocation should be performed by the infrastructure manager, it is prohibited for 'SNCF BH' to confirm or ask modification to 'SNCF Path Service' directly as it used to do. Instead of that, 'SNCF BH' has to ask questions about slot allocation to RFF, and RFF is going to ask them to 'SNCF Path Service'. The answer from 'SNCF Path Service' is going to be transferred to 'SNCF BH' by way of RFF again.

This internal procedure within rail industry has become more complicated than before and takes much longer time than an integrated railway's procedure.[8/FR] There are some possibilities that smooth information transmission process will be realized by means of better information technology system. But at present it takes much more works, and resulted in loss of flexibility of timetabling such as quick scheduling of special trains. [8/FR]

5.5.2.2 Relationship among Different Parties and Relevant Issues

The current railway operation/management in terms of relationship among

different parties and safety issues are identified as Appendix 4. From the viewpoint of vertical separation, they are summarized as follows.

(Relationship between operators on the same track)

- In case several operators are on the same track, sometimes disputes are raised among them. Disputes are raised especially in the following cases: [5/SE, 6/UK, 9/AU]
  1) in a case an operator is faced with an accident or traffic delay because of other operator's responsibility;
  2) in a case of coordinating timetable within a limited infrastructure capacity.[8]

(Relationship between infrastructure and an operator)

- Vertical separation clearly stipulated the financial responsibilities of the infrastructure manager and those of the operator.[9] Each entity has an independent account, and they are inter-related by payment of access charges.
- A principle for setting access charges varies largely according to the countries. For example, Sweden aims to improve rail's ability to compete with road transport and the access charge covers only a part of Banverket's payment for operation and maintenance, whereas Germany intends to allocate the total costs (excluding investment and renewal costs).
- In some cases, the amount of access charges becomes complaints of the operators.[8/FR] Additionally, many of the disputes between infrastructure and operators are raised in the following cases [9/AU]:
  1) in a case of differing interpretations of the infrastructure manager's decision

[8] Along with its rules for slot allocation and train control, the infrastructure manager has a dedicated section for settling conflicts. When the conflict is not settled through the coordination by the infrastructure manager, they ask settlements to the independent regulator and finally they take legal action. The significant conflicts between the operators are not often, nevertheless they sometimes happen.[5/SE, 6/UK, 9/AU]

[9] Vertical separation clearly stipulated financial responsibilities for infrastructure (the government) and railways in the cases in Chapter 4 as well. The main intention of the cases in the former chapter was to allow management freedom of the state-railway reducing the government's intervention and its direct subsidies. On the other hand, the main intention in the cases in this chapter is promoting within-rail competition promoting new entry into the rail market.

rules for train priority;

2) in a case of sudden planning of engineering works, which results in cutting scheduled trains.

- Even though it is intended to realize an integrated control some conflicts have been raised also in France. Before the reform of SNCF, staff have been trained to perform various works without thinking whether the works are for a railway undertaking or for an infrastructure manager. For example, there are many manual switches especially in local lines. Even though turning the switches are works for an infrastructure manager, SNCF drivers have been trained and performed this kind of works as it results in operational efficiency. (It is not efficient to allocate the infrastructure manager's staff to turn each manual switch in local lines.) Nevertheless, some of the new operators hesitate to perform this kind of infrastructure controlling works and insist on performing only train running. Thus, the interviewee worries that too much specialization results in inefficiency and loss of 'railway-men spirits' which wish for improvement of the railway operation as a whole. [8/FR]

(Safety Issues)

- In vertically separated railways it must be determined whether the operator or the infrastructure manager is responsible for the accident once it happened. It is because, in most cases, the responsible entity must compensate other entities within the railway industry as well. This is different from an integrated railway, where compensation is not paid within one entity, and a cause of accident is mainly investigated in order to prevent the similar accidents in the future. [6/UK]
- So far some discussions have been held regarding safety issues of vertically separated railways. For example, although many people believe that safety has deteriorated on the privatized railway, Evans, A.W.(2004) found that the safety performance continued to improve in UK. Nevertheless, the interviewees expressed that procedure to settle down disputes concerning safety issues has become more complicated under vertically separated railways. [5/SE, 6/UK, 8/FR, 9/AU]

- Independent regulator performs arbitration concerning safety conflicts among different entities in the vertically separated railways. Thus, generally, vertical separation requires additional coordination among separated entities. [6/UK]
- At the time of accidents or compensation for train delays, in some cases conflicts between different entities can not be settled down in spite of the regulator's efforts. Then, it can happen that they take legal actions within the rail industry. [5/SE, 9/AU]
- Australian experience suggests that appropriate measures ensuring ongoing collaboration in wheel and rail interface issues largely contribute to reduce negative effects on safety.[10] [9/AU]

As summarized above, there are some conflicts among different entities in vertically separated railways. In general, these matters have to be resolved as a part of the management contracts in vertically separated railways, whereas the conflicts are internalised within the same organisation in vertically integrated railways.

5.6 Transition of Management of the Railways

5.6.1 Freight Traffic Service

1) Economic Growth in the four European Countries

In order to examine the transition of the freight traffic in Section 5.6.1 and the passenger traffic in Section 5.6.2, firstly, the transition of real-term GDP in the four European Countries is investigated. Figure 5.8 shows the trends of the real-term GDP in the four European countries since 1991, and it reveals that the national economy in these countries has progressed steadily over the years.[11]

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[10] Examples of such collaboration on the ARTC network are trackside installations to remotely monitor rolling stock condition. They are continuously provided to ARTC and the operator of the trains concerned. ARTC also makes available to rail operators track geometry data derived from track recording vehicles that shows trends in track condition over time.

[11] During the 15 years since 1991, the real-term GDP in each country has progressed by the following rates: Sweden (47%), UK (50%), Germany (24%), and France (33%).

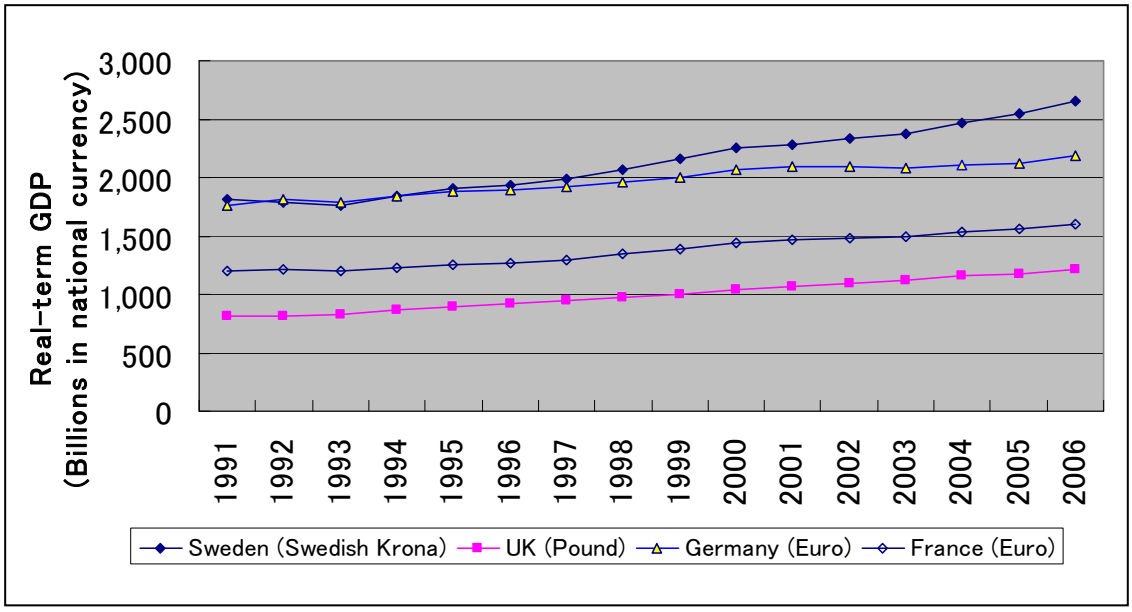

Figure 5.8 Trends of Real-term GDP in the four EU Countries
Source: International Monetary Fund (2008)

2) Procedure for an Entry into the Market

In these railways, it has become common that several rail freight undertakings operate on the same tracks competing with each other. All of the five railways already introduced the regulation of "open access" in the freight sector. Especially, not less than 10 freight operators perform freight rail services in Sweden and Australia, and more than 100 undertakings operate in the freight market in Germany even though the most of them are small. (JRTT, 2006)

The procedure to enter into the freight rail market in these countries is similar and explained in Figure 5.9.

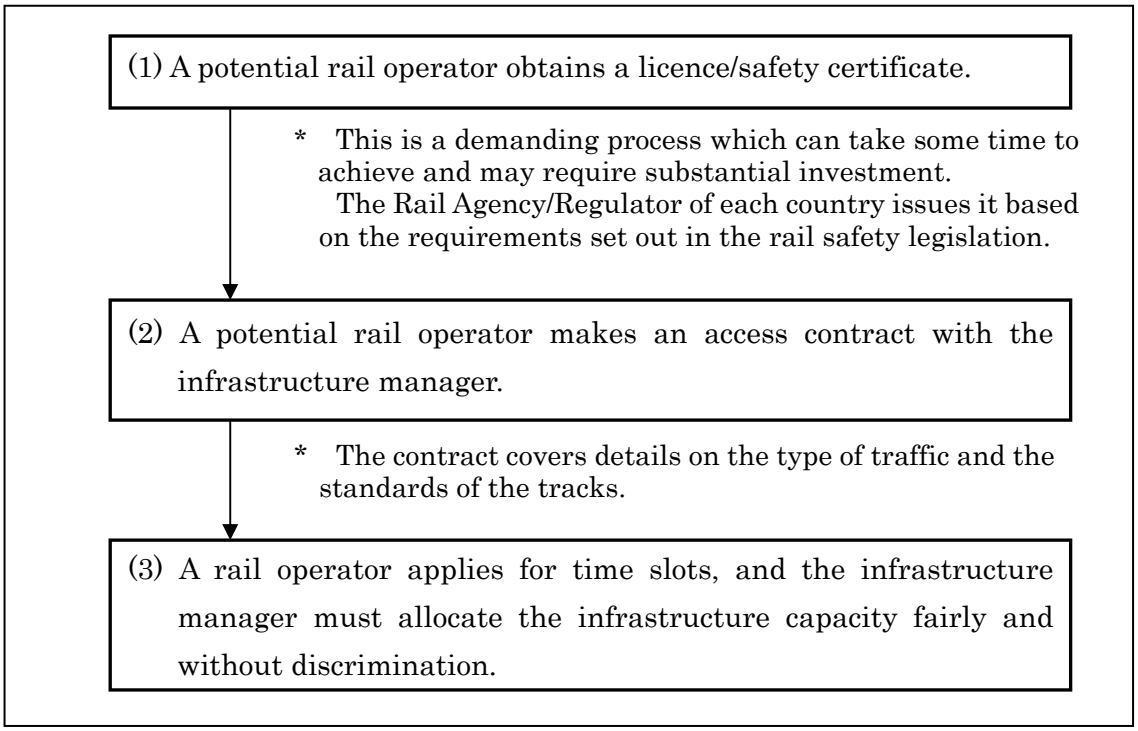

Figure 5.9 Procedure for an Entry into the Freight Market in EU Railways and ARTC
Source: Author, based on the interviews to the railways. [5/SE, 6/UK, 7/DE, 8/FR, 9/AU]

3) Trends of the Freight Transport

The way of managing the rail transport operation, such as slot allocation and timetabling, has become more complicated as examined in the former section. Despite its complex structure of the rail industry, on-track competition in the freight rail market has become common, and trends of the transport performances in rail freight market in the four European countries[12] are shown in Figure 5.10.

In Sweden, UK and Germany, liberalization of the freight market has been progressed based on open access. In these countries, the rail freight performances took an up-turn in the last decade. In France, liberalisation of the freight market is relatively slow. Although a few operators have entered to the freight market since 2004, practically the main operator, SNCF, still dominates the market, and its performance in the last decade is gradually decreasing in spite of the steady progress of the national economy during the years.

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12 The figures of transport trends in ARTC were not available.

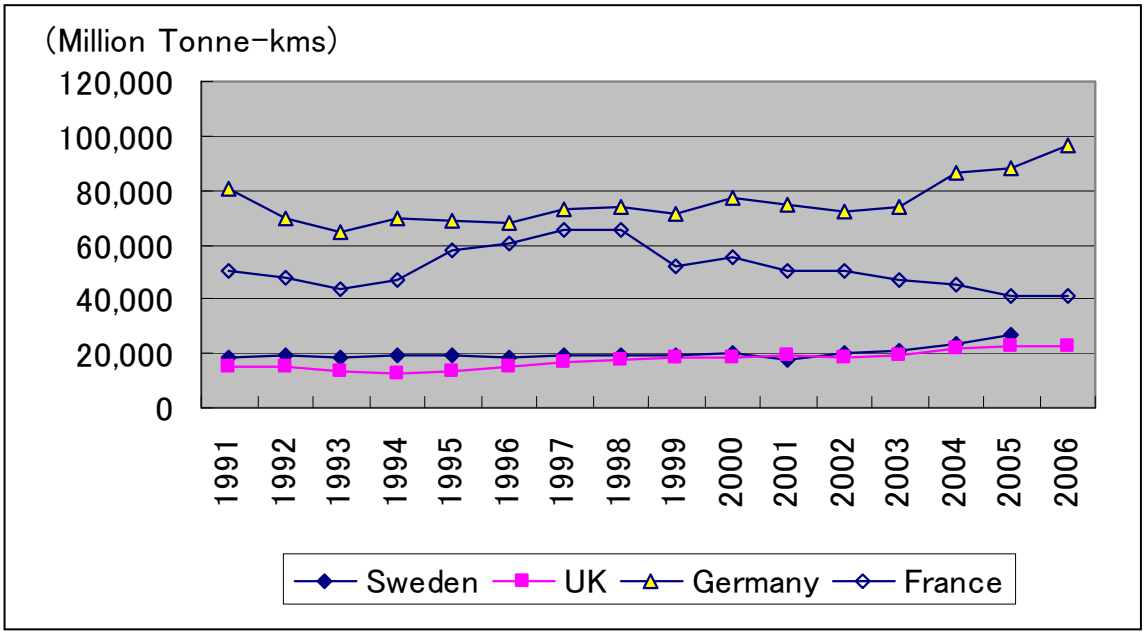

Figure 5.10 Trends of Rail Freight Transport in the four European Countries

Source : Sweden: Eurostat
UK: Office of Rail Regulation, National Rail Trends Yearbook 2006-2007
Germany: Verkehr in Zahlen (Deutcher Verkehrs-Verlag)
France: UIC Statistics

Certainly, it is not quite clear that the change of the rail performance was resulted from the market liberalisation or other exogenous factors such as transition of the national economy, development of other transport modes and so on. Nevertheless, despite the similar steady progress of the real-term GDP in these countries, the trends of the transport reveal a contrast among them. Some interviewees note that the improvement of the traffic performance has been achieved partly because of new railway transport markets created by the new freight operators and/or their competitive pressure to the incumbent operator. [5/SE, 6/UK, 7/DE, 9/AU]

5.6.2 Passenger Traffic Service

5.6.2.1 Outline of the Services

1) Regulation for Track Access

Different from the freight sector regulated by open access, the regulation of track

access for the passenger service varies according to the country and the type of transport services. They are summarized as Table 5.3.

Table 5.3 Regulation of Track Access for Passenger Rail Service

Country (IM)	Regional Services	Inter-regional Services	
		(Non-profitable)	(Profitable)
Sweden (Banverket)	Franchising		SJ AB
UK (Railtrack)	Franchising *1		
Germany (DB Netz)	Open Access *2		
France (RFF)	SNCF		
Australia (ARTC)	Open Access *2		

*1: The charging regime for access to track for passenger operators does not rule out open access. In practice, Hull Trains commenced operations between London and Hull in September 2000. Nevertheless, as open access passenger operators have been still exceptional cases in UK, their effects are investigated in the case of Germany.

*2: Examples of competitive open access entry are limited. In reality, most of the services are procured through franchising or service contract. (This is studied in this section.)

Source: ▪ Author, based on the interviews to the railways. [5/SE, 6/UK, 7/DE, 8/FR, 9/AU]
▪ CER (2005)
▪ White & Case (2006)

2) Regional Passenger Services

In Sweden, France and Germany, responsibility for the regional passenger services were decentralized to the regional authorities. After surveying the regionalization in Sweden and France, the case in Germany will be scrutinized in the following.

In Sweden, based on the Transport Policy Act of 1979, County Public Transport Authority (CPTAs) was established as a new institutional structure for regional public transportation. Several CPTAs have become responsible for the decisions on local and regional railway lines threatened by closure, and also started to control some remained lines. Then, in 1988 the responsibility of the CPTAs was extended into the unprofitable regional railway services, and the rolling stock was also transferred to the CPTAs. Further, in 1991 the government expressed its principle

to open the railways to more competition through tendering. (CER, 2005 p.42)

In France, every French Region has become responsible for organising regional passenger rail services, and it designs the services and defines the tariffs since January 2002. SNCF is charged to execute their decisions and the Regions pay a financial contribution decided in advance by a contract (the Convention) and fully subsidize rolling stock acquisitions. A Convention Agreement specifies the respective undertakings and obligates the Regions to stipulate their service requirements and SNCF to fulfil the agreed missions within budget. Thus the Regions have become full-fledged Transport Organising Authorities for Regional services. (CER, 2005 p.100)

In Germany, one of the major changes in the reforms was the 'regionalisation' of regional passenger railway traffic. Organisational and financial responsibility for it had been shifted from the federal government to the German states (Laender). In January 1996, the respective federal responsibilities ended. "The Laender receive part of the federal petroleum tax revenues and distribute it to railway undertakings, which provide local and regional passenger transport. The legislator has acknowledged that local and regional public railway passenger transport is structurally dependent on public subsidies." (CER, 2005 p.87)

Before the 'regionalisation' the federal government was responsible for the regional transport, but appropriate transport planning based on each region was not necessarily achieved. Since the 'regionalisation' various decisions based on the conditions of each region have become possible and regional rail transport has become active.[7/DE]

We can find several examples which some measures based on regionalisation have succeeded in revitalizing regional rail transport. For example, certain regional services such as between Kaarst and Mettmann in west part of Germany, and between Neumünster and Bad Segeberg in north part of the country were once

abandoned, but the services were re-opened based on the decision by the Laender. Besides the investment to the infrastructure, some other improvements in the operation process, such as coordination with other public traffic modes in timetable and fares, are also performed. The improvements of the services are regarded as one of the results of the 'regionalisation' and various efforts since then. [7/DE]

Figure 5.11 shows the trend of regional passenger rail transport in Germany in contrast with the real-term GDP. It reveals that the regional rail transport has increased and has been keeping steady level since the establishment of DB AG in 1994[13] unifying DB and DR.

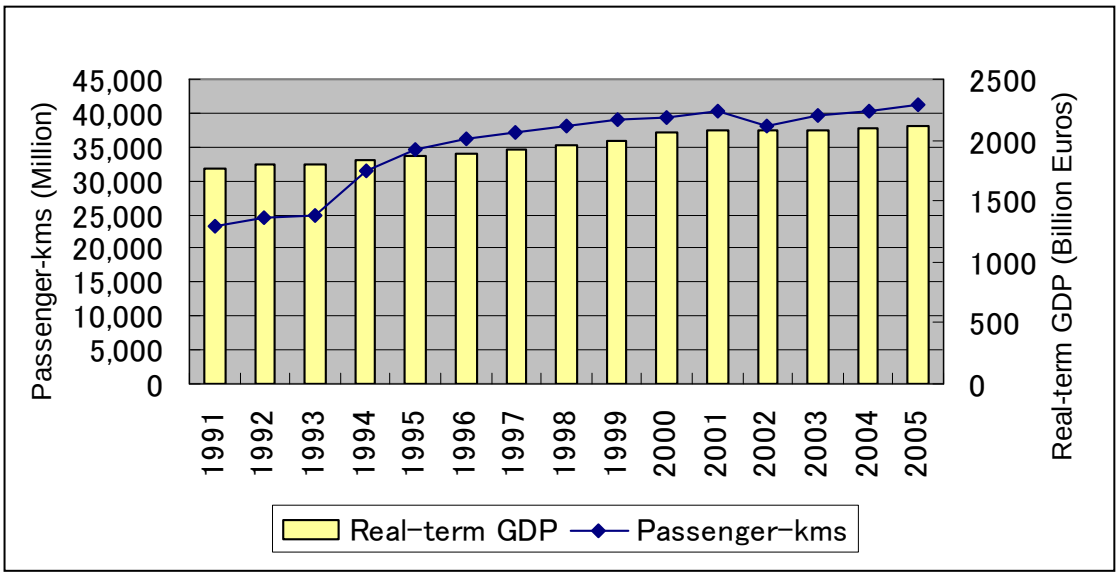

Figure 5.11 Trend of Regional Passenger Rail Transport in Germany
Source: Verkehr in Zahlen 2006, 2007, Deutscher Verkehrs – Verlag
International Monetary Fund (2008)

3) Inter-regional Passenger Services

As Table 5.3 shows, SNCF and SJ AB hold monopoly status in all lines in France and in profitable inter-regional services in Sweden respectively. Franchising is utilized for non-profitable inter-regional services in Sweden and for all networks in

[13] In addition to the establishment of DB AG, the legislation on 1 January 1994 contains alterations of the fundamental railway regulation, which characterizes the current railway operation such as opening of rail network to third parties, obligation of state regarding rail infrastructure, and so on.(Link, H.,1994)

UK.

In Germany and Australia (ARTC), in principle, any qualified operators can access the infrastructure based on open access. On the track of ARTC, with the exception of Great Southern Railway (GSR) which is purely a commercial operator of long-distance tourist trains, all other passenger services are practically heavily subsidised by State Governments.[9/AU] In Germany, examples of competitive open access entry by private operators are also very limited. When the interview was held in December 2005, the examples are limited to only the following inter-city services: 1) between Stralsund and Dresden; and 2) between Rostock and Gera. Both of these cases are operated by a private operator "Inter Connex". Practically, most of the non-profitable inter-regional services are also provided based on the franchising/service contract with a regional government utilizing the scheme for regional passenger services.[7/DE] Thus, voluntary attempts at open access entry into passenger inter-regional lines have been limited to profitable inter-regional lines only, and in practice these attempts are not common in Australia and Germany either.

4) International Passenger Services

In Europe international passenger services, especially high speed transport, between Member States are promoted by establishing joint-ventures among state railways. They are named "international groupings" in the EU Directives, and established by at least two railway undertakings in different EU Member States. The example of "international groupings" and the railway undertakings in cooperation are as follows[14]:

Thalys International SC: SNCF, SNCB, NS, DB AG

Eurostar Group: SNCF, SNCB, Eurostar (UK) Ltd.

Lyria: SNCF, SBB/CFF/FFS

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[14] The acronyms mean as follows:
SNCB: the National Railway Company of Belgium
NS: Netherlands Railways
SBB/CFF/FFS: Railways of Switzerland

Even though crews run through the border, the trains of international groupings are operated under the license of each railway undertaking. This means that their train operation is performed under the responsibility of each railway undertaking. For example, SNCF is responsible for the operation of Thalys trains in France, and the trains are operated under the license of SNCF within the country. The joint-venture, Thalys International SC, is responsible for other commercial affaires such as the policy of ticket sales, the level of services in the stations (special lounges, etc.) and in the trains. The costs and incomes are shared among railway undertakings based on the agreed rules.[8/FR]

Thus, there is not particular conflict among these joint-ventures and the railway undertakings in terms of train operation, timetabling, safety measures, and so on.

Today, on the line of East European high-speed lines, TGV (French high-speed trains) run between Paris and Munich, and ICE (German high-speed trains) operate between Paris and Frankfurt. But in these cases, SNCF and DB AG cooperate each other, and there is an agreement between the two railways to share costs and incomes.[8/FR]

As the above cases show, the international passenger services are operated with cooperation among more than one railway. As of the beginning of 2008, competitive entry into the international passenger services is not common, even though liberalization of the market is scheduled in European Union in 2010.

5.6.2.2 Procurement of the Services

In the passenger sector of these countries, in principle, there are three kinds of methods to procure the transport services: franchising through competitive tendering; service contract through negotiation; competitive entry through open access. The characteristics of each type of service procurement are examined in the

following.

1) Franchising through Competitive Tendering

In Europe and Australia, many of the passenger lines are not profit making. This means that, different from the freight sector, private operators do not have an incentive to enter into a passenger rail market without receiving subsidy from the (local) government. Thus, franchising through competitive tendering is commonly utilized both for the regional and the inter-regional services in the passenger sector.

ECMT(2005b p.68) notes the advantages of competitive tendering as "it permits the preservation of an integrated network of rail services, subsidised where necessary, whilst still introducing competitive pressures, leading to incentives to reduce costs and (depending on who bears the revenue risk and what other incentives are in place) improve quality of service."

Despite some disadvantages[15], 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*.p.68)

2) Service Contract through Negotiation

In France, regional services are provided based on contract between the Regions and SNCF. The Regions must deal with SNCF, and they make a contract without tendering.(CER, 2005 p.100) In Germany, the Laender conclude transport service contracts with either the DB Regio or other railway undertaking holding a valid license. For the conclusion of public service contracts, the Laender have the discretion to make a call for tenders or not. In a case of contract without tendering, usually the amount of it is decided based on the offer from the operator such as DB

15 Kain, P. (2006) indicates several challenges of the franchising system.

Regio. Thus, transparency/accountability for the tax payers is indicated as a problem of the contract without tendering. (Hori, M., 2000)

3) Competitive Entry through Open Access

Competitive entry through open access is effective only in case an operator comes in the market on the basis of commercial incentives. In practice, attempts of it are so limited in the passenger sector behind the background of its unprofitable market in these countries.

In case it has attained, on-track competition in the passenger rail market has potential risks to raise several coordination problems especially those among operators. Moreover, it might have significant influence on the passenger rail market as a whole. Some of the examples of these conflicts are found in Germany, where open access regulation is introduced in the passenger sector as well.

As a first example, there were disputes whether DB AG should include details of other operators' trains in its information system in the station. Even though the infrastructure manager intends to provide detail information, such as a timetable and tickets of other operators, sometimes it is technically difficult, and it might result in a problem among concerned parties.[7/DE] This aspect of information sharing in the passenger sector is different from that in the freight sector as provision of the detail information about other operators is not necessarily demanded in the freight sector.

Secondly, it should increase the total amount of subsidy from the local government to sustain unprofitable regional passenger rail services. There are some examples that a new operator entered into a railway passenger market only in peak hours. For example, Connex entered the passenger transport service between Dresden and Görlitz only in peak hours of weekdays. This kind of competitive entry to the market reduces some profits of the incumbent operator transferring them to the new operator. Considering the incumbent operator receives subsidies from the local

government, this kind of on-track competition would reduce the spare resources to be utilized to sustain other unprofitable services. Thus this kind of "cream skimming" behaviours in the market should result in the increase of the amount of subsidies or abolition of the other unprofitable rail services. [7/DE]

Thirdly, close relationships among several train services are recommended for convenience of passengers. For example, in Japan in case of late arrival of a Shinkansen train, departure time of a regional train can be changed flexibly, and in a certain case it would be delayed intentionally until the Shinkansen train arrives. This kind of flexible operation for the passengers is expected to be possible as whole train services on the network are operated by a single operator. Once train services are operated by different operators this kind of close cooperation among the operators would be very difficult. [7/DE]

5.6.2.3 Trends of the Passenger Transport

According to the Rail Liberalization Index (IBM Business Consulting Service and Kirchner, 2004), railways in Sweden, UK and Germany are regarded as 'easy access' and railway in France is regarded as 'restrictive access'.

Figure 5.12 shows that the passenger transport in France has also steadily increased along with other countries. Thus, the trends of passenger rail transport show that 'easy access' would not necessarily result in the better improvement of the passenger rail performance. The background is that most of the passenger rail services, especially those in the regional rail transport, rely on the subsidy from the regional authorities.

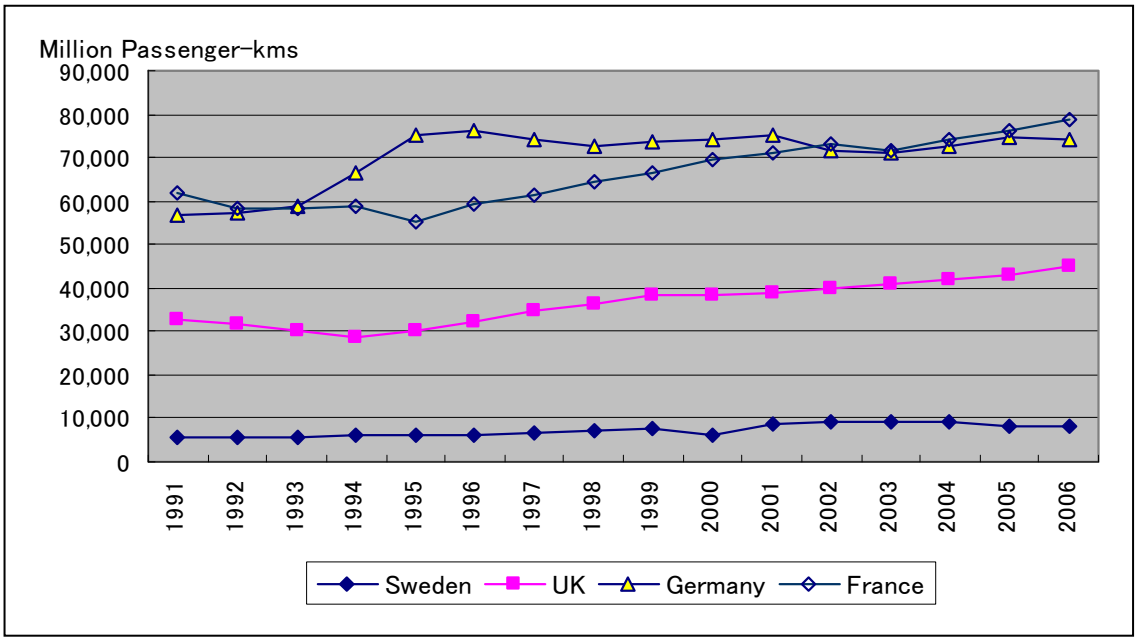

Figure 5.12 Trends of Passenger Transport in the four European Countries
Source: Sweden: Eurostat
UK: Office of Rail Regulation, National Rail Trends Yearbook 2006-2007
Germany: Verkehr in Zahlen (Deutcher Verkehrs-Verlag)
France: UIC Statistics

Although some passenger services are procured by a service contract through negotiation, it is indicated that competitive tendering (franchising) has more advantages in terms of transparency for the usage of public funds. In addition, vertical separation is beneficial to promote new entry into the market through franchising. As it is investigated, instead of covering the deficit of the railways as before, the (regional) government has become active in the procurement of (regional) passenger service, which resulted in the increase of the passenger transport.

5.7 Advantages, Disadvantages and Results

During the interviews/questionnaires to the railways, the following advantages and disadvantages are indicated concerning vertical separation in this type.

5.7.1 Advantages

Besides the aims of the reform through vertical separation studied in Section 5.4, the following advantage was indicated.

1. Specialization of technical and managerial knowledge

ARTC and the various rail operators put greater focus on their core businesses. ARTC's principal aim is to maximize utilisation of their various rail corridors and thus maximize income from access charges. Conversely, the rail operators have concentrated on providing satisfactory service to their customers. [9/AU]

5.7.2 Disadvantages

1. Difficulties to coordinate the timetable

In Germany, based on open access, several passenger operators provide services on the same track of certain lines. It was indicated that sometimes long-distance trains have to wait several minutes until regional trains pass by as the regional authority is not willing to change the timetable of regional trains. Thus, coordination of the timetable has become more difficult as a number of entities are responsible for the rail services.[7/DE]

In Sweden, in general a sole franchisee provides services on a certain network. Nevertheless, it is not easy to coordinate the timetable among different franchised networks. Thus, sometimes well-coordinated timetable scheduling can not be achieved especially at the border of the networks. [5/SE]

2. Limitation of investment solution

Integrated railways can adjust their capacity more easily and appropriately according to the change of the transport demand. For example, when demand of railway transport increases, there are broadly three types of solutions for adjusting their transport capacity:

a) Introduction of other type of rolling stock, which has bigger capacity such as double deck trains. This solution can be performed by an operator;

b) Increase of infrastructure capacity, such as constructing relief tracks or improving signalling system. This solution can be mainly performed by an infrastructure manager;

c) Investments from both operation and infrastructure. For example, an operator extends the length of trains adding more coaches to the trains, and an infrastructure manager extends the length of platforms accordingly.

As they are shown in the above examples, various investment options should be compared deliberately for the appropriate investment planning. Nevertheless, usually it is more difficult for vertically separated railways to compare and invest appropriately as these activities have to be performed among different entities. [6/UK]

3. Difficulties to provide sufficient information of other operators

In Germany several operators perform passenger train services on the same track based on open access. In most cases the new operator provides train services with cheaper tickets which are not exchangeable with other trains. There were serious arguments in Germany whether the staff of DB AG should provide sufficient information about the ticket conditions for the passengers, and should sell other operator's tickets or not. Technically, advanced ticket information system might make it possible. Nevertheless, at present practically it is not easy task for the ticket sales staff to sell various kinds of tickets issued by different operators and to provide the customers with sufficient information about them. [7/DE]

4. Increasing transaction costs

Since the separation of infrastructure and operation, it has become necessary to negotiate and coordinate more frequently among different entities. It has resulted in the increase of transaction costs. [5/SE]

5. Poor economic performance arising from monopolistic status of the infrastructure

manager

Under vertically separated railways, the above and below rail organizations will necessarily have different objectives which can potentially lead to conflicts and, if not addressed, to dysfunctional relationships. In Australia, this can sometimes become an issue, particularly as most infrastructure is still in public ownership. Successful vertical separation therefore requires a degree of maturity and a professional approach to ensure that all decisions are ultimately in the best interests of the overall rail industry. [9/AU]

6. Difficulties to harmonize the technologies and to optimize train operation on the network

As the major potential problem of vertical separation, the interviewee indicated a risk of loss of control of the interface between wheel and rail, and the associated specialist knowledge.[9/AU]

7. Loss of flexibility of controlling trains/crews

The increase of market segment won by new operators tends to result in some sub-optimisation and loss of flexibility. For example, it is difficult to exchange drivers and conductors among different operators. If one operator operates on a certain railway network, the schedule for drivers and conductors can be planned more efficiently and flexibly. For example, facing an accident it is possible for a sole operator to change the schedule of trains/crews according to the situation quickly. This kind of flexibility is one of the advantages for an integrated/franchised railway, which a single operator controls train operation on the network. [6/UK, 7/DE]

8. Several challenges for passenger competitive bidding

"Franchising rather than open access appears the obvious way of introducing competition into [the passenger] sector."(ECMT, 2005b p.75) Nevertheless, some challenges are also indicated during the interviews such as difficulties in assessing franchising proposal: the franchise assessments must be based on

various factors. In addition to a business plan, the proposal should be assessed in terms of service level, the amount of dividends/subsidies, the necessary investment into infrastructure, and so on. It is not easy task for a (regional) authority to judge various proposals. Without clear standards, a judgement of the proposals tends to be obscure, and in some cases it might be done subjectively. Thus a transparent franchising bidding system should be established; otherwise the influence and control by government officials tend to be strengthened through the assessment of the proposals. [6/UK, 7/DE]

5.7.3 Results of the Aims

The results of the aims of railway reform, which were studied in Section 5.4, are summarized as follows.

5.7.3.1 Sweden

(1) Since the railways have been put on an equal footing with other modes through the vertical separation, the government has actively invested into the infrastructure and its renewal.[16]

(2) The government supports for the railway sector financially. Especially, the reform made it possible to keep and develop lines that have a high degree of socio-economic importance.

The restructuring of the sector coincides with several improvements such as the increase of the traffic volumes. In addition, it was indicated that railway operations have become more efficient.[17] Certainly some conflicts among different entities such

[16] In February 2004, the government adopted Banverket's action plan for the period 2004-2015. The plan consists of investments in the infrastructure amounting to a total of SEK 108 billion and SEK 38 billion for maintenance. The increased investment framework is a clear indication on the part of the government that the railways are an important mode of transport.(Banverket, 2004a)

[17] Despite the increase of traffic performance, the number of employees has decreased since the reform, and labour productivity has increased accordingly. (CER, 2005)

as difficulties in timetabling and coordination among franchisees were indicated.[5/SE] But the initial aims appear to have been achieved by and large.

5.7.3.2 UK

(1) As a positive result since the reform involving the private sector, the traffic volumes both in the passenger and the freight sectors have increased sharply.
(2) Despite the replacement of Railtrack with a not-for-dividend company in 2002, privatisation of BR was attained through vertical separation. And, competition 'in' the market has become common in the freight sector, and competition 'for' the market is prevalent among private operators in the passenger sector.

Similar to the results of the Swedish railways, the rail transportation volumes both in the passenger and freight sectors have increased since the railway reform. Certainly it needs further research to clarify it, but one or both of the following factors are expected to be the reason for the increase: 1) external reasons such as congestion of roads and state of the economy; and/or 2) operators' efforts and appropriate marketing strategy such as adjusting tickets fares and so on. Along with the above-mentioned favourable changes, some disadvantages, most of which are coordination issues raised by the vertical separation, are also indicated. [6/UK]

5.7.3.3 Germany

(1) The transportation volumes both in the passenger and the freight sectors have increased since the reform and the liberalization of the railway sector.
(2) Based on the open access regulation, at present the freight operators perform their operation in a commercial basis.[18] Since the regionalisation in 1996, the

[18] In the freight sector, rail transport performance of competitors of DB AG also has been increasing since the liberalization, although their market share remains around 10 percent. (DB AG, 2005)

regional governments are responsible for the regional passenger rail transport. Behind the background of necessity for subsidy in the passenger sector, the regional governments are involved in providing the level of services in practice.

(3) Germany takes the basic approach in track access charges to cover the costs for the operational process, such as those for traffic management, maintenance, and salary. Thus DB AG has been financially viable since the reform.[19] (ECMT, 2005b)

DB AG is regarded as a vertically integrated railway from the view-point of that it owns both infrastructure and operation. Accordingly, it was not indicated that so much coordination problems exist within DB AG compared with other vertically separated railways discussed in this chapter. Nevertheless, based on the regulation of open access, DB AG must grant third parties access without discrimination. It is expected that the increase of the number and the market proportion of the new competitive operators will change the characteristics of the railway sector as the relationships between DB Netz and the new entrants should be different from those within DB AG.

5.7.3.4 France

(1) Following EC Directives the infrastructure manager, RFF, started to be in charge of allocating infrastructure capacities on the national rail network to applicants since 2003. (CER, 2005 p.99)

(2) Despite the intention to realize integrated control, the institutional reform has increased the internal works even within SNCF and RFF.

Compared with the model in Sweden and UK, SNCF keeps operational autonomy in the respect that the main operator is in charge of making working timetable and infrastructure maintenance. Nevertheless, different from the initial intention,

[19] "It is said that 60% of infrastructure expenditure (including loans and grants) is covered by charges."(ECMT, 2005b p.99)

vertical separation has increased coordination problems even between SNCF and RFF. For example, now the procedure for timetabling takes more works and longer time compared with the former situation as described in Section 5.5. It was also indicated that this bureaucratic procedure makes it difficult to plan flexible timetabling such as setting special trains and should result in losing chances to get revenues.[8/FR] As described in Section 5.5.2, there are also conflicts concerning infrastructure maintenance between SNCF and RFF in spite of the contract between the two.

The relationship between the new entrants and RFF would be different from that between SNCF and RFF. Thus, as it is also the case in Germany, it is expected that the increase of new competitive operators changes the current structure of the railway industry.

5.7.3.5 Australia

(1) Competition among freight rail operators is occurring on all principal parts of the ARTC network with at least two competing freight operators on each interstate corridor.[9/AU] Thus ARTC has been working as the National interstate rail network as it was initially intended.

(2) Rail freight market share has significantly increased on long corridor. For example, on the corridor connecting Melbourne-Adelaide-Perth, the rail market share has increased from around 65% in 1997 to approximately 80% in 2005. [9/AU]

As it was revealed above, the original aims have been attained. Establishment of ARTC has promoted rail investment, and most of its funds for the interstate corridors come from the Commonwealth Government through AusLink programme.[20][9/AU] Much of the growth in the rail task since 1997 is considered

[20] The recent infrastructure investment funding for the ARTC network is for AU $2 billion over five years which is roughly the equivalent funding for the same network

attributable to the increased corridor capacity through the large investments and to introduction of on-track competition which, in turn, has led to a reduction in freight charges and improved service levels. [9/AU]

5.8 Conclusion

In European railways and ARTC, vertical separation was introduced mainly in order to promote competition among operators. In the freight sector of these countries competition 'in' the market has become common already. The transition of rail freight performance in France and that in the other further liberalized four railways are contrasting. Some interviewees indicated that on-track competition among freight operators has resulted in the increase of rail traffic performance.[5/SE, 9/AU] Although further research is required to prove it clearly, there are possibilities of validity that on-track competition is effective to improve the rail freight performance in certain circumstances.

In the passenger sector, rail transport has improved after their liberalization and regionalization in these European railways. But, partly because the examples are so limited, the effectiveness of on-track competition has not been clarified. Behind this background, there is generally a need for subsidy for the passenger rail services. For example, in Germany even though open access is admitted by regulation, attempts at open access entry into the market have been very limited. It should be possible that competitive entry into the rail passenger market, such as an entry to only peak hours, reduces a part of the subsidised operator's profit by 'cream skimming', and results in an increase of the amount of subsidy. Thus it appears that passenger franchising has more advantages to preserve an integrated network of rail services permitting tolerable cross-subsidy within the franchised network, whereby the operator avoids wasteful competition and makes the most of limited amount of subsidy.

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over the preceding 20 years. [9/AU]

In Sweden, UK, France and Australia (ARTC), legally and financially independent institutions have become responsible for the infrastructure and operation respectively. Except the case in UK, where the privatized company was responsible for the infrastructure, the public sector has become responsible for the infrastructure. Certainly, this is advantageous for facilitating public investment into the infrastructure fairly as all the investment can be channelled to the state-owned infrastructure rather than to a specific operator, and this has been the case especially in Sweden and Australia (ARTC).[21]

Nevertheless, the study also found that this type of separation changes the structure of the railway industry drastically and makes it complex. Accordingly, some conflicts between infrastructure and operation and those among operators on the same track have been raised in these railways. For example, at the time of timetabling the infrastructure manager faces many difficulties to coordinate a number of time-slots applications especially in case infrastructure capacity is limited.[5/SE, 6/UK, 9/AU] In addition to these coordination problems, the study identified that the reform has changed the staff's way of thinking, and the members of staff in separated institutions started to make efforts only for the institution they belong to. The interview found it is also the case in France, where the top manager (Gallois, L., 2002) had a strong intention to keep a close relationship between infrastructure and operation in the process of railway operation. [8/FR]

In Germany, the main railway (DB AG) keeps a holding structure and intends to avoid coordination problems. Nevertheless, according as competitive new entrants take the share of the rail market, complete separation which infrastructure and operation are totally independent will increase. This is also the case in France, where the main operator (SNCF) currently takes responsibility for making working timetable and for maintenance and operation of the infrastructure as well.

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[21] It is also the case in UK since Railtrack was replaced by Network Rail, which is committed to achieving a substantial improvement in rail infrastructure.(Rail Freight Group, 2007 p.16)

The investigation found the possibility of validity that complete separation can lead to increase of the freight rail transport through promoting on-track competition. In the passenger sector, this model is the most appropriate for promoting new entry to the rail services through franchising. But it is also found that complete separation raises several coordination problems. Thus, upon introducing the form for within-rail competition[22], full costs and benefits should be considered.

[22]. As investigated in the study, "on-track competition" is principally utilized for the freight sector and "franchising" is utilized for the passenger sector. In this thesis, especially from Chapters 8 to 10, without particular explanation in the sentence, "within-rail competition" refers *both* "on-track competition" *and* "franchising" through operational separation between infrastructure and operation.

CHAPTER 6:
RAILWAYS WITH VERTICAL SEPARATION FOR PASSENGER OR FREIGHT TRAFFIC
- IRAN, JAPAN (JR FREIGHT) AND USA (AMTRAK) -

6.1 Introduction

This chapter investigates the railway reform with vertical separation for passenger or freight traffic. Specifically, the author examines the railway reform in Iran (Raja Co.), Japan (JR Freight) and the United States (Amtrak). After reviewing the background and outline of the recent reform of each railway, it is examined in terms of the four key issues.

In these countries, the railway in the prime market keeps an integrated structure and another railway in the smaller/minor market has become a tenant on the main railway. Table 6.1 shows passenger-km as a percentage of traffic units (combination of passenger-km and freight tonne-km).

Table 6.1 Units of Traffic by Market Sector in the Three Countries

Country	Passenger-km (million)	Freight tonne-km (million)	Passenger-km / Traffic units
Iran	10,012	18,182	36%
Japan	241,980	22,264	92%
USA	8,800	2,427,268	0.4%

Source: Author's analysis of UIC statistics for 2004

As Table 6.1 shows these three countries, especially Japan and USA, have particular characteristics that one of the sectors dominates in the rail transport market.

6.2 The Background and Outline of the Recent Reform

6.2.1 Iran (Raja Co.)

Since transport and communication are considered as a prerequisite in any economic development, Islamic Republic of Iran (IRI)'s authorities have paid special attention to the development of transport and communication especially through railways. The structure of the railway was changed in 1990 from that of a state-owned entity to a limited company affiliated to the Ministry of Roads and Transport. In 1996 Raja Passenger Trains (Raja Co.), which affiliates to Railways of the Islamic Republic of Iran (RAI), was established to manage and operate passenger rail services on the network of RAI. (Harris, K., 2003) As all shares of Raja Co. are owned by RAI, the two organizations belong to the same ownership.[1]

Raja Co. is charged with the operation, marketing and ticketing of all passenger services on RAI's network. "Its wide-ranging brief includes the development and upgrading of the passenger coaching fleet, including participating in the procurement of new locomotives and rolling stock, the development of domestic passenger service and facilities, managing the concessioning of train operations to private-sector companies, encouraging joint-venture projects to develop passenger rail transport in Iran [and neighbour countries]." (Harris, K., 2003 p.228)

6.2.2 Japan (JR Freight)

Different from most other countries, freight revenue has almost always been less than passenger revenue throughout the history of the Japanese National Railways (JNR). JNR's freight business had accumulated such heavy debts that it threatened JNR's financial viability as a whole. (Aoki, E. et al., 2000)

In April 1987, JNR was reformed and split into six passenger companies and a single freight company (JR Freight). In the passenger sector, the division into the

[1] Similar to DB AG, it appears the definition of vertical separation does not exactly apply to the type of separation in Iran.

six companies was considered as one of the indispensable factors of JNR's reform in order to promote efficient management based on each region and to eliminate cross-subsidy among the different regions. In the freight sector, the operations became an independent entity covering a single nation-wide freight transport business. It was because, different from the passenger sector, generally the distance of conveyance is much longer and more than 60 % of rail freight transport is crossing the border among the divided passenger companies.(Kato, H., 2007) In this process, the unprofitable freight division was separated from the passenger division borrowing the trunk line sections of the passenger railway companies.

In a few cases JR Freight also accesses the lines owned by the public sector or JR Freight itself. As these cases are exceptional, this paper focuses on the vertical separation where JR Freight accesses the six JR Passenger Companies' tracks.

6.2.3 USA (Amtrak)

Similar to the cases in other countries, competition from automobiles and buses gradually eroded the rail market share in the US. Apparent losses on passenger service began to mount rapidly and, for many years, about half of the total net income from the private US freight railroad industry was being absorbed by losses on passenger services. Thus, the financial viability of many freight carriers and the entire railway industry was threatened. (Thompson, L., 2003b p.3)

"In 1970, the National Railroad Passenger Corporation (Amtrak) was created by Congress to relieve the freight railroads of the burden of money-losing passenger operations and to preserve rail passenger service over a national system of Congressionally-designated routes."(Amtrak Reform Council, 2002) Amtrak was created as a for-profit government corporation that was granted a monopoly to provide intercity rail transportation over its route system and was to receive Federal subsidies for the first few years, but then it was expected to make a

profit.(*ibid.*)

Briefly, Amtrak operates in two different ways. On tracks of the private freight railways, Amtrak operates as an infrastructure separated tenant on them. Another way is on the Northeast Corridor where Amtrak, as an integrated railway, is the owner and a number of commuter operators and freight railways are tenants. This paper investigates the vertical separation where Amtrak accesses freight railways' tracks based on the following reasons:

1) This case is dominant in terms of track length covering the vast majority of lines in the US;
2) Separation of the passenger sector from the freight sector was the central issue in the railway reform in the US.

6.3 Aims of the Reform through Vertical Separation

The three railways have introduced vertical separation for passenger or freight traffic in the process of their reform, and the aims are summarised in Table 6.2.

Table 6.2 Aims of the Reform through Vertical Separation for Passenger or Freight Traffic

Country (Tenant)	Aims of the reform through vertical separation
Iran (Raja Co.)	(1) to promote private participation and investments in the passenger railway market through releasing the new entrants from the burden of infrastructure costs. (2) to specialize in operational management to improve market orientated service/management.
Japan (JR Freight)	(1) to ensure that the new Passenger Companies have a stable revenue base through the separation of unprofitable freight operations. (2) to release JR Freight from track maintenance for reducing its operational cost.
USA (Amtrak)	(1) to rescue freight railroads from passenger deficits. (2) to rescue passenger services from freight management.

Source: ▪ Interviews to the three railways, RAI, JR Freight and Amtrak.[10/IR,11/JP,12/US]
▪ Fukui, K.(1992)

In Japan (JR Freight) and USA (Amtrak), the background and aims for introducing vertical separation have common features to rescue the railway services in the main market from the deficits of those in the smaller market. For example, it was not possible for Amtrak to own its own right of way in most cases, as it typically only operates one train per day in each direction on most long distance lines. Also, on most lines, the freight railways are the dominant operator. Thus, as with JR Freight, it makes sense for Amtrak to be a tenant. [12/US]

On the other hand, the main aim for establishing Raja Co. was to promote private participation and investments to the passenger railway market through releasing the new entrants from the burden of infrastructure costs, and to specialize in market orientated service and management.

6.4 Forms and Implementation of the Vertical Separation

6.4.1 Forms of the Vertical Separation

Forms of the vertical separation in the three railways are summarised in Table 6.3.

Table 6.3 Forms of the Vertical Separation for Passenger or Freight Traffic

Country (Tenant)	Forms of the Vertical Separation
Iran (Raja Co.)	Raja Co. accesses the RAI's tracks. Some private operators also access them in cooperation with Raja Co.
Japan (JR Freight)	Only JR Freight accesses the tracks of the JR Passenger Companies.
USA (Amtrak)	Amtrak accesses the tracks of the private freight railways as a sole inter-city operator.

Source: Author, based on the interviews to the three railways. [10/IR, 11/JP, 12/US]

In this type of separation, the main railway keeps an integrated structure in the prime market, and another operator, which operates in the smaller/minor rail market, accesses the track as a tenant.

6.4.2 Implementation of the Vertical Separation

6.4.2.1 Organizational Structure and Management with Vertical Separation

The results of investigation about the organizational structure with vertical separation and its management are summarised in Appendix 3.

In these railways the dominant integrated railway owns and principally invests into its infrastructure. It also makes a timetable negotiating with a tenant, and controls traffics. In Japan and the US, the integrated railway practically enjoys its advantageous status.

In Japan, timetables are coordinated through the regular meeting with JR passenger companies. In general, an infrastructure capacity on the main lines, which JR Freight operates, is approaching full by the passenger trains during the daytime. Thus JR Freight is obliged to operate its freight trains mainly in the night-time. Nevertheless, the coordination takes many efforts to be settled as the passenger companies have to perform infrastructure maintenance works at night. Despite the difficulties, the two sectors co-operate each other for the settlement, and they have not consulted with the Ministry for the coordination. Instead of consulting to the third parties, sometimes, JR freight itself invests into rolling stock or infrastructure to gain more time-slots or to increase the traffic capacity as explained in the next section.[11/JP]

In the US, Amtrak trains have a long-standing schedule and are by law given schedule and dispatching priority. Nevertheless, this causes some problems on freight lines as Amtrak frequently faces difficulties to get time-slots because of the shortage of infrastructure capacity. As a general matter, Amtrak trains are not given proper priority on freight lines and the trains suffer serious on-time reliability, but Amtrak has very little power to force better treatment from the freight railways.

When Amtrak has trouble getting access to the slots they want, the Surface Transportation Board (STB), the main regulatory agency, can deal with conflicts between Amtrak and a freight railroad.[2] [12/US]

6.4.2.2 Relationship among Different Parties and Relevant Issues

The results of interviews about relationship among different parties and relevant issues are summarized in Appendix 4.

In Iran the tenant can negotiate with the dominant integrated railway at equal standing. Nevertheless, despite its stipulation it is difficult for Amtrak to consult with freight railroads in the same way. As the two cases show, the relationship between the integrated dominant railway and the tenant varies, and it appears that the differences are based on the background of introducing the vertical separation: Japan and the US had an intention to separate the unprofitable minor division from the profitable dominant division. On the other hand, as two divisions belong to the same ownership in Iran, diminishing cross-subsidy was not the main aim for separating into RAI and Raja Co..

Despite the relatively disadvantageous status of the tenant, in order to cope with the difficulty to operate within severely limited time-slots, for example, JR Freight has made efforts to get time-slots or to increase transport capacity by some measures such as [11/JP]:

1. **Speeding up the freight trains:** In order to increase the number of freight trains, JR Freight invested in its rolling stock and electricity substation facilities for speeding up its trains. It is because JR passenger trains are usually faster than the freight trains, and speeding up freight trains makes it possible to operate more number of freight trains within severely limited time-slots;
2. **Making freight trains lengthened:** JR Freight tried to lengthen its trains in order

[2] In practice, the STB has rarely been involved, and they have had no real role in setting disputes over access or service quality. [12/US]

to transport more cargos by limited number of trains.

This kind of relationship between the dominant railway and the tenant is largely different from that in European railways, where several operators are treated equally under the infrastructure manager and the regulator.

6.5 Transition of Management of the Railways

6.5.1 Iran

6.5.1.1 Performance of RAI and Raja Co.

"In 1994 the government had decided to increase rail's share of the transport infrastructure budget to 30%. This resulted in 1,640 km route-km being built, with another 3,500 km of new line currently under construction. Many other options are under examination, and Iran is building more new railway than any country except China." (Brice, D., 2005 p.282)

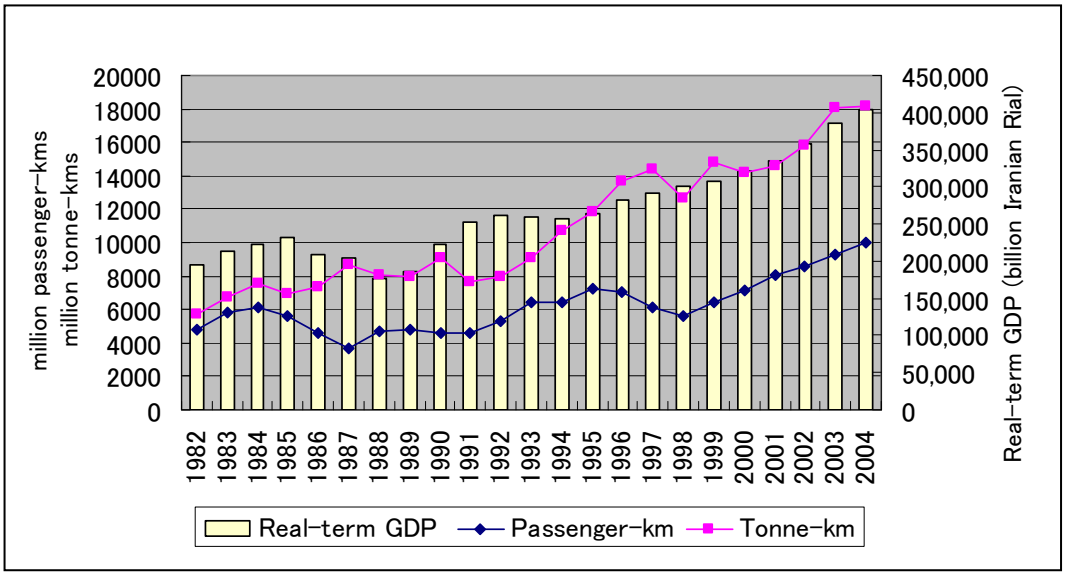

Figure 6.1 Traffic Trends of RAI and Raja Co.

Source: The World Bank's Railway Database
UIC Statistics 2005
International Monetary Fund (2008)

Accordingly, since the establishment of Raja Co. in 1996, in general, transport performances both in the freight and the passenger sectors have been increasing steadily along with the growth of real-term GDP as shown in Figure 6.1.

6.5.1.2 Private Participation into the Transport Service

The railway reform of RAI put special emphasis on promoting investment and participation from the private sector to reduce RAI's investment budget. The tariff of track access is stipulated by laws, and it is aimed to allow private operators to access RAI's tracks. It has been successful and investment from the private sector improved steadily both in the passenger and the freight sectors. [10/IR]

The investigation found that the private investment has been promoted in each division, the passenger and the freight, as follows:

1) Passenger Sector: Management Contract

Some domestic passenger services are operated under management contracts or concessions let by Raja Co.. By the interview in September 2005, there were four private companies in the passenger sector, and it is expected that the number would increase in the future. The access charge is stipulated in order to promote private participation. In other words, it is set so as to guarantee some amount of profits of the new entrants. Based on this stipulation, the new operators do not need to pay access charges in the passenger sector at present. [10/IR]

Two private companies, the Jupar Passenger Trains Company and Bonyad Eastern Railway own coaches, and the other two private companies, the Symorgh Ahanin Company and the Sabz Train Company, lease them from Raja Co.. In all the four cases, the private companies exchange a management contract with Raja Co., and in practice most of the essential factors of daily operation in the new companies are performed by RAI and Raja Co. based on the contract. For example, RAI or Raja Co.

dispatches the drivers to the private companies and performs timetabling, traction and train controlling. The private operating companies perform minor repairs such as those for wagon interior, but Raja Co. is responsible for overhaul and technical ones such as bogie repairs.[10/IR] The interviewee indicated that since a concession/management contract is exchanged on a regional basis and the private sector has entered to a part of railway system, regional passenger service reflecting local conditions has been achieved.[10/IR]

During the past five years, considerable efforts have been made to transfer the fleet to the private sector. All passenger coaches have been transferred to Raja Co. already. RAI and Raja Co. aim to develop domestic passenger facilities and coaches by means of private-sector participation in the market. The majority of locomotives are owned by RAI, but recently Raja Co. has started to purchase new locomotives as well. [10/IR]

2) Freight Sector: Transference of the Wagons

As the aim is full transference of the fleet to the private sector, RAI has been promoting transference of its wagons as well.

Private companies also invest in the fleet by themselves. Those who have invested in fleet are often ex-clients such as steel and automobile companies, and can be divided into the two groups:

1. fully private companies active in freight transportation;
2. the joint companies established by partnership with RAI.

In order to promote private investment there are two methods of financing new wagons:

1. Partial payment by RAI/Government

   A part of the capital is paid by a private company and the other parts are paid by RAI/Government in the form of long-term loans with a proper rate of interest.
2. Loan credit by RAI

RAI offers credit to the bank which lends the necessary funds to a private company as shown in Figure 6.2.

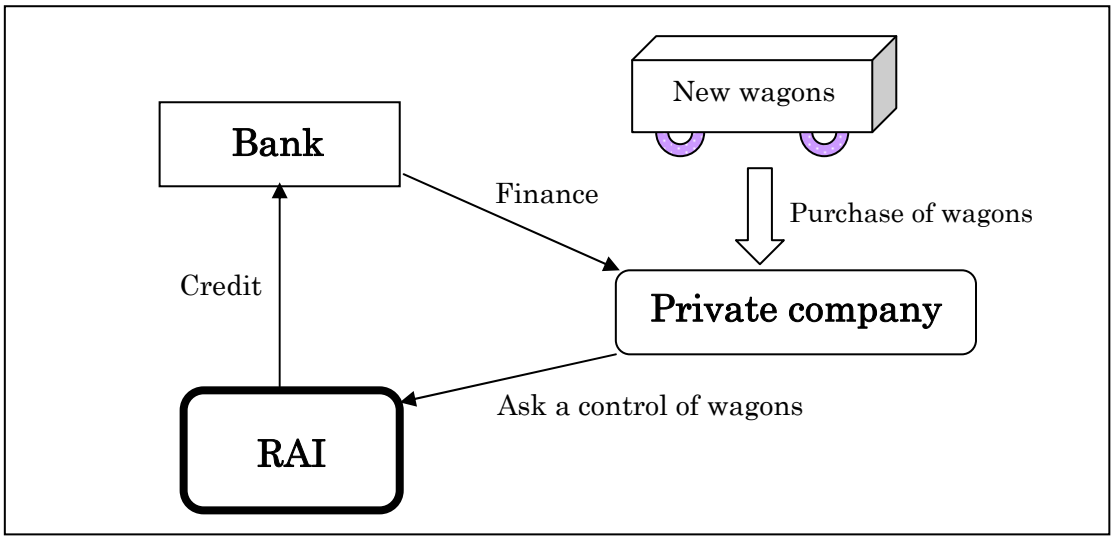

Figure 6.2 A Private Company's Procurement of Wagons through Loan Credit
Source: Author, based on the interviews to RAI. [10/IR]

As the above cases show RAI actively supports private companies in their purchasing the wagons.

RAI also has been transferring its existing wagons to private companies for promoting private investment. Up to the interview in September 2005, about 30 % of the existing freight wagons had been transferred to the private sector. The rest of freight wagons were also planned to be transferred to private companies in due course. They need to ask traction of wagons to RAI, who is the owner of locomotives. [10/IR]

The maintenance works were also transferred to the private sector when the wagons were sold or leased out, and RAI intends to assign all the maintenance works to the private sector because the government has an intention to increase the role of the private sector in the railway industry. [10/IR]

3) Future Prospects

Until the interview, private participation had been achieved through coordination

by the main operators, RAI and Raja Co.. Thus, there was no severe on-track competition among operators, and the above main operators coordinated railway operations including those of the new participants.

Nevertheless, the bills which were approved in 1999 stipulate open access to the railway networks. Thus, even though there is no such competitive new participant at present, it has become possible for new entrants to access the networks competitively. The bills might change the current operation and management of the railways coordinated by the main operators.

6.5.2 Japan (JR Freight)

6.5.2.1 Performance of JR Freight

Figure 6.3 compares the traffic output (freight tonne-kms) with the real-term GDP, and shows that the traffic output had been in serious down-turn trend since 1970's until the reform in 1987 despite the rapid growth of the real-term GDP.

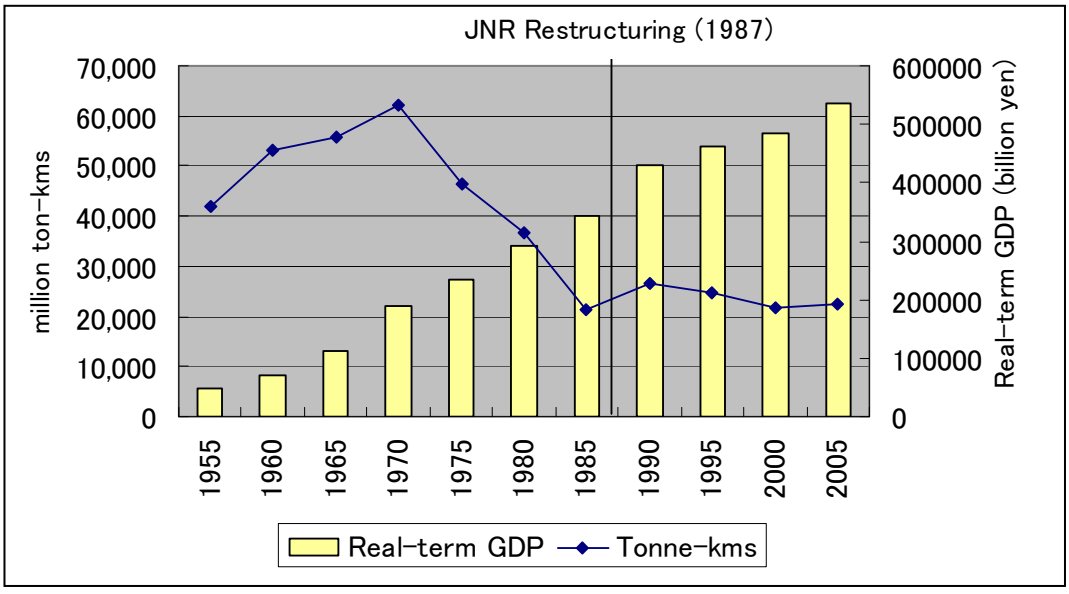

Figure 6.3 Trend of Rail Freight Transport in Japan
Source: Ministry of Land and Transport (1990 - 2006)
International Monetary Fund (2008)

Nevertheless, the trend has been clearly changed during the period of JNR Restructuring and JR Freight has been keeping a steady performance since the reform. Although the government still owns the shares, JR Freight has become an independent company and keeps financial balance. And this statistical transition suggests the favourable managerial change and the active business operations as an independent company since the restructuring.

Fukui, K. (1992 p.79) explains several reasons for this favourable change:

1) The Japanese economy has experienced a steady growth since 1987 and this has increased the demand for transportation as a whole;
2) Truck transport operates at full capacity and has limited prospects for increasing this capacity due to highway congestion and a shortage of long-distance truck drivers;
3) JR Freight itself has endeavoured to design schedules which accommodate the needs of its customers and make services more convenient.

The interviewee stressed managerial efforts as an independent company, the third reason in the above, as an essential reason for the favourable change. For example, the freight sector of JNR was engaged only in the freight railway transport before the restructuring. Thus it was common that freight customers also had to ask for trucks to transport from the sender to the marshalling yard. After the conveyance by railways, the different transport arrangement from another marshalling yard to the final destination was also frequently required. Certainly, the unfavourable results during the JNR era were partly because of regulatory limitation of the business scope imposed to JNR. Nevertheless, JR Freight has been actively engaged in the freight transport expanding the former business scope. JR Freight manages, as one-stop shop, transport services from the sender to the final destination including truck transportation. [11/JP]

In addition, along with promoting one-stop shop services, JR Freight has also endeavoured to establish a highly efficient transport system shifting from freight

wagons to containers. JR Freight attained it through 1) increasing train speeds, 2) improving container capacity, and 3) advanced IT-system. As a result, the container transport has increased from 13.8 million tonne to 23.2 million tonne, and its share in JR-Freight has also increased from 25% to 63% in 20 years since 1987.(Ito, N., 2008)

This kind of active business attitude has become realizable as a result of corporatization of JR Freight.[3]

6.5.2.2 Performance of JR Passenger Companies

Figure 6.4 shows that, similar to the freight performance, the passenger sector had failed to improve its output until the JNR reform despite the growth of the economy. Nevertheless, since the period of the restructuring passenger traffic transported by the six JR passenger railway companies started to increase with much higher rate than before, and this implies improvement of the management of the railways through the reform and the active business performance by the companies since then. This growth rate is higher than that of other Japanese private railways, which had experienced higher rates than JNR before restructuring, and it has greatly exceeded the standards set by the Supervisory Committee before the JNR Restructuring. Government subsidies have declined substantially and the JRs pay large sums in corporate taxes, thereby contributing to the government finances. (Fukui K., 1992)

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[3] In Japan, although JR Freight is still a sole operator in the freight sector, corporatization in 1987 has improved its business attitude to more customer-oriented. For example, it has negotiated with an automobile company, Toyota, and JR Freight started to operate dedicated freight train for the company. The train transports only Toyota's automobile component between its two factories, and JR Freight succeeded in acquiring a new customer, which used to utilize trucks.(Transport Newspaper, 2007)

This case shows that a change of the organizational status of an operator can improve its business attitude. Furthermore, this example shows the customer also might have attained its aim to transport its own cargo more efficiently and economically rather than its direct entry into a rail transport service, which results in an increase of the number of operators raising some coordination problems within the sector.

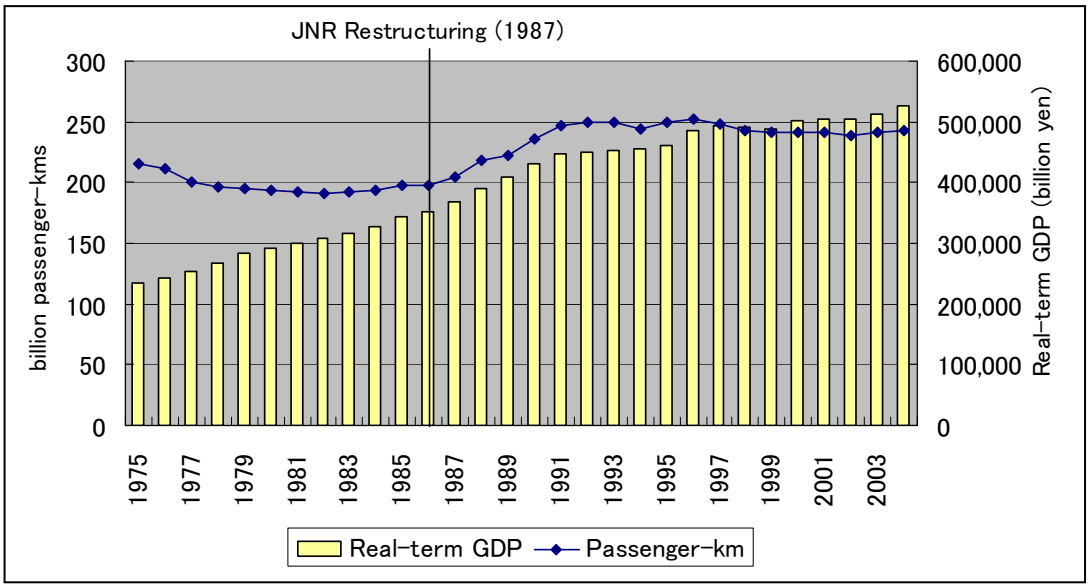

Figure 6.4 Trend of Rail Passenger Transport in Japan *1

Source: Ministry of Land and Transport (1990 – 2006)
International Monetary Fund (2008)

*1: The figure includes the passenger transport of JNR and the six JRs. It does not include that of other private railways.

Reflecting the expansion in transport volume, the operating revenues of the JRs have also increased. Following JR East and JR West, the whole shares of JR Central were listed in 2006, and these three JR Passenger Companies have been fully privatized already. This means that the reform through vertical separation had played a role to promote public listing of shares of the railways, even though it did not intended to introduce within-rail competition. Public listing of shares is regarded as one of the forms of private participation into the railway industry, and it can be attained without increasing the number of operators, which tends to increase coordination problems within the industry.

6.5.3 USA (Amtrak)

6.5.3.1 Performance of Amtrak

The establishment of Amtrak did succeed in shifting the passenger deficits to the (mostly Federal) public sector, and Amtrak has been supported by Federal capital and operating grants. Even after the expenditure of around US $25.6 billion to date funded through the Federal Railroad Administration in the US DOT, Amtrak has generated a continuing series of political and financial crises along with a number of different attempts at restructuring. (Thompson, L., 2003b p.5)

Eliminating autos and trucks, Amtrak carries less than 1 percent of common carrier intercity passenger-km, with 71 percent carried by air and 22 percent by bus. As Figure 6.5 shows, Amtrak's traffic in passenger-km has actually fallen below its peak in 1991. In the US context, Amtrak is not a significant factor in the overall passenger transport market, though it does play a role in some individual markets.(*ibid.*)

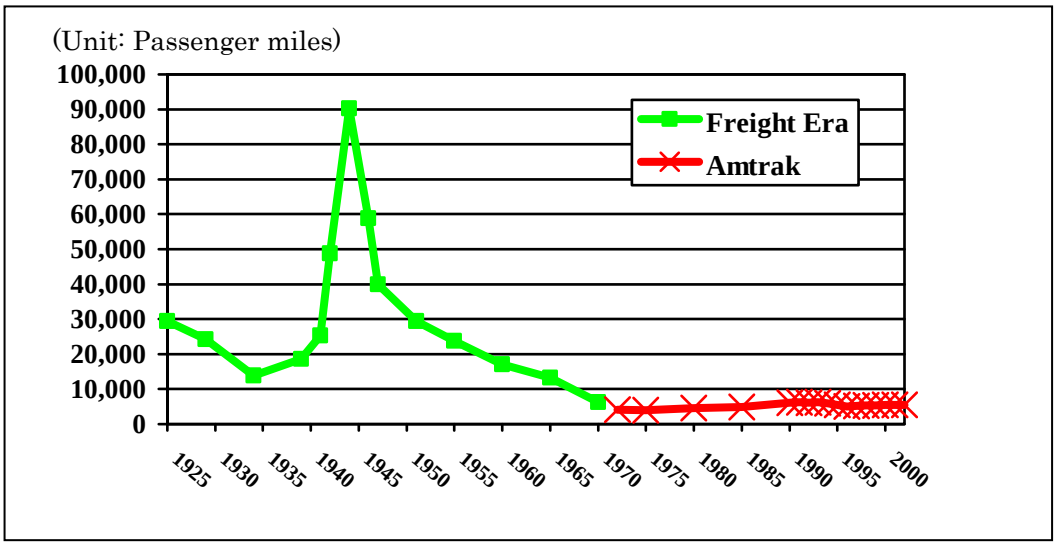

Figure 6.5 Trend of Rail Passenger Transport in the US
Source: Thompson, L. (2003b)

6.5.3.2 Performance of Freight Railroads

Since the railway companies' decision to pull out of the passenger market and to concentrate on the freight in 1970, "the railroads began by focusing their efforts on developing long distance heavy haul to kill off competition from the roads by giving

priority to bulk." (Batisse, F., 2003 p.14)

For example, "many lines have been down-graded to single track with very basic signalling equipment, long block sections and loop lines to avoid gradients to the detriment of speed. [Nevertheless, in the United States,] it is not train speeds that count but the robustness of the track to cater to 30 tonne axle-loads."(*ibid.* p.14) The freight trains tend to be "2,000 metres in length, three times longer than the European maximum and, in particular, have an average charged weight of 2,650 tonnes as opposed to the European 350 tonnes."(*ibid.* p.17) "Freight traffic doubled between 1970 and 1998 as a result of 100 billion dollars worth of investment in infrastructure upgrading and new sophisticated rolling stock." (*ibid.* p.15)

As the above changes show, the American railroads turned to freight for their survival and prosperity since the introduction of vertical separation in 1970. Following partial deregulation through the Staggers Rail Act of 1980, the US rail market share (measured in ton-miles) bottomed out at 35 percent at the end of the 1970s and has trended slowly upward after decades of steady decline. In 2004 freight railroads move 42 percent of the nation's intercity freight ton-miles, more than any other mode of transportation. Rail traffic volumes rose by 81 percent and rail productivity increased by 180 percent during the period between 1980 and 2004. Railroads also have been able to upgrade their systems, reinvest in productive rail infrastructure and equipment, provide higher levels of service, and improve safety – while at the same time sharply lowering rates for shippers. (Hamberger, E., 2004)

6.6 Advantages, Disadvantages and Results

During the interviews/questionnaires the following advantages and disadvantages were indicated for the vertical separation in the three railways.

6.6.1 Advantages

1. Improving the focus on service efforts on either the passenger or the freight

In all the three cases, the interviewee indicated that concentration on each transport market is an essential advantage.[10/IR, 11/JP, 12/US] Additionally, elimination of cross-subsidies between the two sectors was the primary objective of the vertical separation in Japan and the US. [11/JP, 12/US]

2. Clear definition of the government's role

In the US, as the result of elimination of the cross-subsidies that brought the revival of the freight railways, vertical separation made the government define what Amtrak should do and what the government itself has to pay for. [12/US]

3. Relieving one of the sectors of the infrastructure costs

One of the sectors could be free from the burden of infrastructure costs. Thus, this sector's condition could become similar to that of other modes of transport, whose infrastructure is generally supported by the government. RAI indicated this advantage as its passenger sector could be relieved of the infrastructure costs. [10/IR] Even though another dominant sector sustains the infrastructure, this type of vertical separation can lead to putting the tenant on equal footing with other transport modes.

6.6.2 Disadvantages

1. Loss of economies of scope

The structure of this type is the combination of an integrated dominant railway and a tenant accessing it. As the passenger and the freight sectors are operated by different organizations and have some transaction costs between the two, RAI indicated that this model of vertical separation has a risk of leading into loss of economies of scope. [10/IR]

2. Damage of tracks

RAI worries about the damage of tracks raised by ill-conditioned rolling stock since the introduction of vertical separation. RAI indicated a necessity to check rolling stock through appropriate means in order to keep the condition of tracks and prevent disputes among operators when several operators access the same track.[4] [10/IR]

6.6.3 Results of the Aims

The results of the aims of the reform through vertical separation examined in Section 6.3 are summarized as follows.

6.6.3.1 Iran (Raja Co.)

(1) RAI has been in success in improving private participation to a transport service as examined in Section 6.5.
(2) The interviewee regarded concentration on the business in each market as one of the main factors for improvement of the rail transport. [10/IR]

Thus the interviewee recognizes that the aims of the reform through vertical separation were achieved by and large in Iran. [10/IR]

6.6.3.2 Japan (JR Freight)

(1) The management of the new JR Passenger Companies has been much better than that in the JNR' era. Elimination of the cross-subsidies from the passenger sector to the freight sector has contributed to the improvement.

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[4] JR Freight inspects the wagons even if they are owned by other private companies, and this kind of measures contributes to prevent disputes with the dominant integrated operator.[11/JP]

(2) JR Freight had only about twelve thousand employees at the time of its establishment in 1987. Moreover, the number has decreased into less than eight thousand in 2005. It is impossible for JR Freight to perform track maintenance of wide rail network in Japan. The restructuring through vertical separation released JR Freight from track maintenance and the personnel for the works, and contributed to its balanced management.

Consequently, the interviewee recognizes that the establishment of JR Freight has achieved its objectives. [11/JP]

6.6.3.3 USA (Amtrak)

(1) Separation of management and financial responsibility of the freight from the passenger services has been achieved, and US private railroads concentrated on the freight service since that time.
(2) Cross-subsidies have been eliminated, and the result has been a clearer definition of what Amtrak does and what the government has to pay for. [12/US]

Thus the interviewee believes that the establishment of Amtrak has achieved its objectives by and large, and does not think there have been many problems created by the separation of Amtrak from freight lines. [12/US]

6.7 Conclusion

This chapter has investigated the three railways with vertical separation for passenger or freight traffic. In these countries, the railway in the prime sector, either the passenger or the freight, retained an integrated structure and another in the smaller/minor sector had become a tenant. The results of the investigation are summarized:

- In all the three railways, the integrated dominant railway principally performs the essential factors of daily operation such as timetabling, train control, signalling, investment and maintenance of infrastructure;
- Promoting private participation and investments was one of the most essential objectives of vertical separation in Iran, and it has been performed in the passenger sector as the new entrants were released from the burden of infrastructure costs.[10/IR] Nevertheless, as Raja Co. is in charge of private participation letting management contract or concession, this is not for within-rail competition with the incumbent operator;
- In Japan and the US, elimination of the excess cross-subsidies between the two sectors was the primary reason for introducing vertical separation. Since the reform through separation, the integrated railway has improved at a higher rate than before. In Japan the reform has contributed to list the shares of the three large passenger companies. In the US it has also resulted in clearer definition of the government's financial role for the tenant [12/US], and revitalized the management by the private freight railroads. In both cases, the reform has contributed to improve/retain the private participation into the railway industry;
- In the US and Japan, in practice, the tenant faces some difficulties to get its time slots. This is expected to be derived from the background of introduction of the vertical separation to rescue the dominant railway. In Japan, in spite of its status as a tenant, management efforts as an independent company, focusing on its own market, have resulted in the increase of freight rail transport as well. [11/JP]

In summary, as the three cases show, improving the focus on services in each transport market was an important objective/advantage for the reform through this type of vertical separation. Additionally, elimination of excess cross-subsidy between the two sectors has successfully worked for strengthening the competitive sector in Japan and the US.

In these three cases within-rail competition is not aimed, and the laws concerned permit those operators to retain relatively exclusive track-access rights in general.

Based on this regulation, the incumbent/reformed operators continue their railway operation even after the reform.

Generally, this type of vertical separation appears to be a very successful approach in case one of the sectors is dominant and profitable enough to sustain the infrastructure, and another sector takes the only small rail market. As the dominant railway keeps an integrated structure, in principle, coordination problems through the separation of infrastructure and operation, such as difficulties to get time-slots fairly, can be confined only to the small rail market.

CHAPTER 7:
PRIVATE RAILWAYS WITH LONG-RUN ACCESS TO INFRASTRUCTURE
- MEXICO AND TWO NEWLY-ORGANIZED LINES IN JAPAN -

7.1 Introduction

This chapter investigates private railways with long-run access to infrastructure.

Firstly, the author examines the railway reform in Mexico, where significant changes in sectoral performances were brought about through long-run concessions.[1] Long-run concessions have been widely adopted in railways in Latin America and some countries in Africa. In these countries the state-owned railways were privatized, and a railway operator as a private concessionaire manages the infrastructure whose ownership is retained by the government. In addition to the freight concessionaires, this chapter investigates the Mexico City Terminal Railway, which the above freight concessionaires access the marshalling yard and terminal facilities in Mexico City.

Then, this chapter examines newly-organized lines with public investment in infrastructure in Japan focusing the two cases:

1) New Shinkansen lines, which were constructed after the privatization of JNR;
2) Aoimori Railway, which is a conventional line separated from a JR Passenger Company.

Different from the former cases, vertical separation in these two cases is not for the reform of state railway itself, and public investment has been utilized for

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[1] Galenson, A. and Thompson, L.(1993 p.4) notes that "concessions are a form of lease in which the contractor agrees to make certain fixed investments and retains the use of the assets for a longer contract period."
In February 2006, the author had made a questionnaire to one of the freight concessionaires in Argentine, which had experienced a long-run concession as well. As the results of the questionnaire were, in general, similar to those in Mexico in terms of vertical separation, the author discusses only the case in Mexico as the case of long-run concessions.

constructing or sustaining a certain line.

7.2 The Background and Outline of the Reform

7.2.1 Long-Run Concessions in Mexico

7.2.1.1 Freight Concessionaires: TFM, Ferromex

Ferrocarriles Nacionales de Mexico (FNM) was an integrated monopolistic railroad controlled by the Transport Ministry. Following problems were present in the Mexican railway sector before the privatization process (Federal Competition Commission, 2001):

- The rail services needed considerable public subsidies;
- The track network had not been enlarged for decades; and
- Infrastructure became out of date and poor quality.

The Mexican government recognized the deterioration of its rail sector and considered that the financial drains in the sector were due to inefficiency and poor performance of it.[2]

Nevertheless, despite the necessity to promote investment into the railway sector, as it was common with other Latin American countries which had introduced concessioning, economic conditions of the country were not good enough to continue spending a large amount of public expenditure into the sector. This was the impetus to seek private financing even into the rail infrastructure, and this background was different from that of some European countries, of which government had an intention to promote public investment into the sector actively for revitalizing railways.

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[2] In 1994, the outlook of Mexican railway was: 1) the market share in freight traffic was only 15%; 2) the average speed of the freight trains was no more than 26 km/hr; 3) more than 1,000 operational accidents took place per year. (Federal Competition Commission, 2001)

After several institutional reforms within the existing system, in February 1995, the Mexican Congress approved to open opportunities for private sector investment within the railway system. A new sectoral law in May 1995 stipulated the general procedures for the investments into the railway sector and defined the conditions under which private participation in railways was going to be allowed. (Campos. J., 2001 p.90) Shaw, N. et al. (1996 p.3) notes the characteristics of concessions as:

1) A government defines and grants specific rights to a company (usually private);
2) A concession has a defined term (generally 5 to 50 years);
3) A concession is geographically delimited;
4) An agreement describes the concession's objectives and directly or implicitly allocates risk.

Through the concession, despite the ownership of the infrastructure by the government, the public sector withdraws from daily operation of the rail services and the private sector performs it including below-rail functions. The case in Mexico is one of the typical examples of transition from state-railway to private-operated railway by means of concessions.

In the reform the primary lines were divided into three geographical divisions, North-east, North-Pacific and South-east. The rest of the system formed the short lines. The three major railroad companies were chosen in such a way that they serve broadly parallel routes in order to enhance the following competition in major markets (OECD, 2003, p21):

1) competition on parallel tracks;
2) both source and end-market competition.

In addition, this regional segmentation scheme had an intention to enhance competition with road focusing on regional market needs by diminishing cross subsidies between the routes. (Federal Competition Commission, 2001)

The study focuses on the following three concessionaires[3]:

[3] TFM and Ferromex operate the two largest railroads in Mexico. Their freight traffic as a percentage of total is 37.6 % and 46.2% respectively in 1996. (Campos, J.,2002)

1) the North-eastern Railroad (TFM), which has been acquired by the TFM consortium;
2) the North-Pacific Railroad (Ferromex), which was acquired originally by Grupo Ferroviario Mexicano; and
3) the Mexico City Terminal Railway (TFVM).

Figure 7.1 Geographical Divisions of the Mexican Railway Network
Source: Federal Competition Commission (2001)

7.2.1.2 The Mexico City Terminal Railway : TFVM

As the three primary freight concessionaires access Mexico City, its rail terminal was formed into a separate company. The case of vertical separation in Mexico City's terminal, of which characteristics are different from the freight concessionaires, is also examined in this chapter.

The Mexican Government founded a neutral terminal access area for the Mexico City area, thus marshalling yard and terminal facilities in the Mexico City area are operated by an independent organisation, the Mexico City Terminal Railway (TFVM). TFVM has four owners: 25 percent each for the three main freight

concessionaires and 25 percent for the government. The government retains its share because it wants eventually to run commuter trains on one of the lines, and it would transfer the remaining 25 percent ownership to the concessionaire. Since April 1998 TFVM operates with total commercial autonomy and neutrality with respect to the owners. (Campos, J., 2001 p.94)

7.2.2 Regulation and Operation in Japanese Railways

7.2.2.1 The Japanese Railway Enterprises Act

In order to investigate regulatory reform of the two cases in Japan, it is worth understanding the Japanese Railway Enterprises Act, which Japanese railway activities are based on. Thus the Act is investigated in this section.

The division and corporatization of Japanese National Railways (JNR) on 1st April 1987 also changed the framework of the railway business. The Japanese National Railways Act and the Local and Private Railways Act were abolished and the Japanese Railway Enterprises Act was newly established. (Kamata, S., 1997 p.186) The Act stipulates that a railway license is necessary for an entry into the railway service. The Act classifies the railway licenses into the categories:

- **Class 1**: Enterprises that provide rail passenger and/or freight services while holding their own rail infrastructure;
- **Class 2** : Enterprises that provide rail passenger and/or freight services using rail infrastructure owned by another organization; and
- **Class 3** : Enterprises that own infrastructure only for renting it to a Class 2 Enterprise.[4]

[4] Actually, Class 3 also stipulates enterprises that build rail infrastructure for a sale to a Class 1 Enterprise. Nevertheless, the author does not deal with these enterprises in this paper as they have little relation to vertical separation defined in Chapter 2. The license for this case is applied to only construction process, and there are only a few examples in Japan at present.

Most railways in Japan are Class 1 Enterprises, but there is no one-to-one relationship between each rail enterprise and a type of license. As a licence is given to each line, it is possible for an enterprise to have different kinds of licenses. (Mizutani, F., 1999 p.256)

The direct reason for implementing the system of classification is to accommodate JR Freight, which was created by the division of JNR. JR Freight does not own the railway infrastructure but uses the JR Passenger Companies' infrastructure to run its trains. Thus it was designated as a Class 2 Enterprise.

Another reason for legally separating the categories is to promote investment. Because railway facilities are much larger today and require vast amounts of capital for construction, it is necessary to separate the construction/ownership of these facilities from the business of operating them. This capital burden strains railway business management and makes it more difficult to launch new railway lines. Therefore, to construct and sustain railways, it has proved necessary to divide railway enterprises into entities that construct and administer the railway and those that operate it, and to alleviate the capital burden of construction from the operating entity as much as possible. (Kamata, S., 1997 p.188)

In principle, the following combination of the enterprises can be regarded as "vertical separation" which is defined in Chapter 2.

Combination 1: A Class 2 Enterprise accesses the track of a Class 1 Enterprise.

Combination 2: A Class 2 Enterprise accesses the track of a Class 3 Enterprise.

An example of the Combination 1 is the relationship that JR Freight accesses the infrastructure of JR Passenger Companies.[5]

An example of the Combination 2 is the relationship that JR West accesses the

[5] In this case the JR Passenger Company only has a license of Class 1, and does not need to get a license of Class 3. Because a license of Class 3 is for the enterprises which do not provide rail passenger and/or freight services by themselves.

infrastructure which is owned by Kansai Rapid Railway, which has a licence of Class 3 Enterprise. JR West operates its passenger trains through its own network and Tozai Line, which is owned by Kansai Rapid Railway. JR West provides rail passenger service as a Class 1 Enterprise on its own network, and as a Class 2 Enterprise on the network of Tozai Line.

Fundamentally, the railway operation only by Class 1 Enterprises is not within the scope of "vertical separation" defined in Chapter 2. Nevertheless, in Japan there are several cases that one train provides passenger services going through different Class 1 Enterprises' infrastructure.

In order to comprehend the concept of "vertical separation" and to analyze it, it is essential to recognize the difference between "vertical separation" and "reciprocal running" among Class 1 Railway Enterprises. Thus, in the next section the author discusses train operation in the form of "reciprocal running" in Japan.

7.2.2.2 Reciprocal Running among Class 1 Railway Enterprises

1) Introduction

In this paper, the author defines "reciprocal running" as a train operation where two or more Class 1 Railway Enterprises operate a train running through among them without vertical separation. In other words, "reciprocal running" is a through-train operation as a Class 1 Railway Enterprise.[6]

Through reciprocal running the passengers can enjoy through-train services and reduction of travel time without inconvenience of changing trains. The concerned operators can achieve these advantages without heavy investment in the

[6] Before the issue of the EU Directives, European railways have also established their own traditional rules of interoperability and they have had well-established cooperative relationship between state railways.(IRJ, 2003) This relationship among operators for cross-border operation is simply explained in Figure 5.1, and the traditional model of international railway transportation has similarity with "reciprocal running" in Japan.

infrastructure. Thus reciprocal running is useful for reducing terminal congestion of both passengers and trains.

As Japanese passenger rail companies are eager to promote their transport services without huge investment, the cases of reciprocal running are expected to increase for promoting through-train operations with other rail companies.

2) Characteristics of Reciprocal Running

(Revenue of fares and rent-fees for rolling stock)

In the form of reciprocal running, the rolling stock of a Class 1 Railway Enterprise goes out of its own network and accesses the tracks of another Class 1 Railway Enterprise. Thus the relationship between the two railways is shown in Figure 7.2.

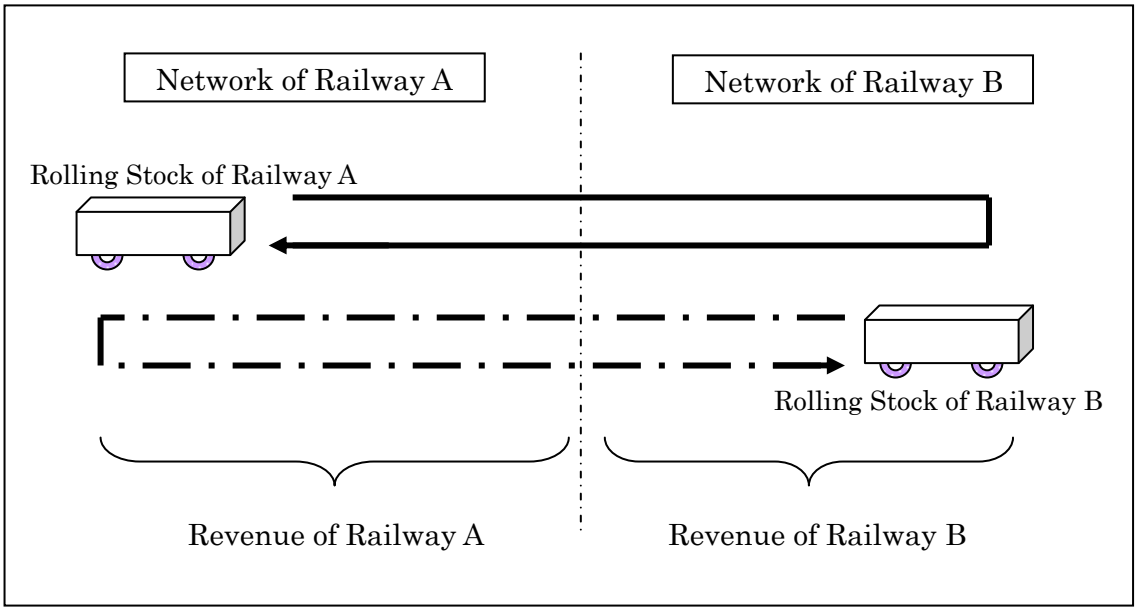

Figure 7.2 Reciprocal Running between Class 1 Railway Enterprises
Source: Author, based on the interview [15/JP]

As it is shown in Figure 7.2, the fare for railway operation using Railway A's tracks belongs to Railway A. Thus, in the form of reciprocal running, in general, it is not necessary for a certain railway to have ticket gates independent from another railway. For example, within a network of Railway A, the fare belongs to Railway A even if Railway A uses Railway B's rolling stock. In case Railway A uses Railway B's rolling stock, Railway A pays rent-fees of the rolling stock to Railway B. [15/JP]

(Operational responsibilities)

As railways permit the access of other railways' rolling stock, the concerned railways negotiate, in advance of reciprocal running, mutually-agreeable terms regarding the condition of the access. They make serious efforts to this process. For example, they have to agree with each other about rolling stock performance such as gauge width, size of rolling stock, type of car body and bogie, standard for fire-resistance, electrical system, signalling apparatus, train-control system, weight of rolling stock, passenger capacity, brake performance, telecommunication system, 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. [15/JP]

In the form of reciprocal running the responsibilities of train operation are clearly separated at the border, and each railway is fully responsible for the train operation on its own network. In general, the drivers change at the border station and they drive a train on their own network only.[7] This is for securing the operational safety, and this kind of measures has become fundamental policy since a serious train accident on the network of Shigaraki Highland Railway in 1991. The train accident, which two trains crashed resulting in 42 people death and 614 people injury, had happened when the driver of a JR Company performed train driving out of his own company's network, and lack of sufficient communication between the two companies was regarded as one of the important factors of the train accident.[15/JP] Since this accident, in order to secure greater safety, each railway company took 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 reciprocal running, have become thorough not only in Shigaraki Highland Railway but also on other lines over Japan. In brief, in the form of reciprocal

[7] As it is considered that the conductors can work beyond their own network without deteriorating safety level of train operation, they sometimes perform their services even after the train passes a border of the two railways. In this case one of the railways pays for the conductor's services to another railway. [15/JP]

running each Class 1 Railway Enterprise takes responsibility of train operation within its own network. [15/JP]

3) Summary

Certainly, there are several examples of vertical separation in Japan, but Japanese railways have made efforts to promote their passenger through-train services by means of reciprocal running. In other words, in principle they tried to avoid vertical separation and have introduced reciprocal running instead.[15/JP] 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 in the form of reciprocal running. If the concerned railways agree on the conditions, reciprocal running can promote through-train services between them improving transport services. It is not necessary for them to invest huge amount of funds into the infrastructure, and it is prospected that reciprocal running will be utilized in more cases to develop seam-less rail transport services in Japan.

In the form of reciprocal running the concerned railways cooperate for smooth operation and safety, and each railway takes necessary measures, such as changing the drivers at the border station, in order to bear safety responsibility. Nevertheless, they sometimes utilize vertical separation as well for some reasons. Even in the case of vertical separation, Japanese railway enterprises keep close cooperation among the concerned entities. For example, in addition to the facility condition they reach mutual understanding about communication methods, emergency measures, and other detailed operational issues for smooth and safe operation. They believe that close communication and cooperation among concerned parties, not only at the stage of getting a license but also in the daily operational stage after commencement of the train services, are pre-requisite for securing safety both in reciprocal running and in vertical separation. (JR East, 2003)

7.2.3 Two Newly-Organized Lines in Japan

7.2.3.1 New Shinkansen Lines

This section examines a new scheme for construction of the new Shinkansen lines after the privatization of JNR in 1987.

Shinkansen lines are planned and constructed based on the Nationwide Shinkansen Railway Development Law. Shinkansen lines had been constructed with interest-bearing loans before the privatization of JNR. Thus it meant a precondition that the construction costs be paid back from sales revenue after the opening of operations. A construction and operation scheme for the new Shinkansen lines was established in 1989 reflecting the failure of JNR, and the lines built since then are constructed and operated based on this new scheme. Under the new scheme, Japan Railway Construction, Transport and Technology Agency (JRTT), a wholly government-financed entity, carries out the Shinkansen construction work. The precept is that as building a Shinkansen line has an impact on the entire community located along the new line, the projects are handled as a public works. The state and local governments bear the financial burden of the projects with the ratio of 2:1. (Koga, T., 2003 p.21)

JRTT procures construction costs and owns the facilities that it has constructed. The JR Passenger Company leases those facilities from JRTT after the completion and pays the usage fees, which will be explained in Section 7.5.3. Operation of the new Shinkansen lines should not deteriorate the JR Passenger Companies' financial results. Thus the agreement of local communities is also required to be confirmed with respect to the management separation from the JR Passenger Company of conventional lines parallel to new Shinkansen line segments. (JR East, 2004a)

7.2.3.2 Aoimori Railway

As the last case of this chapter, the author investigates the management of a conventional line separated from the JR Passenger Company as a result of construction of the new Shinkansen line.

Aoimori Railway was established in 2002. As it had been a conventional line running parallel to the new Shinkansen line segment, it was separated from a JR Passenger Company, JR East, based on the agreement of local communities.

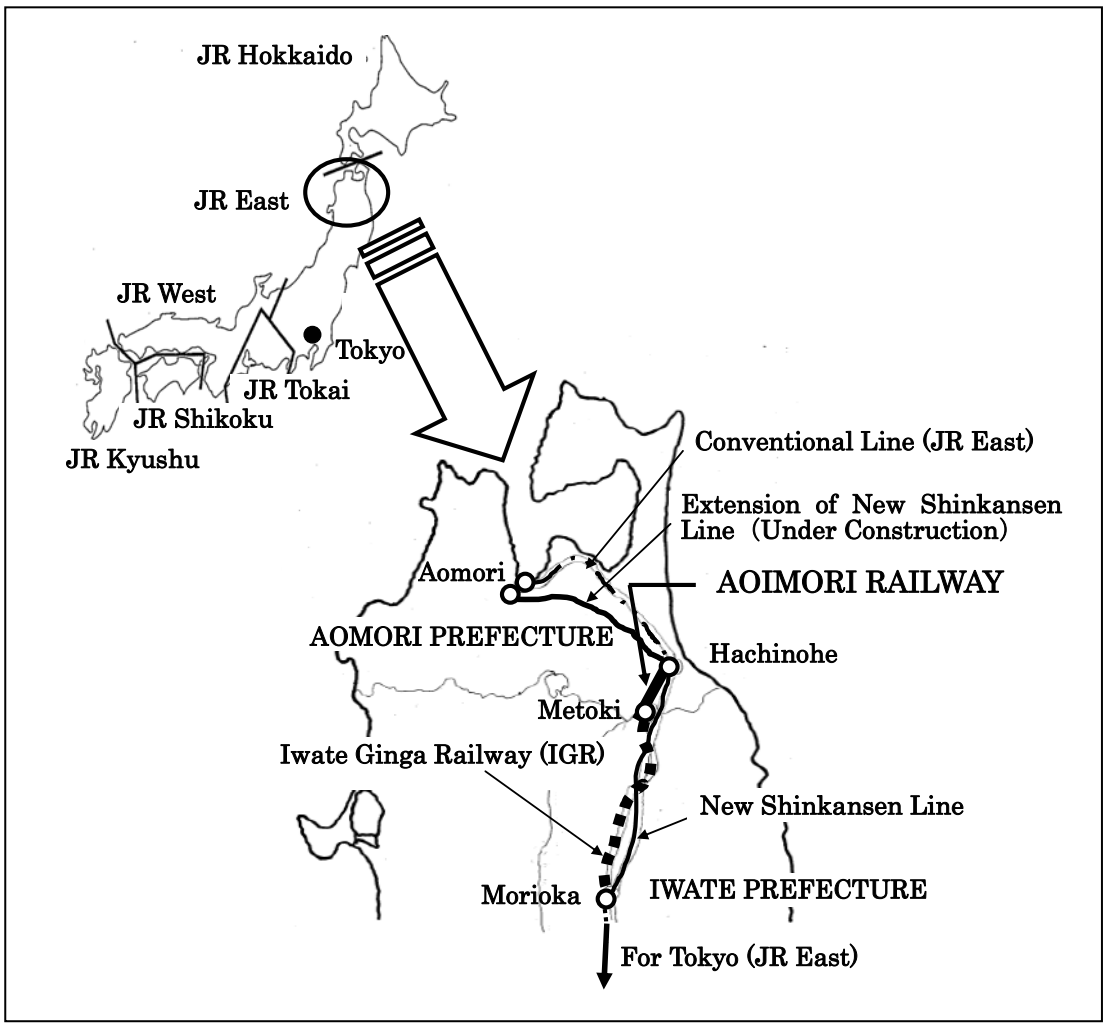

Figure 7.3 Aoimori Railway and its Surroundings

Source: Author

Aoimori Railway was formerly a part of the JR East's Tohoku Main Line. The separated Morioka – Hachinohe segment covers both Iwate and Aomori Prefectures, and Aoimori Railway is the section in Aomori Prefecture covering 25.9km at

present.[8] Aoimori Railway is the first case in Japan that a third sector, a joint-venture between the private and public sectors, had introduced vertical separation as a result of management separation from a JR Company. The segment in Iwate Prefecture is operated by the newly established Iwate Ginga Railway (IGR) as a Class 1 Railway Enterprise. An outline of the railways around Aoimori Railway is shown in Figure 7.3.

As Iwate Prefecture had another third sector Class 1 Railway Enterprise, IGR was established as an integrated structure considering the equality with it. On the other hand, comparing with the section in Iwate Prefecture, there were not so many passengers in the part of Aomori Prefecture, and the average traffic density was expected to be only 1,700 daily passenger-kms / route-length.[9] Thus it was clear that the separated conventional railway in Aomori Prefecture can not cover the initial infrastructure cost. In Japan if the planned management can not be financially viable, the government would not issue a license of Railway Enterprise. Thus Aomori Prefecture, as a Class 3 Railway Enterprise, bought and owned its infrastructure, and Aoimori Railway, which Aomori Prefecture invested 55% of the shares, took only a responsibility of train operation without investing the initial infrastructure costs. (Aomori Prefecture, 2001)

The railway operator and infrastructure in the segment of Aoimori Railway and those in the surrounding regions are shown in Table 7.1.

As it is shown in the table, rolling stock of IGR and JR East also accesses the segment of Aoimori Railway as a form of reciprocal running. But the relationship between Aoimori Railway and these two railways is not competitive. Three of them make serious efforts to reach mutually-agreeable terms regarding conditions of the reciprocal running. Similar to other Japanese railways, they believe that reciprocal

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8 Upon a completion of the construction project of the new Shinkansen line's extension segment between Hachinohe and Aomori, the conventional line between these cities will be also separated and transferred from JR East to Aoimori Railway.

9 The actual traffic density in 2006 was 1,114 daily passenger-kms / route-length.

running, clearly distinguishing each railway's responsibility, is more appropriate means for promoting through-train operation among them. The operation performed on the track of this segment is one of the typical examples of reciprocal running in Japan.

Table 7.1 Railway Operators and Infrastructure in Iwate and Aomori Prefectures

Prefecture		**Iwate Prefecture**		**Aomori Prefecture**	
Section *<Separation from JR>*		Until Morioka	Morioka-Metoki	**Metoki-Hachinohe*1**	After Hachinohe
			<The Separated Segment>		
Passenger operator (Type of a license)		JR East (Class 1)	IGR (Class 1)	**Aoimori Railway (Class 2)**	JR East (Class 1)
Freight operator (Type of a licence)		**JR Freight (Class 2)**			
Infrastructure owner (Type of a licence)		JR East (Class 1)	IGR (Class 1)	**Aomori Prefecture (Class 3)**	JR East (Class 1)
Reciprocal Running *2	**IGR**	←	- - -	→	-
	Aoimori Railway	←		- - -	-
	JR East	← - - -	→	→	- - - →

***1: Parts of Underline**: The segment of Aoimori Railway

*2: Railways whose rolling stock accesses as a form of reciprocal running.

1) ——→ : Reciprocal Running

2) - - - → : Class 1 Railway Enterprise (segments in IGR and JR East); Class 3 Railway Enterprise (segment in Aoimori Railway)

Source: Author

7.3 Aims of the Reform through Vertical Separation

The aims for introduction of vertical separation in the four cases are summarised as Table 7.2. As it is summarized, the background of introduction of the vertical separation varies. Nevertheless, in these cases the private sector[10] participates into the railway operation with long-run access to the infrastructure.

[10] Aoimori Railway is a joint-venture between the private and public sectors as described in Section 7.2.3.2.

Table 7.2 Aims of Vertical Separation in the Cases in Mexico and Japan

Railway	Aims of the vertical separation
Mexico (TFM, Ferromex)	(1) to promote more investment in infrastructure. (2) to eliminate subsidies from the government. (3) to improve service efficiency utilizing Mexico's main commercial partners.
Mexico (TFVM)	(1) to avoid monopolistic access in the country's most densely used network. (2) to promote competition on parallel tracks.
New Shinkansen Lines	(1) to utilize public investment funds for construction of the infrastructure. (2) to keep independent management of the JR Passenger Company as an operator.
Aoimori Railway	(1) to utilize the local government's funds to buy and own the infrastructure in order to alleviate huge amount of initial investment by the operator, Aoimori Railway. (2) to clarify responsibilities of the regional government and those of the railway operator.

Source: ▪ Interviews/questionnaires to Mexico and Japan. [13/MX, 14/JP, 15/JP]
▪ Campos, J. (2001)
▪ Aomori Prefecture (2001)

7.4 Forms and Implementation of the Vertical Separation

7.4.1 Forms of the Vertical Separation

The forms of vertical separation in the four cases are summarized in Table 7.3. As it is examined in the table, forms of vertical separation vary in the railways in this chapter. But in all the cases a private operator provides railway services on the infrastructure which is owned by the public sector.

Table 7.3 Forms of Vertical Separation in the Cases in Mexico and Japan

Railway	Forms of Vertical Separation
Mexico (TFM, Ferromex) (*1)	The infrastructure is owned by the government, and rail transport services are performed by the concessionaires. (*2)
Mexico (TFVM)	TFVM operates the infrastructure, which is owned by the government. The three freight concessionaires, which are the share-holders of TFVM, access the infrastructure.
New Shinkansen Lines	Only one designated JR Passenger Company can access the infrastructure, which is owned by the public sector, JRTT.
Aoimori Railway	Infrastructure is owned by the public sector, Aomori Prefecture. Aoimori Railway, along with JR Freight, operates rail transport services accessing the infrastructure.

(*1) Frequently, the long-run concessions, such as the case with the two Mexican freight concessionaires, have been referred as "vertically integrated railways" in many other papers. Nevertheless, based on the definition in Section 2.4.1 they are regarded as one type of "vertical separation" in this paper.

(*2) Sharp, R.(2005 p.7) notes that "over the 1990s, Mexico essentially eliminated rail passenger traffic prior to concessioning, passenger-km declining from 15 percent of the total passenger-km in the region to under 1 percent."
Several passenger services were assigned to the concessionaires bidding for the lowest subsidy. This process was only applied to routes that lacked an alternative traffic mode. (Campos, J., 2001 p.91)

Source: Interviews/questionnaires to Mexico and Japan [13/MX, 14/JP, 15/JP]

7.4.2 Implementation of the Vertical Separation

7.4.2.1 Organizational Structure and Management with Vertical Separation

The result of investigation about the organizational structure and management with vertical separation are summarised in Appendix 3. In all the cases, the private sector performs railway operation with long-run access to the infrastructure.

In the Mexican freight concessionaires (TFM, Ferromex) and new Shinkansen lines, the railway operator performs the essential factors of daily operation such as

infrastructure maintenance, timetabling, traffic control, and rolling stock maintenance, and these factors are carried out with the operator's financial responsibilities. The operator itself makes financial planning and investment in operations and infrastructure over the period which the infrastructure is leased. These railways are characterized by integration of the different functions/services retaining the ownership of the infrastructure to the public sector.

In Aoimori Railway, Aomori Prefecture orders the maintenance works of infrastructure and is directly responsible for the planning and budget for the infrastructure maintenance.[11] Nevertheless, different from European Railways, the railway operator, Aoimori Railway, makes a timetable. Thus, except the maintenance of tracks and infrastructure, Aoimori Railway performs the essential factors of daily operation. In this segment, the rolling stock of IGR and JR East accesses the tracks in the form of reciprocal running under the control of Aoimori Railway. As it was investigated in Section 7.2.2.2 and Section 7.2.3.2, reciprocal running is largely different from the vertical separation, which European Directives are trying to achieve. Despite separation of the financial responsibilities between infrastructure and operation, the operator is responsible for the most of operational factors including signalling and train controlling in this case as well.

7.4.2.2 Relationship among Different Parties and Relevant Issues

The outline of relationship among different parties and relevant issues are described in Appendix 4. This section mainly examines the measures to assign operational services to the private sector in each case.

In the two Mexican freight concessionaires, the operation is assigned through the competitive bidding. Without the track-age right by other operators, the

[11] Aomori Prefecture and Aoimori Railway worry about coordination problems between infrastructure and operation. At present, Aomori Prefecture plans to contract out the track maintenance to Aoimori Railway in order to decrease the coordination problems between them.

concessionaire controls both infrastructure and operation as if it were an integrated railway during the concession period. There are no subsidies or other financial transfers between the government and the freight concessionaires after the concessioning processes.

In TFVM, the three freight operators, the share-holders of TFVM, can access the infrastructure with neutral conditions. Practically, it is not intended to open the infrastructure other than these three and the planned commuter concessionaires. Thus share-holding relationship practically stipulates the access to the infrastructure.

In new Shinkansen lines, it is generally recognized by the public that only JR Passenger Companies can operate Shinkansen trains because of the operational and engineering abilities. In addition to this fact, the service on the new line should be linked to that on the existing line smoothly so as to maximize potential of the railway network. Thus a JR Passenger Company in the region is designated as an operator.

In Aoimori Railway, as it is intended that ability and management efforts of the private sector should be utilized in the operating sector, a joint-venture between the private and Aomori Prefecture was established, which resulted in a share-holding relationship between infrastructure and operation. Thus the infrastructure manager has no intention to permit the track-age rights to other operators in the passenger sector.

In each case the public sector owns the infrastructure and the tracks, and the private sector performs railway operation accessing them. But as it is investigated, the measures to stipulate the access to the tracks vary. In the case of two Mexican freight concessionaires and new Shinkansen lines, the assignment of the operation is stipulated by the contract or the law. On the other hand, in TFVM and Aoimori Railway, close share-holding relationship between infrastructure and operation

practically stipulates the access to the tracks. Based on the above-mentioned stipulation, the number of operators is limited to sole or a few.

7.5 Transition of Management of the Railways

7.5.1 Long-Run Freight Concessions in Mexico: TFM, Ferromex

7.5.1.1 The Concession Bidding Processes

The way to sell the rights for the usage of rail infrastructure varies depending on the countries. Some countries such as Argentina and Brazil sold the concession by itself. Mexico took the different procedure as follows (Thompson, L. et al., 2001):

1) The Mexican government divided the FNM into some regionally segmented companies to be sold with the rolling stock and concession.[12] The government eliminated several unprofitable routes through this process;
2) The companies were converted into stock companies and they started to operate autonomously since April 1996;
3) The government sold the shares of the concessionaire companies through a competitive bidding to strategic investors.[13] Firstly, the government sold 80 % of the shares of each company. Then, within 5 years of the initial transfer, the government sold the remaining 20% shares. Only the Mexican legal entities whose foreign capital share is below 49% were permitted to join in the bidding.

In the case of Mexico, the awards were based simply on the best offer for shares of

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[12] The concession contains:1) indicators of efficiency and safety for the evaluation of the service; 2) the period of the concession; 3) the characteristics and amounts of the guarantees the firm has to commit to the government; 4) all the payments and the form of payment in which the concessionaire must pay. (Calva, L. 2001 p.13)

[13] There were three general approaches to sell the concessions/shares of the companies with concessions: 1)sealed bids; 2)public auction; 3)direct negotiation. The government in Mexico sold the shares through a sealed bid auction to be won by the highest bidding consortium, which might be the simplest awarding approach.(Thompson, L. et al., 2001)

the companies.[14] The new investments were not either specified or evaluated in the process of the competitive bidding. The concessionaires were allowed to invest whatever they thought appropriate. [13/MX]

This procedure is slightly different from the model of competitive bidding to win franchises in passenger rail services in Europe, where the winner is mainly based on the one who will pay the maximum premium or accept the minimum subsidy.

The results of concession bidding of the two main freight railroad were indicated in Table 7.4. For the years prior to concessioning, FNM had been losing around US$400 million annually, which accounted for about 5 percent of Mexico's internal debt. The concessioning has relieved this large amount of deficits of the state-railway because subsidies to the freight concessionaires have not been paid and those to passenger rail services have been suppressed. Instead of the former annual losses, in addition to the taxes paid by the private concessionaires, the government of Mexico has received from concession sales by the amount of US $2.4 billion including short lines. (Thompson, L. et al., 2001)

Table 7.4 Results of Concession Bidding of the Two Mexican Freight Railroads

Railroad (Concessionaire)	Auctioned Assets	Initial Transfer	Value (million US $)	Committed Investment (million US $)
North-eastern (TFM)	80 % shares	Jun. 1997	1415	690
North-Pacific (Ferromex)	80 % shares	Feb. 1998	524	334

Source: Campos, J. (2001)

7.5.1.2 Transition of the Performance

Before the restructurings, tariffs were not based on market conditions and had not

[14] Each line or system to be concessioned had a "technical value", which was estimated by the government. The government would not award the concession below that value that performed as a kind of "minimum value" of the concession. The technical value was kept secret and was unknown to the bidders. [13/MX]

reflected costs of providing the services. Nevertheless, in recognition of the severe competition from roads as well as competition between the tracks, the new sectoral law stipulated that rates may be regulated only in case effective competition does not exist in the transportation service. (Campos, J., 2002)

After the restructurings, the freight concessions had stronger incentives to increase the traffic with liberalized railway management such as setting market-oriented tariffs.[13/MX-1, 2] These changes resulted in several advantageous effects. For example, in addition to the improvement of safety performance, revenue and traffic have been improved remarkably.

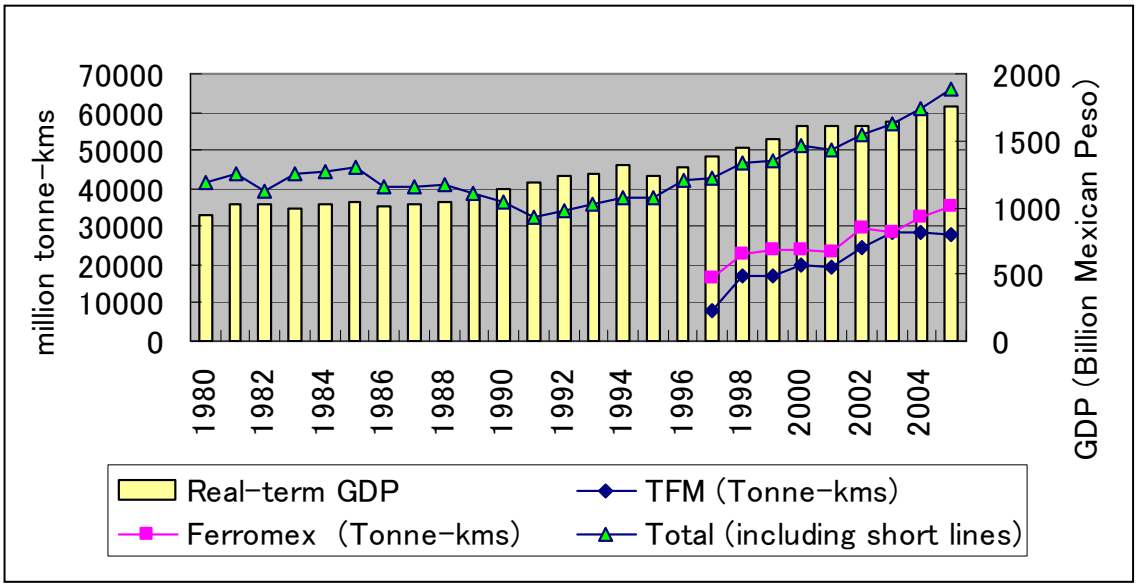

Figure 7.4 Trends of Freight Rail Performance in Mexico
Source: World Bank Railway Database
International Monetary Fund (2008)

Federal Competition Commission(2001) explains that freight rail performance has increased because of a better attention to users, adoption of better equipment and modern operation system, as well as of a more aggressive trading strategy. Figure 7.4 shows that the traffic output (tonne-kms) had increased 55.3% during the period between 1997 and 2005. Since the growth of the real-term GDP during the same period is 27.2%, the rail freight traffic has improved more remarkably than that of national economy.

This growth has been attained while the number of employee is decreased, as it is usual with other cases of railway concessioning.[15] Figure 7.5 shows that the productive efficiency of the concessionaires has improved remarkably since the concession is awarded.

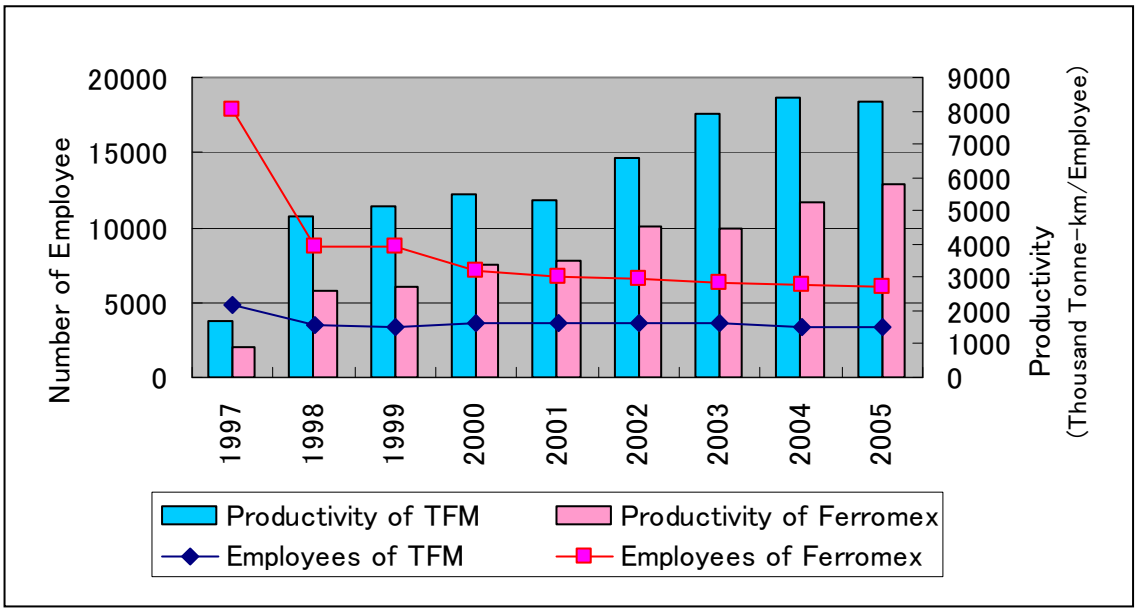

Figure 7.5 Trends of Employees and Productivity in Mexican Concessionaires
Source: Author based on World Bank Railway Database

Federal Competition Commission (2001) concludes the effects of the reform in Mexico as follows:

- The privatization scheme adopted in Mexico promoted investment and the development of railroad infrastructure;
- New investments had enhanced efficiency, competitiveness, modernity and safety of a system which had significant deficiencies;
- Unnecessary railroad stretches and some passenger services were eliminated

[15] In order to cope with severity of labour cutbacks, strong coordination with labour union is essential. Thompson, L. and Budin, K.J. (1997) notes that a fair and effective program for dealing with redundant labour should be developed for the success of the concessioning.
In the case of Mexico, in 1995 FNM had around 46,300 employees, but the number has decreased into 17,500 in 2000. (Federal Competition Commission, 2001) Mexico took the following approach: 1) The government calculated a safety net package based on the worker's wage history, job security, employment potential, etc; 2) Every worker was paid this package after each concession was transferred; 3) The workers decided whether to accept any offers made by the new concessionaires. (Thompson, L. et al., 2001)

whenever more efficient transportation alternatives existed.

7.5.1.3 Challenges of the Long-run Concessions

The railway concessioning in Latin America including the case of Mexico is reviewed that "concessioning has been successful overall *in preserving and reviving railway operations on existing assets*" (Sharp, R. 2005 p.4) and the process clearly addressed fiscal problems faced by the country. But it has identified the following challenges.

1. Non-fulfilment of the promised/committed investments

It is so difficult to specify long-run concessions allowing for changing circumstances, and there is a possibility that the concessionaire has an incentive to promise lots of investment but not to deliver it actually. [13/MX-1, 2] R. Sharp (2005) also indicates the failure of concessions to meet investment promises/ commitments as one of the controversy issues of long-run concessions.

In particular, the interviewee stressed that the major investment issue for long-run concessions is infrastructure[16] because: 1) it has long life and long payback period; 2) it is hard to borrow money against infrastructure. Sleepers and rail, once put into the ground, cannot be reclaimed if a borrower does not meet his obligations. Thus, potential investors are very cautious about making investments in infrastructure because the security value if things go wrong is very limited. Since the concessionaire does not actually own the infrastructure in long-run concessions, the security value only resides in the concession agreement and its profitability. This is usually limited and, in any case, unproven at the beginning.[13/MX-1, 2] Based on the above-mentioned background, private concessionaires often had difficulties to perform major infrastructure upgrading

[16] On the other hand, freight wagons and locomotives are relatively simple to repossess in case they are for a standard gauge railway. In addition, the lifetime of rolling stock is somewhat shorter than that of infrastructure, thus the commitment in the investment is shorter as well.[13/MX-1,2]

even if traffic demand is favourable enough.

In order to cope with this issue of infrastructure investment, firstly, Thompson, L. and Budin, K.J. (1997 p.7) suggests that concession term should be consistent with the government's objectives regarding the private investment. This is because the private sector generally does not finance assets whose service life is significantly longer than the concession term.

Secondly, the interviewee suggests, as the most reliable approach to settling the issue, that the government should identify the upgrading/expanding works which the government needs (for whatever reason) but are not profitable for the concessionaires, and then should invest into them directly since concessionaires generally make investments into the works profitable for themselves without being forced to do so. Nevertheless, they frequently fail to perform investments that are unprofitable even if the government wants them to do so, and even if they promised it in their initial bids. [13/MX-1, 2]

2. Conflicts about access prices

In the case of Mexico, in order to enhance competition among different regional railroads and to control monopoly power of the concessionaire, the track-age and haulage rights are also imposed to other concessionaires in certain key routes such as those in major urban and industrial areas and some ports.(Campos, J.,2001 p.93) Only fundamental principles are stipulated in the concessions, and the interviewee indicated there were conflicts regarding access prices which should be paid by other operators. [13/MX-1, 2]

Although provisions in the concessions require the companies to negotiate track-age rights for certain critical areas and there was also pressure from the government to do so, the negotiations have not succeeded as each company wanted to charge a high price for its track-age rights, and the other company never wanted to pay. The government could intervene and force the

implementation of access charges for track-age rights, but it has not been done so far. [13/MX-1, 2]

3. Controlling market power of the concessionaire

Campos, J. (2002) indicates that how to control market power is one of the essential issues relevant to concessioning since the concessionaire would be the sole, at least dominant, licensed operator on the network. Even if competitive bidding could select an appropriate concessionaire, it will gain somewhat monopolistic status at least in the railway transport on the network, and its market power should be controlled by some means.

Some of the above-mentioned potential problems appear to be derived from the fact that the concession contract covers a long-term and that the market circumstances and economic environment might change significantly over the period. It is needless to note that, at the initial stage of the structuring process, concession contract should be carefully designed based on a number of factors such as nature of the network, risk allocation, tariff and service specification, contract length, and so on. Nevertheless, it is practically impossible to predict the transition of country condition and that of concessionaire performance at the time of competitive bidding with certainty. Thus, Thompson, L. and Budin, K.J. (1997 p.7) notes that “concessions inherently require continuing government involvement in regulating safety, monopolistic behavior, and compliance with the pricing and service requirements of the concession.”

Despite the above-mentioned challenges inherent in long-run concessions, the results in the case of Mexico appear to have succeeded in introducing market mechanism into the railways, which is considered to be the main objective of private participation in the sector.

7.5.2 The Mexico City Terminal Railway: TFVM

Since April 1998, TFVM apparently operates keeping commercial autonomy and neutrality with the shareholders. TFVM is now self-financing through its operational revenues. Additional equities have not been required from them besides the initial disbursements, mainly because of cost control and improved performance. (Campos, J., 2001 p.94)

This type of vertical separation appears to be appropriate for attaining neutral access for certain operators exclusively. As TFVM has no reason to open the tracks to the operators other than share-holders, the share-holding relationship with limited number of operators was realizable, and this relationship contributes towards managerial cooperation between infrastructure and operation. The three freight operators apply the time-slots, and the infrastructure manager, TFVM, allocates the time-slots as it is similar to the process of the railways in Europe. What is different from the European model is that the infrastructure manager has close share-holding link with plural operators accessing the tracks. Due to relatively sufficient infrastructure capacity, TFVM has been successfully coordinating the timetabling so far. At present, the access charges paid by the freight operators also can cover the maintenance costs of the Terminal.[17] In the case of conflicts between infrastructure and operation, the government could intervene. Nevertheless, it has not happened so far owing to the cooperative relationship based on the close share-holding link between them. [13/MX-3]

In terms of the above point of views, despite the fact that the access rights are practically exclusive only to the shareholders, compared with the German model in

[17] Although TFVM is now self-financing through its operational revenues, as a potential problem, Campos, J.(2002 p.94) indicates a long-run internal instability risk due to owners' asymmetry. In TFVM, freight concessionaires are simultaneously the owners of it, and each of them has the equal voting rights and management decisions require a majority of 75 %. Nevertheless, there exists the owners' asymmetry in terms of traffic volume, number of trains on the network and even in the price paid for their concessions. Once, for example, the decrease of cargo volume results in requiring additional capital, this might result in raising some conflicts among owners when they seek to re-negotiate their stakes.

which the main railway with infrastructure permits other operators' access rights, the form of TFVM, which does not belong to a certain operator, is more likely to attain the neutral access by the concerned operators.

7.5.3 New Shinkansen Lines

Firstly, this section examines the usage fees paid by a JR Passenger Company, as it characterizes vertical separation in new Shinkansen lines. Then, management of the line is investigated.

7.5.3.1 Usage Fees of the Infrastructure

The amount of usage fees paid by an operator of new Shinkansen lines is an essential factor of the relationship between the JR Passenger Company and the public sector.

Payment of the usage fees is now regulated by the Japan Railway Construction, Transport and Technology Agency Law. The Law stipulates that JRTT calculates the amount primarily based on the benefits received as an operator of the new Shinkansen lines after opening. Of those, the benefits received as an operator are calculated by comparing the following two amounts:

1) the estimated revenues and expenses generated by the new segment of Shinkansen line and related line segments after opening; with
2) the estimated revenues and expenses that would likely be generated by parallel conventional lines and related line segments if the new segment of the Shinkansen line were not opened.

In brief, the expected benefits are the difference between the amount that the operator of the new Shinkansen line should receive as a result of operation and the amount that would be received if the new Shinkansen line did not commence

services. Specifically, the above benefits are calculated based on expected revenues and expenses over a 30-year period after opening. In addition, the taxes and maintenance fees are included in calculations of corresponding benefits as an expense of the operator of the new Shinkansen line after opening. Therefore, the burden of the operator is kept within the limits of the corresponding benefits. (JR East, 2004a)

7.5.3.2 Management of the New Shinkansen Line

The JR Passenger Company pays above-mentioned fixed usage fees of the new Shinkansen line. Thus, once the usage fees are settled, the JR Company does not, necessarily, need to negotiate with the third party, such as JRTT, the government and local governments, during the 30-year period regarding the operation of the line. Practically, the JR Company in the region can operate passenger rail services utilizing the infrastructure of the new Shinkansen line in almost the same way as an integrated railway. For example, the JR Company can make the timetables of the new Shinkansen line, and is only required to report them to the government along with those of other lines.

Since the reform of JNR in 1987, three segments of new Shinkansen lines were opened under the new scheme. Because of its high-speed transport service, the traffic unit (passenger-km) of each segment is larger than that of the former JR Express Trains. Nevertheless, as it is explained above, whether the opening of the line is advantageous or disadvantageous for the JR Companies' management depends on the difference between the actual benefits and calculated ones for fixing the usage fees.

7.5.4 Aoimori Railway

7.5.4.1 The Operational Status

Aoimori Railway and JR Freight access the network in the form of vertical separation and the fare belongs to each company. Some trains of JR East and most of the trains of IGR access the section of Aoimori Railway in the form of reciprocal running, and the fare earned by these trains on this section belongs to Aoimori Railway. Fare adjustment is performed by means of appropriate methods among concerned railways. For example, most of the JR East's rolling stock accessing on the section are long-distance night trains, and usually JR East receives the total fare from the passengers. Then, fare adjustment is performed based on the passenger-km on the section of Aoimori Railway, and JR East pays the calculated amount to Aoimori Railway. [15/JP]

As it is examined in Section 7.2.2.2, the main aim of reciprocal running avoiding vertical separation is to keep more reliable safety. This is the reason why, for example, rolling stock of IGR and JR East run through the line of Aoimori Railway by reciprocal running not by vertical separation. As it is usual in reciprocal running, the drivers of IGR change at the border station and they drive the trains only within their own company's network. Regarding the maintenance of infrastructure, IGR and Aoimori Prefecture clarified the segment which each entity is responsible for, and they also negotiated and made an agreement about emergency measures such as mutual support for the recovery from accidents or troubles.[15/JP]

7.5.4.2 The Management Status

The newly established Aoimori Railway has made efforts to increase the number of passengers, and the number of trains within the section has increased excepting the former JR Express Trains.

Nevertheless, Aoimori Railway had to raise the fares in order to maintain the

annual income. In addition to the change of fares, the passengers who pass through different railways have to pay the base fare each time they cross the border between the railways, Aoimori Railway, IGR and JR East. Even though the concerned railways introduced some discount of the base fare for those passengers, the total fare for the passengers has become more expensive than that in JR's era.

Before the managerial separation from the JR lines, unprofitable lines such as the segment of current Aoimori Railway used to be sustained by cross-subsidy within the JR Company. This means that the profits from Tokyo Metropolitan Area and existing Shinkansen lines had been utilized for sustaining the unprofitable lines. The management separation from the JR Company abolished this cross-subsidy, and this is one of the backgrounds why the management of Aoimori Railway has been difficult.

In the following the author investigates management status both the infrastructure and operation sectors in the section of Aoimori Railway. Firstly, the author will investigate the management of Aoimori Railway, the operation sector.

Originally, it was planned that the revenue and expenditure of Aoimori Railway would be balanced, and its management would be self-sustained without subsidy from the local government. Nevertheless, about 90% of the access charges have been remitted since the establishment of Aoimori Railway. Owing to this remittance its management had been balanced until 2004. Nevertheless, despite this remittance, the financial result has been in deficit since 2005. And it is prospected that the management in the coming years is also very difficult because of the transport market change in the region such as decrease of the number of high-school students, which dominate the train passengers.

Secondly, the author investigates the infrastructure sector, Aomori Prefecture. It is originally planned that annual expenditures, most of which are the maintenance fees for the engineering contractor, should be covered by the access charges paid by

Aoimori Railway and JR Freight.[18]

Before the management separation in 2002, JR Freight paid only avoidable costs to JR East. Nevertheless, JR Express trains were abolished at the opening of the new Shinkansen line segment. Thus, it had become impossible for Aomori Prefecture to cover all of the maintenance cost in case the Prefecture adopts the same stipulation of access charges as before. As a result of the negotiations among the concerned parties such as Aomori Prefecture and JR Freight, it was decided that JR Freight would pay revised access charges based on JR Freight's track usage.[19]

Based on the above-mentioned modification, Aomori Prefecture established the revised scheme that the access charges should cover the total maintenance costs necessary for sustaining the infrastructure. Nevertheless, because of the deficit of Aoimori Railway, its access charges have been remitted as described above. Thus, annually a certain amount of expenditure, which was unexpected at the commencement of railway operation, has been paid to its railway division within Aomori Prefecture.

As it is investigated above, now it should be the time we admit that the passenger demand forecast and management prospects at the time of establishment of Aoimori Railway was too optimistic. It is getting to be clear that without unplanned subsidies as a form of remittance of access charges and so on, it is difficult to sustain the management of Aoimori Railway.

Nevertheless, abolishing or continuing the operation of Aoimori Railway is not only the matter of its management issue. Alike other railways, Aoimori Railway plays an

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[18] Some amounts of rent-fees from Aomori Prefecture's facilities are also the revenue to the infrastructure sector. (Aomori Prefecture, 2001)

[19] This modification of JR Freight's access charges was applied only to the segments which management separation was performed at the opening of the new Shinkansen lines.

As the increase of access charges to these segments might threaten the management of JR Freight, it was also decided that the government would pay the difference of the amount comparing with the former case to JR Freight. (Satou, T. 2004)

important role in the region. For example, students' commuting mainly relies on the railway, thus without establishment of another appropriate transport, it would be difficult for them to continue punctual daily commuting.

The issue is more serious in the rail freight sector, since it is still a segment of a trunk line and has been playing a vital role connecting Tokyo Metropolitan Area and the north part of Japan. Without the segment of Aoimori Railway the current rail freight transport which connects the above two regions can not be sustained. Thus, there is also an opinion that the government should recognize the role which JR Freight plays in the country, and should take some necessary measures in order that this managerially separated segment could be sustained. (Satou, T., 2004)

In order to make future decisions they should also count social costs and benefits of the region in the passenger sector, and the government should do so in terms of the rail freight transport over Japan in the freight sector.

7.6 Advantages, Disadvantages and Results

7.6.1 Advantages

In addition to the results of the aims of the reform, which will be studied in the next section, the study also clarified the related advantages such as the improvement of labour productivity in the long-run concessions.

7.6.2 Disadvantages

The following issues were also indicated as disadvantages of the vertical separation in each case.

(Freight concessionaires: TFM, Ferromex)

1. Non-fulfilment of the promised/committed investments

As it is examined in Section 7.5.1.3, there is a case that the concession contract did include a promise/commitment of lots of investments, and the concessionaire only made those investments that were actually profitable to the concessionaire after award of the contract. In this case, the government did not meet a number of commitments it had made, and the effect of the government's failure was that at least some of the promised investments were no longer profitable. [13/MX-1, 2]

2. Conflicts about access prices

As it is also examined in Section 7.5.1.3, there were some conflicts about access prices between concessionaires. Issues about track-access and failure to develop cooperation between the railroads have also resulted in weakening the close inter-connection among their networks. [13/MX-1, 2]

3. Inequality with other transport modes

The concessionaires insist that trucks do not pay the environmental costs and other externalities, and this neglect leaves the railway sector disadvantageous status. They claim that equal-footing with other transport modes including external costs has not been realized in the current freight concession system in Mexico. [13/MX-1, 2]

(New Shinkansen Lines)

1. Complexity of the infrastructure ownership

In new Shinkansen lines, most of the infrastructure is owned by JRTT, and it is leased to the JR Passenger Company. Nevertheless, the JR Company itself can also invest its own funds to the infrastructure for the improvement of facilities after the operation. In this case, some parts of the infrastructure are owned by the JR Company while most parts are owned by JRTT, thus the interviewee indicated that the management of infrastructure assets tends to be complicated. [14/JP]

2. Difference from the expectation

In new Shinkansen lines, the usage fees are settled, as it is described in Section 7.5.3, based on the operator's benefits calculated over a 30-year period after opening. Thus, in a case of drastic change of circumstances such as radical economic change, the operator's actual benefit might largely differ from the original calculation. [14/JP]

7.6.3 Results of the Aims

The results of the aims of the reform through vertical separation examined in Section 7.3 would be summarized as follows.

7.6.3.1 Freight Concessionaires: TFM, Ferromex

(1) Amount of investment has been increased based on the concession contract.[20]
(2) The government subsidies have been eliminated except for a part of rail passenger transport.
(3) Efficiency has been improved as a result of the better management strategy diminishing the former bureaucracy, and reduction of unnecessary personnel and costs. [14/MX-1,2]

As the above results show, the concessioning could change the trend of deteriorating state-owned railway, and the initial aims have been attained in general. Campos, J. (2002 p.16) also notes that "a wide majority of private investors and government officials agreed that …railroad restructuring through open auctions in Mexico constituted a fine example of transition from a model of public sector dominance to a system of private operation of an existing transport infrastructure."

[20] The amount of investment has been effectively promoted and it had increased 287.5 million dollars per year during the period between 1997-2000.(Federal Competition Commission, 2001)

7.6.3.2 The Mexico City Terminal Railway: TFVM

(1) The three main concessionaires access the rail infrastructure of the metropolitan area enhancing economy of density.
(2) Sharing track access between concessionaires in this kind of essential area contributed towards promoting intra-modal competition in the case of Mexico.

TFVM commenced its operation in 1998, and its management has been self-financed. Thus the aim of establishment of TFVM is assured.

7.6.3.3 New Shinkansen Lines

(1) Infrastructure of the new Shinkansen Lines has been constructed with public funds after the restructuring of JNR.
(2) The JR Passenger Company keeps its managerial independence without deteriorating the financial status owing to the afore-mentioned usage fees.

The aims have been achieved, and the new Shinkansen line has been operated as if it were one of the lines of the JR Passenger Company in spite of the public sector's investment and ownership of the infrastructure.

7.6.3.4 Aoimori Railway

(1) The local government's funds were utilized in order to alleviate huge amount of initial investment by the operator for sustaining its management.
(2) Despite the aim to clarify responsibilities between the two sectors, actual management status differs from the initial intention because of the lack of revenue in the passenger sector.

As it was investigated in Section 7.5.4, despite the introduction of vertical separation to the segment, it has become clearer that the management of Aoimori Railway is not financially sustainable on the current basis.

7.7 Conclusion

In Mexico, as the main mechanism of the reform, the concession system was adopted and private operators have participated in the railway transport service. Fundamentally, only one freight concessionaire operates on a specific line with commercial management techniques performing most railway operation including all financial planning and investment in operations and infrastructure over the period. In brief, the concession worked as a mechanism for rail privatization, and utilization of private sector's ability for efficient controlling both operation and infrastructure. Despite the several advantageous results, the study also revealed some challenges of concessioning such as non-fulfilment of the committed investments especially those into the infrastructure.

The Mexico City Terminal is operated by an independent joint-venture in order to avoid monopolistic access to the country's most densely used network. Apparently, it is not practical approach for each freight concessionaire to have its own marshalling yard and terminal facilities in Mexico City. Thus, in addition to promoting intra-modal competition between concessionaires, vertical separation in the case of TFVM has worked for economy of enhanced density.

Because of the massive capital and a long investment recovery period the construction of a new railway line is an extremely large risk for railway operators. Thus it is very difficult, even in a country such as Japan with an extremely heavy passenger rail transport density, for a railway operator to promote railway construction by its own funds. New Shinkansen lines are constructed as public

works projects utilizing finances of the state and local governments. The JR Passenger Company in the region is designated as an operator, and it operates the line with its own financial and operational responsibilities, as if it were an integrated railway once the amount of usage fee is fixed based on the 30-year period expected benefits.

Aoimori Railway was established when the management of the segment was separated from the JR Company as a result of the opening of the new Shinkansen line. Vertical separation was introduced in order to alleviate the initial financial burden from the newly-established operator.

These four cases in this chapter have common characteristics that the private operator accesses the infrastructure which is owned by the public sector. In other words, vertical separation in these cases contributed towards involving the private sector in the railway operation. It has been achieved by way of certain measures:

1) leasing the infrastructure to the private operator (based on the concession contract in the freight concessionaires in Mexico, and based on the law in new Shinkansen lines); and
2) close share-holding relationship between infrastructure and operation (TFVM in Mexico and Aoimori Railway).

From the different point of views, these cases have some contrastive aspects:

1) Access right is permitted only to the incumbent/newly-established operator (new Shinkansen lines, Aoimori Railway)
2) Access right is permitted also to the voluntary participant (the freight concessionaires in Mexico)

Efficient railway operation is expected through the capability of the incumbent/newly-established operator utilizing the regulation of the government in the former type. On the other hand, it is expected to be achieved through the capability of other private operator utilizing the competitive tendering and concession contract in the latter type. Nevertheless, in all the cases, promoting the

within-rail competition is not the principal aim of introducing vertical separation[21], and the above measures could confine the number of operators into a few. Compared with the type of complete separation investigated in UK, Sweden, Australia (ARTC), the operator in these cases performs the railway operation with the more integrated manner in the operational processes.

[21] The concession contract in Mexico is granted for a maximum of 50 years and renewable for another similar period. Thus, despite the initial open auctioning process that is essential for the success of privatization, the author regarded the main aim of the long-run concessions as utilization of commercial mechanism by the private sector. On the other hand, the structural design in Mexico was planned to promote intra-modal competition through “competition between the tracks”.

CHAPTER 8: COMPARATIVE ANALYSIS Ⅰ: Forms, Operation and Finance

8.1 Introduction

In the former chapters several kinds of vertical separation have been examined. Based on the study into each case, this chapter performs analytical comparison among them in terms of the following viewpoints: 1) forms and separation of operational responsibilities; 2) separation of financial responsibilities; 3) relationship among operators. The characteristics of each type of vertical separation would be drawn out through the above comparison and analysis.

8.2 Forms and Separation of Operational Responsibilities

This section examines the forms of vertical separation mainly in terms of the entity that performs the essential factors of daily operation, and the degree of operational separation is investigated comparing among the railways in the case studies.

In order to investigate the implementation form of vertical separation, firstly, this section focuses on how the six essential factors of daily operation, which are defined in Section 2.4.2, are performed within the industry.

Among the six essential factors of daily operation, this paper defines the former three factors following as the “below rail” functions:

1. Maintenance of track and infrastructure;
2. Capacity allocations and timetabling;
3. Route setting (daily traffic controlling and signalling).

Similarly, the latter three factors listed below are defined as the “above rail” functions:

4. Maintenance of rolling stock;
5. Daily operations of trains (train service running and crew rostering);
6. Service marketing and ticket sales.

The investigation clarified that, in general[1], these "above rail" functions are performed:1) by the main operator; or 2) by the tenant (Group 3: Iran; Japan; USA.).

The investigation also clarified the entity that performs each factor of "below rail" functions, and categorized the type of vertical separation based on the entity operationally responsible for it. They are summarized in Table 8.1 according to the degree of operational separation between infrastructure and operation.

Table 8.1 shows that a variety of forms of vertical separation exist in the railway sector, and the degree of separation varies to a large extent from the type of "integral" to "complete separation". Characteristics of each type of separation are examined as follows:

1. Integral (Both Markets)

In an integrated railway such as IR, in addition to the ownership of the infrastructure, the railway operates both the passenger and freight services in an integrated manner including the "below rail" functions. As it was described in Section 2.2.1, this was the most common structure in the railway sector. Nevertheless, faced by severe competition with other modes, except very advantageous market for the railway sector, generally, most of the railways can not afford to bear sufficient amount of costs on the maintenance of track and infrastructure through its revenue. And, in many countries, it has become very difficult to sustain this type of organizational structure without subsidy;

[1] Regarding the maintenance of rolling stock, a variety of cases exist and the details are described in Appendix 3-c.

Table 8.1 Degree of Operational Separation between Infrastructure and Operation

Degree of Operational Separation between Infrastructure and Operation

Below Rail Functions * / Type of Separation	1. Maintenance of track and infrastructure	2. Capacity allocations and timetabling	3. Route setting	Examples of the Country / Railway
1. Integral (Both Markets)	O	O	O	India (IR)
2. Integral (Only in the Primary Market)	O	O	O	Japan (Passenger Co.) USA (Freight Co.) Iran (RAI)
3. Separation of Ownership Only	O	O	O	Mexico (TFM, Ferromex) New Shinkansen line
4. Separation of Financial Support for Track Maintenance	O'	O	O	Vietnam (VNR) Indonesia (PT.KA) Tunisia (SNCFT)
5. Separation with Common Ownership	(O)	(O)	(O)	Germany (DB AG) Iran (Raja Co.)
6. Separation with a Large Shareholding Relationship	*1	O	O	Aoimori Railway
7. Separation as a Shareholder of Infrastructure Manager	(O')	(O')	(O')	Mexico (TFVM)
8. Separation of Slot-Allocation	O'	O√*2	O	France
9. Separation as a Tenant	√	√	√	Japan (JR Freight) USA (Amtrak)
10. Complete Separation (Both Markets)	√	√	√	Sweden UK Australia (ARTC)

Notes:
*: The below rail functions marked in the table are those for the country in the examples.
O: The main operator performs the factor with its finance.
O': The main state owned railway performs the factor operationally, and the infrastructure owner is responsible for the factor financially.
(O): The infrastructure manager, which is the common ownership with the operator, is responsible for the factor operationally and financially.
(O'): The infrastructure manager, which has a share-holding relationship with the operator, is responsible for the factor operationally and financially.
√: The infrastructure manager (Group2: France, Sweden, UK, Australia) or the dominant integrated railway (Group3: Japan, USA), both of which are independent from the operator (Group2) or the tenant (Group 3), is responsible for the factor operationally and financially.

*1: Aomori Prefecture now contracts out the works to the engineering firms, but they are planned to be contracted out to Aoimori Railway for decreasing coordination problems.
*2: RFF is responsible for capacity allocation, and SNCF makes working timetable.

Source: Author

2. Integral (Only in the Primary Market)

In the railways such as those in Japan (passenger), USA (freight) and Iran (freight), only the railway which operates in the primary market keeps an integrated structure. In this type of railway, the primary rail market is profitable and the integrated dominant railway can retain the cost of infrastructure. The another railway in the minor/smaller market accesses the infrastructure paying track-access charges;

3. Separation of Ownership Only

In the freight concessionaires in Mexico (TFM, Ferromex) and the new Shinkansen lines, the infrastructure is not owned by an operator. Thus they are defined as vertically separated railways in this paper. The main difference between the two cases appears that the former operator is selected through a competitive bidding for the concession licence, and the latter one is designated by a law. In this type of separation, the operator performs all the essential factors of daily operation and infrastructure improvements with their own funds. The railway is operated as if it were an integrated one once after the concession is awarded or initial conditions are fixed. Except some track-age rights such as the case in Mexico, there is not a particular coordination problem between infrastructure and operation in the process of daily operation;

4. Separation of Financial Support for Track Maintenance

Except very advantageous market to the railway sector, a railway operator can not afford to shoulder their maintenance costs of the infrastructure in these years. In this type of separation, the state-owned railway performs essential factors of daily operation including “below rail” functions with integration, while the government owns and invests into infrastructure and also finances the maintenance cost of it. The two entities, the railway and the government, make efforts for the smooth railway operation with close annual negotiation in order to lessen the coordination problems raised by the financial separation between them. As long as the

stipulated amount of compensation is paid by the government, through the interview/questionnaire, any particular coordination problems have not been indicated as only the state-owned railway performs the daily railway operation in practice;

5. Separation with Common Ownership

In this type, "above rail" and "below rail" functions are performed by separated organizations, which belong to the same ownership. The study has investigated two types of separation. One is the case in Germany and another is that in Iran.

DB AG has an intention to integrate the above-mentioned two types of functions within the holding structure. Despite the fact that respective functions are performed by different organizations, coordination problems can be greatly reduced as they are controlled under the common ownership.[2] This type of organizational separation has been introduced in some European railways in order to follow the legislation in EU.

In Iran, the "below rail" functions are performed by a dominant integrated railway (RAI), and the tenant (Raja Co.) performs only the "above rail" functions in the smaller rail market. Different from the case in Japan and the US, the tenant is a subsidiary of the dominant railway, and two entities try to co-operate each other as they operate in the different markets. As separated entities have become responsible for each market, they could specialise their transport services in their own market;

6. Separation with a Large Share-holding Relationship

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[2] In contrast with the lower degree of coordination problems within the holding company, this model inherits the following disadvantageous characteristics with regard to a new entrant (Nash, C.A., 2007 p.75):

- according as new operators win the greater segment of the market, the type of "complete separation" increases in practice;
- new entrants need to go to a subsidiary of their greatest rival for track access.

Thus, there are severe criticisms that the holding company, which practically controls infrastructure, can keep advantageous status, and this prevents fair competition among operators.

In this type of separation, the infrastructure and operation have a large share-holding relationship. Similar to the above type, the close share-holding link contributes towards managerial cooperation between the infrastructure and operation. In the case of Aoimori Railway, Aomori Prefecture has no intention to introduce competition among operators, and this led Aomori Prefecture to own the infrastructure and 55% of the Railway's shares. The public sector became responsible for the infrastructure financially in order to alleviate the financial burden of the operator and to sustain its management.

In the case of Aoimori Railway, at present Aomori Prefecture contracts out the maintenance works of the tracks directly to the engineering firms. Nevertheless, both Aomori Prefecture and Aoimori Railway have been worrying over coordination problems between infrastructure and operation. In order to decrease the problems among the two parties, they discussed and reached a plan that the track maintenance works should be contracted out to Aoimori Railway.[15/JP] This is regarded as one of the typical examples that in case they have no intention to introduce on-track competition, they could not find any reasonable reasons to separate these functions operationally even though they have to separate the financial responsibilities. They reached the belief that railway operation can be performed more smoothly in case the prime operator performs both the "below rail" and "above rail" functions with integration [15/JP];

7. Separation as a Share-holder of Infrastructure Manager

In this type, similar to the above two cases, share-holding relationship between infrastructure and operation contributes to managerial cooperation between the two. In the case of the Mexico City Terminal Railway (TFVM), three concessionaires need to share the track-age rights to the infrastructure, and each concessionaire owns the stock of the infrastructure manager, TFVM. In case the infrastructure has enough capacity, through sharing the track-age rights, the operators could achieve their aim with far lower costs than providing their own facilities individually;

8. Separation of Slot-Allocation

The railway in this type has an intention to keep integrated rail control under the main operator, but slot-allocation is separated to another entity following the regulation that aims to introduce on-track competition among operators. For example, in France the main operator, SNCF, is also responsible for most of the "below rail" functions based on the contract with RFF. Both of the public entities, SNCF and RFF, are independent without share-holding relationship. Despite the initial intention to achieve an integrated control, this institutional independence and each entity's own interests sometimes lead to certain conflicts between the two entities as it was investigated in Chapter 5. Regarding the position of a new entrant, this type of separation also inherits the similar disadvantageous characteristics as the German model, which the type of "complete separation" increases according as new operators win the greater segment of the market;

9. Separation as a Tenant

In this type, a tenant in a smaller market accesses the track which is owned by another independent railway. The dominant railway operates in the profitable primary market and keeps an integrated structure. The tenant could be free from the infrastructure maintenance and could specialize in the transport services in the smaller market. It was indicated that the managerial efforts as an independent firm have resulted in the favourable results in JR Freight.[11/JP] In the US, elimination of cross-subsidies between the freight and the passenger divisions was the primary objective for establishing Amtrak, and resulted in defining the government's role for the passenger services.[12/US] Affected by the background of introduction of vertical separation as the structure of the industry, the tenant is in a relatively weak position regarding the access to the track;

10. Complete Separation (Both Markets)

In this type, as studied in the case of Sweden, UK and Australia (ARTC), infrastructure manager and the operators are separated into independent entities.

The infrastructure manager performs the "below rail" functions, whereas operators perform the "above rail" functions only. Each entity is respectively responsible for the functions operationally and financially.

This type of complete separation is regarded as the most appropriate to introduce new entrants to the railway market competitively "[as it has removed] all incentives for the infrastructure manager to favour one operator over another. [Nevertheless, it] also leads to problems in coordination between the infrastructure manager and the train operating companies in terms of planning, investment, timetabling and day to day operations."(Nash, C.A., 2007 p.75) The study revealed that these problems are striking especially in a case infrastructure capacity is limited with dense traffic.[3]

The above investigation into each type of separation revealed that the degree of operational separation between infrastructure and operation varies to a large extent, and identified that the railway industry has experienced various types of vertical separation.

The examination into each case and the above comparative investigation into the different types revealed that in case it is not aimed to introduce within-rail competition[4] through promoting new entry into the market, they have endeavoured to keep an integrated operation in order to decrease the coordination problems by certain measures such as follows:

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[3] The interviews showed that they have difficulties to coordinate timetable under limited infrastructure capacity such as application for the same slots of timetable and difficulties in securing time schedule for maintenance works. (Section 5.5.2.1) Furthermore, they also noted that many disputes are raised in a case of: 1) coordinating timetable under lack of infrastructure capacity; 2) setting train delays by compensation; and 3) sudden engineering works.(Appendix 4-b)

[4] As referred in the footnote in Section 5.8, in this thesis, without particular note in the sentence, "*within-rail competition*" refers *both* "on-track competition" *and* "franchising" through operational separation between infrastructure and operation.

1. **Assigning the below rail functions to the main operator:**

When the railway can afford the maintenance of the infrastructure, it can be operated performing "below rail" functions as well such as the case in long-run concessions in Mexico (TFM, Ferromex) and New Shinkansen Line. On the other hand, even though the government has become responsible for the infrastructure maintenance cost financially, in some railways such as the case in Vietnam, Indonesia and Tunisia, the main railway retains performing the essential factors of daily operation with integration in these cases;

2. **Close share-holding link between infrastructure and operation to attain managerial cooperation:**

Infrastructure and operation keep close share-holding relationship, for example, in the railways in DB AG, Iran, Aoimori Railway, TFVM in Mexico. In these cases operation of, at least, some of the essential factors of daily operation are separated. Nevertheless, the different entities, infrastructure and operation, have share-holding link and this relationship contributes to managerial cooperation between the different organizations;

3. **Confining operational separation only into the smaller/minor rail market:**

In the market where one of the sectors, passenger or freight, is dominant separation of the essential factors of daily operation can be confined only into the smaller sector. As a result, the main railway in the dominant sector can perform integrated railway operation without coordination problems through vertical separation. This is the case in Japan (JR Freight) and USA (Amtrak).

Different from the above cases, it was also disclosed that, instead of a unique aim to introduce new entrants to the market competitively, the type of "complete separation" has separated *all* the "below rail" functions from the operator to the independent infrastructure manager which has no share-holding relationship with the operator even in the primary rail market. Thus obviously this is a distinct

characteristic of “complete separation”, which is significantly different from other types of vertical separation.

The investigation into each case and the comparative analysis in this section clearly revealed the large difference in the form of vertical separation in terms of the operational responsibility for each essential factor of daily operation. The study also disclosed that the above large difference between the type of complete separation and other types mainly comes from whether they have an intention to introduce within-rail competition into the railway sector through vertical separation or not.

This section has investigated into various types of vertical separation in terms of separation of operational responsibilities. The next section examines vertical separation from the view point of separation of financial responsibilities.

8.3 Separation of Financial Responsibilities

8.3.1 Type of Financial Bearing

Traditional utility industries such as railways have “a structure in which a non-competitive component of the industry is vertically integrated with a potentially competitive component or activity.”(OECD, 2001 p.7)

Regarding reform of the above-mentioned industries, Hori, M. (2004) notes that structural separation of a public entity has the following functions:

1) Diminishing cross-subsidy by means of separating the accounts;

2) Clarifying boundary between the commercial division and the social division.

As vertical separation is one type of the structural separation[5], it can play the above

[5] Vertical separation can be compatible with other types of structural separation such as regionalization and separation by line-of-business management. Thompson, L.(2005 p.421) notes that “railways serve at least three distinct market segments:

roles, and Thompson, L (2005) stresses that it is essential to separate the operational and commercial function from social and policy aspects of the government's role at the time of railway reform. This is because cross-subsidy between them weakens the commercial division, which has to compete with other private sector transport such as buses and trucks. It is also important to revitalize the commercial division through an appropriate manner such as public listing of shares (privatization), deregulation, private sector participation, and so on.

Based on the above background, this section investigates how each type of vertical separation clarified the role of the government and that of the railway. Different from the former section, it will be investigated which entity, either the government or the railway, bears financial responsibility for each function of the railway operation.

As most of the "above rail" functions, such as maintenance of rolling stock, daily operation of trains, service marketing and ticket sales, are financially borne by the railway, the study mainly focuses on the financial responsibility for "below rail" functions:

a) Upgrading: Investment for upgrading the infrastructure. It does not include investment for construction of new lines as it is not ordinary rail operation.

b) Maintenance: Maintenance of tracks, electrical and signalling facilities.

c) Below-rail operation: Timetabling and route setting.

Table 8.2 summarizes the result of investigation, and shows which entity bears the financial responsibility. The comparison reveals the following characteristics of financial bearings in each type.

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freight, inter-city passengers and suburban or regional passengers. These have such different characteristics of demand, competition, regulation, subsidy and policy that no single management can successfully handle them."

Table 8.2 Financial Bearing for the Factor of Railway Operation

Degree of Financial Separation between Infrastructure and Operation

Factors of Railway Operation * / Type of Financial Bearing	a) Upgrading	b) Maintenance	c) Below-rail operation	d) Above-rail functions	Examples of the Country (Railway)
1. Self-financed Railway with Infrastructure	R	R	R	R	India (IR) Japan (Passenger Co.) USA (Freight Co.) Iran (RAI) Mexico (TFM, Ferromex) New Shinkansen line Mexico (TFVM) *1
2. Tenant Accessing the Self-financed Dominant Railway	R'	R'	R'	R	Japan (JR Freight) USA (Amtrak) *2 Iran (Raja Co.)
3. Railways with Government's Financial Support for Infrastructure Engineering Works	√	√	R	R	Aoimori Railway*3 Vietnam (VNR) *4 Tunisia (SNCFT) Indonesia (PT.KA) *4
4. Railways with Government's Large Financial Responsibilities for Below-rail Functions	√	√	√	*5 R	Germany (DB AG) *6 France Sweden Australia (ARTC) (UK*7)

R : The railway is mainly responsible for the factor financially.
R': The integrated dominant railway is mainly responsible for the factor financially.
√ : The government or a state entity is largely responsible for the factor financially.

*1: Three concessionaires are responsible for *the above-rail functions* financially.
*2: The government largely supports Amtrak financially.
*3: As access charges are remitted, in practice the local government is responsible for the maintenance of its track financially.
*4: The regulation stipulates that the railway can receive PSO in a certain case.
*5: In some cases the (regional) government contributes to the (regional) passenger services financially. (Examined in Chapter 5)
*6: DB Netz is responsible for the below-rail functions with active financial support from the government. ECMT (2005b p.99) notes that "it is said that 60% of infrastructure expenditure (including loans and grants) is covered by charges."
*7: In UK, firstly the private sector, Railtrack, was principally responsible for the below-rail functions. Since it is replaced by Network Rail, the government has been actively supporting the functions financially.

Source: Author

1. Self-financed Railway with Infrastructure

- (Integral: both markets) Traditional monolithic integrated railway, such as the case in IR, is responsible for both the commercial and the social divisions when they do not receive subsidy from the government. Thus, it takes financial responsibility both for the *below rail* functions and for the *above rail* functions.

- In this type, the railway takes the financial responsibilities both for above-rail functions and for below-rail functions. As the railway should be profitable enough to cover the cost of infrastructure as well, in some cases, such as those in Japan and Mexico, unprofitable lines and services were abolished during the process of the reform in order to realize financially balanced management of the remained services including infrastructure controlling. In the case of the US, the unprofitable sector (passenger) was separated, and the private integrated freight railroads had become financially viable including the costs for below-rail functions. This type can be sustained only in the market relatively advantageous to the railway sector in these years.

2. Tenant Accessing the Self-financed Dominant Railway

- In this type, the financial responsibilities for the smaller/minor rail market has been separated. As the main advantage of this type of financial separation, cross-subsidy is abolished between the passenger sector and the freight sector. Even under the common ownership, such as the case in Iran, financial responsibility of each organization has been clarified. In the prime rail market, the dominant railway principally retains financial responsibilities for the the below-rail functions as well. This type of financial separation, in a certain case, has an advantage to separate a railway into the commercial division and the social division. For example, in the US the government has become responsible for the social division, the passenger services, through its subsidy.

3. Railways with Government's Financial Support for Infrastructure Engineering Works

- In this type of separation, vertical separation clarified the government's financial role for the infrastructure. The ownership of the infrastructure is transferred to the (local) government, and the (local) government started to take financial responsibilities for the construction, renewal, upgrading and maintenance of the infrastructure. On the other hand, financial responsibility of the railway has been confined to above-rail functions and below-rail operation such as signalling and route setting only.
- One of the main advantages of this type is promoting active managerial efforts with advanced commercial freedom in the commercial division, which was separated from the social division.
- In certain cases the regulation stipulates that the government is also responsible for the payment of PSO. This also clarifies the boundary between the commercial division and the social division within the above-rail functions as well.

4. Railways with Government's Large Financial Responsibilities for Below-rail Functions

- In this type, in addition to the financial responsibility for infrastructure engineering works, the independent infrastructure manager takes financial responsibility for the other below-rail operations such as timetabling and route setting as well.[6]
- As examined in Chapter 5, in some cases, the (regional) government finances the (regional) passenger services. The commercial entity, the railway operator, can utilize the public finances through the contract, and the boundary between the commercial division and the social division is clarified through the contract.

This section has investigated various types of vertical separation mainly in terms of the separation of the financial responsibilities. Along with the former section, the investigation revealed:

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[6] In France, RFF performs slot-allocation and contracts out other below-rail functions to SNCF. In Germany, although the infrastructure manager is one of the organizations under the holding company, following EU Directives, its account is independent from other organizations.

- In most of the cases, vertical separation has been introduced when it is not possible for a railway to sustain the infrastructure investment and/or its maintenance;
- Vertical separation contributes to clarify the boundary of financial responsibility of the railway and that of the public sector;
- The public sector can bear various scope of financial responsibility in the railway sector such as:

  1) only investment in construction stage (Ex. new Shinkansen line);

  2) operation in the minor market (Ex. Amtrak in the US);

  3) infrastructure engineering works (Ex. Vietnam, Tunisia, Indonesia); and

  4) all the below-rail functions (Ex. Sweden, Australia (ARTC)).
- Only the type of "complete separation" has separated both operational and financial responsibilities for all the below-rail functions to the legally and financially independent entity even in the prime market;
- In other types of separation, in spite of the separation of financial responsibilities, an integrated operation is intended in order to decrease the coordination problems through vertical separation at least in the prime market.

8.3.2 Vertical Separation and Public Listing of Shares

The above study showed that there are a variety of measures to divide a monolithic railway into the social division and the commercial division by way of vertical separation. Certainly, there are also other methods to extract the social division through railway reform such as separation of long-term liabilities, making PSO type contract between the government and the railway, and so on. But it was demonstrated that vertical separation, one type of structural separation, also can be utilized for this separation.

Broadly speaking, there are two options to promote private sector participation into the railway services. One of the methods is permitting an access by a private

operator, and another method is public listing of shares. In the latter type, shares of the incumbent/reformed railway are listed in the stock exchange, and this method is also closely related with vertical separation.

For example, diminishing excessive cross subsidies between the passenger and the freight sectors had played an important role to achieve the public listing of shares of the three profitable JR Passenger Companies in the main island (Honshu) of Japan. It also largely contributed toward sustaining and revitalizing the private freight railroads in the US. Aoimori Railway was established as a joint-venture with the private sector by means of transferring capital costs of the infrastructure to the public sector.

As the above examples show, public listing of shares is one of the principal measures for private sector participation, and vertical separation can be utilized for one of the effective methods to achieve it. The financial burden of the integrated railway can be reduced by transferring a certain part of it, such as that for the infrastructure, to the government through vertical separation. Once the commercial division has become financially viable, it will have a possibility of public listing of shares.

For example, in the case of Vietnam and Indonesia, vertical separation relieved the financial burden of the railways, and specified the commercial division making it financially balanced. Furthermore, organizational conversion into a corporation has been performed in accompany with vertical separation. ADB (2006 p.1.1) also notes that "[corporatization is] an emerging practice gaining momentum among government-owned railways, [and it] is often the first step towards divestiture either by sale of shares to the public or to strategic investors."

As public listing of shares does not increase the number of operators, it can attain private sector participation without increasing coordination problems among different entities in the railway sector.

8.4 Relationship among Operators

This section investigates the relationship among operators under vertically separated railways. For discussing it, firstly, the author examines what kind of regulation/access agreement is applied for each operator so as to enter the rail services.

1) Access Right for the Incumbent/Reformed Operator

During the process of the railway reform, in some cases, only the incumbent/reformed operator can keep relatively exclusive track-access rights. The study revealed that they are based on the regulations such as follows.

1-1. Legal Access Right

In Vietnam, Indonesia and Tunisia, based on the regulations stipulated in the law, the state-owned railways perform operation accessing the government-owned tracks. In new Shinkansen lines, also based on the law, the JR Passenger Company in the region provides the rail services exclusively accessing tracks owned by the public entity. In the US, the tenant, Amtrak, accesses the network of the dominant railway based on the law. These examples show that the incumbent/reformed sole railway retains the exclusive legal access right to the tracks.

1-2. Share-holding Relationship

In the case of Aoimori Railway and the Mexico City Terminal Railway (TFVM), only the limited operators access the infrastructure. The operator is a joint-venture with the public infrastructure owner in the former case, and is a share-holder of the infrastructure manager in the latter case. In these cases it appears that strong share-holding relationship practically stipulates the access right to the infrastructure, and it is not intended to open the tracks to other operators.

2) Access Right for Voluntary Participants

In contrast with the above cases, the study revealed that voluntary participants are permitted to perform transport services based on the following regulations.

2-1. Franchising, Concessioning, Service Contract

In some cases voluntary entry to the rail services was attained by means of franchising controlling only the operation or concession controlling both infrastructure and operation. For example, franchising is adopted in the passenger sector in Sweden, UK, and concessioning is adopted in the freight sector in Mexico. In the regional passenger services in Germany, an entry to the market has been attained by franchising as well as a service contract with negotiations. In these cases, in general, the number of operator in the same sector, especially in the passenger sector, is practically limited to one for avoiding unnecessary conflicts and minimizing the amount of subsidy.

2-2. Open Access

In the freight market in European railways and Australia (ARTC), a voluntary entry to the market has been attained based on open access, and it has become common that plural operators compete *on* the tracks in the same market sector.

2-3. Permission by the Authority

In some cases, an operator can obtain track-age rights through the permission by the authority. For example, in the US, the Interstate Commerce Commission often gives one railway the right to operate over another in order to create competition between the two. Chapter 7 investigated that the track-age/haulage rights are also imposed to other concessionaires in certain key routes for promoting competition between the tracks in the case of Mexico as well.

2-4. Joint Venture, Management Contract with the Main Operator

Different from the above three types, this type of access right for voluntary participants is not for promoting within-rail competition. In the passenger sector of Vietnam, Tunisia and Iran, the private sector has participated in a transport

service in close cooperation with the state-owned railway through establishing a joint-venture or making a management contract. While the incumbent main operator continues to play a principal role in rail operation, it can also gain the benefit of introducing the private investment and expertise into the railway sector.

As it is reviewed above, the study clarified characteristics of several regulations, which stipulate the track-age rights to enter into the transport services. Provided that access rights can be granted only to the incumbent/reformed operator, there is a risk that the primary operator is not efficient enough. For example, the re-organized state railway might succeed the problematic characteristics of the former state-owned railways.[7] On the other hand, in a case that the access right is awarded for voluntary participation as well, there is a good chance that the private sector also can enter into a rail transport service with enough motivation to increase the revenue, which hopefully results in improving the efficiency of the railway operation. Besides the joint-venture and management contract with the main operator, the latter type of access right is also effective in promoting within-mode competition.

The following section investigates the relationship among operators on the same track, and Table 8.3 categorizes the type of track-access in terms of the relationship among them.

7 The problems of state-owned railways are described in Section 2.3.3.

Table 8.3 Type of Track-Access and Possibilities of Coordination Problems among Operators

Possibilities of Coordination Problems among Operators

Type of track-access	Regulation	Track-access by the incumbent/ reformed operator	*Track-access by voluntary participants*
1. Access by the Sole Operator	Law	Vietnam (VNR) Indonesia(PT.KA) Tunisia (SNCFT) New Shinkansen Lines France(SNCF) <P>	
	Shareholding Relationship	Aoimori Railway	
	Concession		*·Mexico (TFM, Ferromex)*
	Franchising		*·UK <P>* *·Sweden <P>*
	Service Contract		*·Regional passenger services in Germany *1*
2. Access through Voluntary Agreement with the Main Operator	*Management Contract with the Main Operator*		*·Tunisia<P>* *·Iran <P>*
	Joint-Venture with the Main Operator		*·Vietnam<P>*
3. Limited Access to Another Sector	Law	USA <P> Japan <F> *2 Iran <P>	
4. Limited Access to the Same Sector	Shareholding Relationship	Mexico (TFVM)	
	Permission by the Authority		*·Some routes in the US<F>* *·Some key routes in Mexico<F>*
	Franchises Overlap		*·Some overlapping lines in UK<P> & Sweden <P>*
5. Competitive Access in the Same Sector	*Open Access*		*·Sweden <F>* *·UK<F>* *·Germany<F>* *·Australia<F>*

Notes:

*1: In Germany, the regulation stipulates open access, but most of the regional passenger services are provided by a contract with Laender.

*2: In Japan, there is no new entrant into the freight sector after the reform in 1987. But the regulation does not prohibit entering into the services.

<P> Passenger Sector
<F> Freight Sector
Source: Author

Based on the Table 8.3, the relationship among operators will be investigated according to the type of track-access.

1. Access by the Sole Operator

In this type of track-access, in general, the sole operator can perform operation without competitors in its own railway market even if other operators might perform the services within the different market. Thus the operator does not particularly have conflicts with other operators at least within the same market based on the exclusive access rights to the track.

2. Access through Voluntary Agreement with the Main Operator

In this type of track access, the new entrants are supportive to the main operator, and it was revealed that there is not a particular conflict among the operators. As the conflicts between them, if any, can be settled down by themselves, the regulator does not need to make many efforts to coordinate the relationship between the operators. Whereas most of the essential factors of daily operation are performed by the main operator, it also gains benefits of introducing capital and expertise from the new entrants.

3. Limited Access to Another Sector

In this type of track access, the two railways perform the operation in different markets, the passenger or the freight. Thus their relationship is not competitive even though it is necessary for them to coordinate some operational factors such as timetabling and each operator is obliged to make possible efforts to coordinate the railway operation.

4. Limited Access to the Same Sector

In this type, more than one operator in the same sector is permitted to access a certain segment of the network. For example, in freight railroads in the US, the Interstate Commerce Commission intended to create intra-modal competition and it often gives one railroad the right to operate over another. In the passenger

sector in UK, although it is not the main aim of the passenger franchising, because of overlapping franchisees there are some cases of on-track competition where a route has more than one passenger operator. In these cases, the relationship among operators tends to be competitive rather than supportive.

5. Competitive Access in the Same Sector

When the track is made available to all users on non-discriminatory terms by an independent infrastructure provider, as open access, the level of intra-rail competition becomes the highest.(Thompson, L. and Budin, K. J., 2001 p.5) The investigation into the rail freight sector in Europe and Australia showed that the relationship among operators is competitive, and that possibilities of coordination problems among operators would be, generally, also higher than other types of track-access. In order to coordinate the relationship among operators fairly it is required for a neutral infrastructure manager to perform some of the essential factors of daily operation such as capacity-allocations and route setting. In spite of these measures, the investigation revealed that there are certain conflicts among them especially in a case infrastructure capacity is limited or an accident/train delay happens.

This section has examined various types of track-access and relationship among operators. Operation is limited to only the incumbent/reformed railway in a certain type of track-access, whereas new entrants can also access the tracks in the other types. The relationship among operators varies to a large extent depending on the type of access. According as the number of operators increases, in general, the possibilities of coordination problems become high. Although it also depends on other factors such as traffic density, in case several operators compete on the same track in the same market, possibilities of coordination problems among operators would become highest. In this case appropriate coordination by an independent regulator would become further more important.

8.5 Conclusion

The study in this section examined the characteristics of various types of vertical separation in the railway sector in terms of:

1) forms and separation of operational responsibilities;
2) separation of financial responsibilities; and
3) relationship among operators.

In summary, the study clarified the following findings:

- Degree of separation between infrastructure and operation varies to a large extent. In general, possibilities of coordination problems between them become high according as the degree of separation increases operationally. Additionally, when other operators access the same track especially in the same market, coordination problems among operators tend to become higher as well;

- Despite the public sector's investment in the infrastructure and its ownership, the railway is able to continue its operation as if it were an integrated railway, provided maintenance costs can be self-financed through the railway operation;

- In case the maintenance cost cannot be self-financed by the railway, the public sector is required to support all or a part of the track maintenance cost and some coordination problems tend to be raised by the separation of financial responsibilities[8]. Nevertheless, in these cases, except the cases in Europe and Australia where the regulation aims to introduce within-rail competition, it is intended to keep an integrated operation by the main railway in order to minimize the coordination problems between the entities concerned. They endeavoured to achieve it through the following measures:
  1) assigning the below rail functions to the main operator;

[8] They would be examined as Disadvantage D.2 in the next chapter.

2) retaining share-holding link between infrastructure and operation to attain managerial cooperation; and/or

3) confining operational separation only to a small market.

- The above item means that, without an aim to introduce within-rail competition, the main railway operator is responsible for the essential factors of daily operation or has share-holding relationship with the infrastructure manager at least in the primary railway market. On the other hand, “complete separation” has a unique exclusive aim to introduce within-rail competition through promoting new entry to the market, and this type has separated all the *below rail* functions to the infrastructure manager even in the prime market both operationally and financially;

- Separation of financial responsibilities can be varied according to the expectation of the government for the railway sector. For example, the Swedish government, which has an intention to support the railway sector putting railways on an equal footing with roads, actively continues financial support to the social division of the railway sector, whereas the Mexican government released most of the financial responsibilities in the railway sector and the private concessionaires keep railway operation in the commercial division. Thus, in the process of separating the railway into the social and commercial divisions financially, the government can clarify the boundary between the two through defining their scope.

CHAPTER 9: COMPARATIVE ANALYSIS Ⅱ: Advantages and Disadvantages and Relationship with the Form

9.1 Introduction

This chapter mainly investigates advantages and disadvantages of vertical separation and the relationship between these and the form of separation. In Section 9.2 and Section 9.3, advantages and disadvantages of vertical separation are investigated mainly based on the interviews/questionnaires. As introduction of within-rail competition is one of the advantages of vertical separation, competition issues in terms of vertical separation are also examined. Section 9.4 comparatively examines the relationship between these advantages, disadvantages and their forms of vertical separation. Then, Section 9.5 examines an appropriate form of vertical structure in terms of the market structure, and finally the analysis is synthesized.

9.2 Advantages of Vertical Separation and Competition Issues

9.2.1 Advantages of Vertical Separation

The study clarified various kinds of the advantages of vertical separation of railways. The interviews/questionnaires presented evidence for the advantages which are investigated in Section 2.5.1, and revealed the additional advantages as well. They are summarized based on the afore-mentioned author's main categorization:

A.1) to facilitate public investment into infrastructure;

A.2) to permit private sector involvement;

A.3) to introduce competition;

A.4) to promote specialization;

A.5) financial arrangement among different entities.

In the following, the presented evidence and the newly revealed advantages are summarized along with further investigation into the advantages.

A.1) To Facilitate Public Investment into Infrastructure

A.1-1. Putting different modes on an equal footing within the transport industry.

A government can support the railway sector for social objectives and to ensure competitive balance with other modes of transport clarifying relationship within the transport industry. Section 2.5.1 and Chapter 5 studied this kind of advantage especially through the case of Sweden.

A.1-2. Utilization of external financial support for improving railway infrastructure through voluntary negotiation.

Section 2.5.1 explained the case of Yamagata Shinkansen in Japan to explain this type of advantage. A third party such as a regional government receives external benefit which is generated by the railway services improved by the investment in the new infrastructure. As the private sector such as a real estate developer and firms beside the new lines also receive the external benefits, this type of vertical separation has a potential to promote the private sector's investments into railway infrastructure as well.

A.1-3. Financial support for sustaining an unprofitable operator by transferring its infrastructure to a third party.

Vertical separation can be one of the effective means for sustaining unprofitable railways when they are socially beneficial. The financial burden of the railway can be alleviated by way of transferring the infrastructure and the related expenditures from the railway to a third party such as the (local) government.

Vertical separation between the government and the state-owned railway in Vietnam, Indonesia and Tunisia is regarded as an example of this type. Another example is Aoimori Railway, which was investigated in Chapter 7.

A.1-4. Public investment into infrastructure keeping independent management of the incumbent operator.

Despite strong demand for railways and their social benefits, undertaking a major rail project by the private sector or a railway operator is not financially viable in the most cases. Thus large investment into the railway sector, such as construction of new lines, should be performed without deteriorating independent management of the incumbent operator.

In Japan it was decided by a law that JR companies should operate new Shinkansen lines, which would be constructed after the privatization of JNR. The infrastructure of new Shinkansen lines is owned by the public sector, and the operator of the new Shinkansen lines pays usage fees which were calculated based on the benefits received as an operator of the lines. Thus the burden of the operator is kept within the limits of the corresponding benefits. This case was investigated in Chapter 7.

A.1-5. Development of infrastructure with authority of the state.

The study in Tunisia indicated that, through transferring the responsibility from the state-owned railway to the government, it has become easier to promote infrastructure development projects taking up land with authority of the state. [4/TN]

A.2) To Permit Private Sector Involvement

A.2-1. Utilization of ability of the private sector through monopoly concession for achieving efficient controlling both infrastructure and operation.

The government can establish a concession contract licensing to a sole/dominant concessionaire expecting efficient investment, maintenance and management of railway system while ownership of the infrastructure remains with the government. In this type of concession controlling both infrastructure and operation, the contract generally covers long-term period as the licensed

concessionaire should have enough incentives to invest into the infrastructure. Chapter 7 investigated this type in the case of long-run concessions in Mexico.

A.2-2. Facilitating a private entry into a part of railway system separating sunk costs.

The study revealed that new private participants have entered the rail transport market in Vietnam, Tunisia and Iran in close cooperation with the incumbent operator. These new participants have attained the entry to the specialized rail market without bearing infrastructure investments. As the management contract is made on a regional basis, it was indicated that transport services based on the local conditions have been achieved as well. [2/VN, 4/TN, 10/IR]

A.2-3. Track-access based on voluntary agreement for economy of enhanced density.

Mutual track access can be realized based on the commercial interests as the more traffic a rail line carries the lower is the unit cost. In general, regulatory power is not required to manage this kind of voluntary mutual access among the operators. Section 2.5.1 studied this kind of advantage through the case in the US.

The investigation in Chapter 7 clearly revealed the difference between vertical separation and reciprocal running, both of which contribute to through-train services and economy of enhanced density based on voluntary agreement.

A.2-4. Promoting convenience with through-trains.

In addition to the advantages in the passenger sector examined in Section 2.5.1, this advantage can apply to the freight sector as well. Section 5.2.1 studied that in Europe it was thought that the failure of the railway industry in international traffic was partly due to the structure of the industry, where each national company operates the services only within the border. This is the background that the European Commission set about opening up the rail market for international freight, where the new entrants might offer through service competing with roads.

A.3) To Introduce Competition

A.3-1. Encouraging intra-modal competition permitting track-age access to more than one operator.

The European rail policy has an intention to introduce within-rail competition into the rail transport sector by separation of infrastructure and operation (at least in accounting sense)[1], and by the progressive opening up of entry to the market for new operators. Chapter 5 studied that it has become common that several rail freight undertakings operate on the same tracks competing with each other under the regulation of "open access".

A.3-2. Creating competition among train operators by franchising out operational services.

Chapter 5 showed that franchising is adopted as a regulation of track access in the passenger sector in Sweden and UK. Different from the above-mentioned "open access", basically a sole operator has a right to access the track. Nash, C.A. (2005b) stresses that franchising is utilized to achieve competition throughout the rail market, especially in the passenger sector, avoiding wasteful competition. It is also utilized for preserving an integrated network of rail services, subsidized where necessary.

A.4) To Promote Specialization

A.4-1. Specialization of technical and managerial knowledge either infrastructure or operation.

In the case of complete separation such as the case in Sweden, Australia (ARTC), the rail operators started to concentrate on providing satisfactory service to their customers, and the infrastructure manager also put greater focus on their own core businesses. [5/SE, 9/AU]

Chapter 4 revealed that the private companies, which are good at tourism

[1] Even if the incumbent operator keeps an integrated structure it is possible for other operators to access the tracks by regulation. Nevertheless, it is discussed that in the case of "complete separation", any operator can access the tracks in equal conditions with other operators.

businesses, have participated into the rail services successfully attracting passengers for sight-seeing through marketing and investment into the rolling stock. As this example shows, this kind of familiarity with the market can also be a motive for the private sector to participate into the railway services.

A.4-2. Concentrating the service efforts on either the passenger or the freight.

In order to discontinue cross-subsidy between the passenger and freight sectors, in certain types of railway reform, the passenger and freight sectors have been separated into independent entities. Since they became independent, they have started to improve the services focusing on their own market.

Chapter 6 showed the structure which the dominant operator owns infrastructure and another sector accesses the infrastructure in Japan, the US, and Iran. The study revealed that each operator started to focus on the services within its own market. [10/IR, 11/JP, 12/US]

A.5) Financial Arrangement among Different Entities

A.5-1. Dealing financial settlements among several companies.

In a certain case, common ownership of the infrastructure is utilized for financial settlements among different railways. Section 2.5.1 investigated the case of Shinkansen Holding Corporation, which was established to attain this kind of advantage.

A.5-2. Common ownership/management of the infrastructure for sharing accesses.

Chapter 7 investigated this type of mutual access in the Mexico City Terminal Railway (TFVM), where the three concessionaires and the government are the shareholder of TFVM, and attained the mutual access to the dense rail infrastructure in the country. Through this kind of common ownership/ management of the infrastructure, each operator could achieve access to the infrastructure with much less costs than providing its own infrastructure.

A.5-3. Improvement of the accounting system and financial management.

The investigation into VNR revealed that introducing the track access charges clarified the costs of each transport service and improved the accounting system. [2/VN] Similarly, the study about SNCFT showed that allocation of the infrastructure costs to each transport division resulted in tightening its cost control and financial management, and contributed to decreasing unnecessary maintenance costs. [4/TN]

A.5-4. Separation of the social division and the commercial division of the railway.

In the US, elimination of the cross-subsidies was the primary objective of the government in establishing Amtrak. In addition to the revival of the freight railways, vertical separation made the government define its role for the passenger sector.[12/US] Through the restructuring processes, it was also defined that the government should support necessary passenger rail transport in Australia, Mexico and some European regional services.[9/AU, 13/MX, 7/DE, 8/FR] These cases show that the separation of financial responsibility clarified the boundary between the social and the commercial divisions within the railway sector.

A particular example of vertical separation in a railway does not necessarily have only one of the above advantages, and several advantages can be utilized at the same time in order to attain a certain aim. For example, a number of the above-mentioned advantages of vertical separation would be utilized as complementary policies to promote private participation into the railway services.[2]

Brooks, M. and Button, K.(1995 p.235) notes that “there has been, as part of what has been called a ‘general withdrawal of the state’, an almost universal move towards market liberalization and the transference of significant parts of transport

[2] The following advantages play at least a certain role in private sector participation in the railway sector: A.1-1, A.1-2, A.1-3, A.1-4, A.2-1, A.2-2, A.2-3, A.2-4, A.3-1, A.3-2, A.4-1, A.4-2, A.5-2, and A.5-4.

supply from the public to the private sector." Moyer, N. and Thompson, L. (1992 p.i) also generalizes regarding the private sector participation as "a monolithic railway does not function well in a market economy in competition with privately owned, properly (lightly) regulated competitors – especially trucking. *All* attempts to commercialize, corporatize, or increase the role of the private sector in railway activities have started with one or another form of reshaping the railway entity. Solutions will vary, but the universal objective as an economy becomes more market-driven is to make the railway more market-sensitive."

The above-referred indications mean that it might be possible to utilize vertical separation to reshape a monolithic railway and to make it more market-sensitive.

9.2.2 Competition Issues

Introduction of within-rail competition is one of the advantages of vertical separation. Thus, this section investigates how each railway faces competition which was described in Section 2.2.2.4. Especially, introduction of competition through vertical separation is examined, and the results of the investigation are summarized in Table 9.1.

The study based on the table revealed that, through utilizing vertical separation, only railways in EU and Australia have an intention to introduce within-rail competition:

- Type 1: competition *for* the tracks; and
- Type 2: competition *on* the tracks.

The study also revealed that only the freight sector in Mexico could have successfully introduced another following competition through vertical separation making a contract with different concessionaires:

- Type 3: competition *between* the tracks.

Table 9.1 Comparison of the Types of Competition

	Type of Competition / Country	Within-rail Competition *		3. Competition *between* the tracks	4. Competition *beside and above* the tracks	5. Competition *between companies* on their own tracks
		1. Competition *for* the tracks	2. Competition *on* the tracks			
Group 1	**India** (IR)				c<P;F>	
	Vietnam (VNR)				c<P;F>	
	Indonesia (PT.KA)				c<P;F>	
	Tunisia (SNCFT)				c<P;F>	
Group 2	**Sweden** (Banverket)	**C<P>**	**C<F>***1		c<P;F>	
	UK (Railtrak)	**C<P>**	**C<F>***1		c<P;F>	
	Germany (DB Netz)	**C<P>***2	**C<F>**		c<P;F>	
	France (RFF)		**C<F>**		c<P;F>	
	Australia (ARTC)	**C<P>**	**C<F>**		c<P;F>	
Group 3	**Iran** (Raja Co.-RAI)				c<P;F>	
	Japan (JR Freight-JR Passenger)			c<P> *3	c<P;F>	*4
	USA (Amtrak-US Freight)		c<F>*5	c<F>*5	c<P;F>	c<F>
Group 4	**Mexico** (TFM, Ferromex)	*6		**C<F>**	c<P;F>	
	Mexico (TFVM)		*7		c<P;F>	
	New Shinkansen Lines				c<P;F>	
	Aoimori Railway				c<P;F>	

<P>: Passenger Sector
<F>: Freight Sector

C: Competition which was introduced as an aim of the reform through vertical separation.
c: Competition which was already existed even before the reform.

* : Although "3. Competition *between* the tracks" and "5. Competition *between companies* on their own tracks" are also regarded as intra-modal competition, as noted in the footnote of Section 8.2, the term of "within-rail competition" refers to both "franchising" and "on-track competition" in this paper.

*1: In certain overlapping lines, different franchisees compete on the track in the passenger sector as well. Nevertheless, this was not an aim of the reform.

*2: Open access is stipulated in Germany. Nevertheless, in the passenger sector, examples of on-track competition are limited, and most of the services are operated based on a contract with subsidy.

*3: Like US freight corridors, there are some examples of competition between a JR Passenger Company and a private passenger railway in Japan.

*4: The newly established JR Passenger companies face yardstick competition and profitability competition on the stock exchange to some extent. Nevertheless, this is not an aim of vertical separation.

*5: U.S. Interstate Commerce Commission often gave one railway the right to operate over another in order to create competition between the two. [12/US]

*6: The Mexican freight concessionaires face competition *for* the market at the time of bidding for a concession contract. Nevertheless, besides this type also controls the infrastructure, the period of the contract is 50 years and renewable for another similar period in the case of Mexico. Thus the author regarded the main aim of long-run concessions as utilization of ability of the private sector utilizing market mechanism.

*7: Certainly, the three freight concessionaires access the network of TFVM. Nevertheless, the aim of establishment of TFVM is not for promoting on-track competition among concessionaires, but for 1) economy of enhanced density of the network avoiding monopolistic access to the country's most densely used network; 2) promoting competition on parallel tracks.

Source: Author

The above investigation demonstrated that introduction of a new type of competition through vertical separation of railways has been so limited except the afore-mentioned cases. Nevertheless, in some cases, vertical separation could have changed status of the railway in the transport market. For example, diminishing cross-subsidy between the freight and the passenger sectors strengthened competitiveness of the freight railroads in the US, and they have gained advantageous status against other transport modes. As this example shows an appropriate model of vertical separation can strengthen competitiveness of the railway sector, utilizing only the existing competition.

As mentioned in Section 2.3, railways have lost the market share drastically over the past thirty years in many countries, and in most of the cases the government has an intention to develop railways in order to keep and develop preferable environment. Thus it is extremely vital for the railway sector to tackle the inter-modal competition, which is the most serious in common. Accordingly, it is essential to design an appropriate railway structure, which the railway sector itself can be efficient and can cope with this significant competition.

9.3 Disadvantages of Vertical Separation

The research clarified various kinds of the disadvantages of vertical separation of railways. The interviews/questionnaires presented evidence for the disadvantages which are investigated in Section 2.5.2, and also revealed the additional disadvantages. They are investigated based on the afore-mentioned author's classification:

D.1) coordination problems due to vertical separation of entities performing railway operation;

D.2) coordination problems due to separation of finance;

D.3) coordination problems due to multiple operators.

The presented evidence and the newly clarified disadvantages are summarized along with further discussion about the disadvantages which are investigated in Section 2.5.2.

D.1) Coordination Problems due to Vertical Separation of Entities Performing Railway Operation

D.1-1. Increase of the transaction cost between infrastructure and operation.

For promoting competition *on* the tracks, in addition to the costs of necessary regulation for coordinating the complex relationship among different entities, the infrastructure manager is bound to compile annually a network statement explaining the network license conditions, the price structure, access conditions to the network, the rules for capacity allocation, etc. for accepting track-access. [5/SE] Regarding the competition *for* the tracks, the interviewees also indicated several challenges for the passenger franchising bidding system such as difficulties in assessing the franchising proposal.[6/UK, 7/DE] Even the two entities belong to the same ownership, the interviewee in Iran also indicated the risk of higher transaction costs through the loss of economies of scope. [10/IR]

D.1-2. Difficulty in clearly identifying the respective responsibilities of the different parties.

As vertically integrated railways take full responsibilities of railway operation, they must bear all the liability for accidents as well. Thus, they will make efforts to find a cause of the accident in order to prevent the similar accident thereafter. Nevertheless, the separated entities tend to have difficulties to identify the respective responsibilities.[5/SE, 6/UK, 8/FR, 9/AU]

RAI worries about the damage of tracks raised by ill-conditioned rolling stock, and believes that, without appropriate means to check the condition of rolling stock and tracks, risk for disputes among operators would be higher when several operators access the same track. [10/IR]

D.1-3. Difficulties in acquiring broad knowledge for operation and safety measures.

In addition to the difficulties in acquiring comprehensive knowledge about railway operation, the interviewee in France indicated a serious concern that strict separation of the operational responsibility would lose 'railway-men spirits' out of the employee, and results in inefficiency as a consequence.[8/FR]

D.1-4. Difficulties to harmonize the technologies and to optimize train operation on the network.

The results of the questionnaire to Australia stressed this potential problem of vertical separation indicating the risk of loss of control and specialist knowledge about the wheel/rail interface.[9/AU] The optimal train operation can be realized based on the harmonization of the technologies both for above rail functions and for below rail functions. Separation of these functions tends to make it more difficult, and the lack of harmonization results in a non-optimal train operation.

D.1-5. Difficulties to achieve further technical development of the comprehensive railway system.

Chapter 6 revealed that the passenger sector in Japan and the freight sector in the US have greatly improved after the reform in each country. In both of the two cases the largely improved sector keeps an integrated structure, and their experience appears to support the common view that vertically separated railways have more difficulties to achieve further technical development of the railway system as a whole.

D.1-6. Difficulties in planning certain works such as maintenance and unprecedented works.

Sometimes, vertically separated railways have more difficulties than integrated railways in planning maintenance works. Some of the maintenance works, such as changing turnouts and exchanging long rails, require securing long time for the engineering works and, in some cases, abandoning planned train operations. Within integrated railways maintenance works can be planned by negotiation within an organisation, and a responsible person can make the ultimate decision. However, under vertically separated railways a final decision can be reached only after the negotiation and agreement between the two parties, and sometimes it takes longer time and large difficulties. [15/JP] ECMT (1996) also indicates that it is easier for integrated railways to manage in unprecedented circumstances through appealing to their hierarchical decision-making procedures.

D.1-7. Difficulties to make coordinated managerial decisions.

Some managerial decisions require sophisticated interaction between the infrastructure and operation. This can apply to non-technical issues as well. These managerial decisions also require close relationship between the infrastructure and the operator.

For example, active affiliated businesses such as real estate developments around new stations are regarded as one of the main reasons of managerial success for Japanese integrated railways. If a railway company can internalize the external economies of its investment and provision of rail services, it greatly contributes to

increasing the income to the railway. Nevertheless, once the two have become independent entities, the separated parties tend to have more difficulties in reaching coordinated managerial decisions. [15/JP]

D.2) Coordination Problems due to Separation of Finance

D.2-1. Difficulties in planning and performing adequate investment in a railway system.

When vertically separated railways try to make optimized investment for the improvement of railway operation, they have more difficulties than integrated railways as railway traffic is the result of interlinked production. The improvement of rail operation can be achieved, in most cases, through the simultaneous, comprehensive investment by both infrastructure and an operator.[6/UK]

Once the financial responsibilities are separated into different entities, even though the railway operation is intended to be integrated, some coordination problems among concerned entities have been identified.[2/VN, 3/ID, 8/FR]

D.2-2. Poor economic performance arising from monopolistic status of the infrastructure manager.

Instead of efforts for the improvement of a railway, which is competing with other transport modes, it is also possible for the infrastructure manager to focus only on his own entity. This might result in harmful effects to a railway itself. The study through the questionnaire also indicated this disadvantage, and stressed that successful vertical separation requires a degree of maturity and a professional approach to ensure that all decisions are ultimately in the best interests of the overall rail industry. [9/AU] Chapter 5 studied that, in the case of UK, the rail regulator independently determined how much money the infrastructure manager needs so that the government shall appropriate funds for the railways.

D.2-3. Conflicts raised by non-payment of the stipulated amount of compensation.

Railway operation faces serious problems in case payment of the stipulated amount of compensation is not fulfilled by the government. Chapter 4 has revealed that the government's failure to pay the stipulated amount of compensation and the lack of stable allocation of necessary funds for maintenance of the infrastructure is considered as one of the most serious problems after the restructuring through vertical separation in Indonesia.[3/ID] Considering the British experience referred in the above item, a certain authority such as an independent regulator which retains the power to provide appropriate funding levels on the railway sector might be a solution to lessen the problem.

D.2-4. Non-fulfilment of the promised investments and difficulty to specify long-term contract.

In practice, concessionaires have an incentive not to make investments that are unprofitable even if the government wants them to do so, and even if they promised to do so in their initial bids for the contract. The investigation in Chapter 7 clarified the risk of non-fulfilment of the promised investments.[3] Additionally, it is also very difficult to specify long-term contract, and the operator's actual benefit might largely differ from the original expectation especially in the case of radical economic changes.[14/JP]

D.3) Coordination Problems due to Multiple Operators

D.3-1. Difficulty in slot allocation, timetabling and coordination among operators.

The interviews also revealed that the infrastructure manager has difficulties to coordinate the operators' slot-application especially in the following cases [5/SE, 6/UK, 7/DE, 9/AU]:

1) in a case infrastructure capacity is limited;

2) in a case several operators apply the same slots of timetable;

3) in a case time schedule for maintenance works is difficult to be secured.

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[3] The interviewee also suggested an alternative approach that the government identifies the desired investments and performs the payment for it.[13/MX] This approach appears to be similar to the case of new Shinkansen lines as the public sector invested in the infrastructure initially, and the operator can upgrade it in case it is prospected to be profitable.

Difficulty in coordination was indicated even though the number of operators is limited to a few as each operator tries to pursue its own interests. [13/MX]

D.3-2. Lack of integration of prices and services.

Chapter 5 studied that in Germany several pasenger operators perform railway operation on the same network under the regulation of open access. The interviewees indicated that it is difficult to integrate prices and services among the main operator and the new entrants.[7/DE] The interviewees in Sweden also indicated the lack of coordination in timetable scheduling at the border of the franchised networks.[5/SE] These cases show that this kind of coordination problems happens when plural operators access the network in the passenger sector.

D.3-3. Loss of flexibility of controlling trains/crews.

The interviews to European railways clarified that the increase of new entrant operators tends to result in some sub-optimisation and loss of flexibility. It was indicated that flexible operation, such as that for unprecedented issues, is one of the advantages for integrated or franchised railway where a single operator controls train operation on the network. [6/UK, 7/DE]

D.3-4. Difficulties to provide sufficient information of other operators.

It was indicated that in case several operators perform passenger train services based on open access, practically, it is difficult for the station staff to sell various types of tickets issued by different operators and to provide sufficient ticket conditions to the customers. [7/DE]

In addition to the evidence, this study revealed a number of problems and disadvantages derived from vertical separation of railways.

Along with Section 9.2, the study investigated various kinds of advantages and disadvantages according to the author's categorization. In the following section, relationship with these advantages/disadvantages and the form of vertical separation will be analyzed.

9.4 Relationship with the Form of Vertical Separation

Table 9.2 shows relationship between the main advantages/disadvantages and the forms of vertical separation. In the following, advantageous and disadvantageous aspects are investigated according to the type of vertical separation based on the table.

Table 9.2 Relationship between the Main Advantages/Disadvantages and Forms of Vertical Separation

Advantages and Disadvantages / Forms of Vertical Separation	Advantages					Disadvantages		
	A.1) To Facilitate Public Investment into Infrastructure	A.2) To Permit Private Sector Involvement	A.3) To Introduce Competition	A.4) To Promote Specialization	A.5) Financial Arrangement among Different Entities	D.1) Those due to Separation of Entities Performing Railway Operation	D.2) Those due to Separation of Finance	D.3) Those due to Multiple Operators
1) Integral Ex.)India								
2) Separation of Ownership Only Ex.) New Shinkansen Line, Mexico(Freight)	√*1	√						
3) Separation of Financial Support for Track Maintenance Ex.) Vietnam, Indonesia, Tunisia	√						√	
4) Separation with Share-holding Relationship* Ex.) Aoimori Railway, Mexico(TFVM)	(√)	(√)		(√)	(√)	(√)	(√)	
5) Vertical Separation for Passenger/ Freight Traffic Ex.) Japan, USA, Iran				√		√*2	√*2	
6) Complete Separation Ex.) Sweden, UK, Australia (ARTC)	√	√	√	√		√	√	√*3

* : Advantages and disadvantages depend on the cases and the forms of railways.

*1: A.1) is applied only to the process of construction, such as the case of new Shinkansen line.

*2: The disadvantages are confined to the smaller market where the tenant operates.

*3: Multiple operators operate on the same track under open access. In the case of franchising, the number of operators is limited.

Source: Author

1) Integral

In this type of organization, only one operator performs the railway operation both in the passenger and in the freight including social services as well as commercial ones. The main advantage of this type of structure comes from the integration of the main stages of the production process. Trujillo, C.R.(2004 p.9) notes that the integration of the infrastructure and operation makes it easier to plan the long-term investment and to programme the operations. In addition, it is possible to retain a simple compatible tariff policy over the whole network and eliminate/ reduce any contract with other firms to a minimum.

Nevertheless, the most cases of this type have been in public hands managed and operated by a public firm for avoiding the use of monopoly power. And this monolithic public organization tends to lose incentives to improve efficiency and to reduce the costs.[1/IN] Moreover, as it was investigated in Section 2.3.3, the state-owned railways generally have had several other disadvantages such as poorly defined goals mixing the commercial and the social divisions.

Recent poor financial performance caused by severe competition with other transport modes has made this type of management financially difficult. Furthermore, accompanied with a general recognition to the inefficiency of public operations, many of this type have already been restructured and the many of the remaining ones are also facing management restructurings.

2) Separation of Ownership Only

In this type, public investment is limited in the construction process as studied in the case of new Shinkansen line. The railway can be, in general, self-financed in the operational process. Without permission of track-age rights by other operators, the number of operator is limited to one at least in the same market. Even though the ownership is separated and generally owned by the public sector, once after the concession contract is made or the condition of infrastructure leasing is fixed, the private sector can perform the rail operation as if it were an integrated railway

controlling both infrastructure and operation.

As one of the (private) firms is selected to manage the publicly-owned infrastructure, the process of the selection, such as the transparent competitive tendering or designation with enough accountability to the tax payers, is essential for making this system functioned fairly.

3) Separation of Financial Support for Track Maintenance

In this type of separation, the railway itself cannot afford to sustain the cost of the infrastructure in the operational process either, and the government has become financially responsible for the track maintenance as well. Because of the separation of financial responsibilities, state-owned railways face some coordination problems with the government. However, the disadvantages are limited to a small extent as the sole railway operator practically performs the essential factors of daily operation including track maintenance works. This means that the coordination problems are endeavoured to be lessened by assigning the below rail functions to the main operator. In addition, the two entities cooperate to lessen them with mutual close negotiation. As studied in Indonesia, in case the government cannot make the payment of the stipulated amount of funds to the railway, the coordination problem between the two would become greatly enlarged, and results in difficulties of smooth railway operation.

4) Separation with Share-holding Relationship

Especially in case it is not intended to promote new entry into the market promoting within-rail competition fairly,[4] close share-holding relationship between infrastructure and operation is utilized in several cases to attain managerial cooperation between the two. The study has investigated various types of share-holding link to attain a couple of aims.

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[4] Although the main railway (DB AG) in Germany accepts competition from other operators following the EU regulations, there are strong opinions that fair competition is difficult to be attained under the condition that the dominant railway controls the infrastructure.

In the case of Aoimori Railway, where the private sector has been introduced for revitalizing as the commercial division, the railway operation could not be self-sustained if it bears the cost of infrastructure. Thus the public sector has become responsible for the infrastructure financially. Despite the separation of financial responsibilities, infrastructure and operation are linked with a large share-holding relationship, which practically stipulates the exclusive track-access and contributes towards managerial cooperation between the two.

The aims and structure are somewhat different in the case of the Mexico City Terminal Railway (TFVM). Although the track access is practically exclusive to the share-holders (concessionaires) alike the above case, vertical separation was introduced in order to share track access among them.

The study also examined the case in DB AG and Iran as examples of share-holding relationship between infrastructure and operation. In each of the above cases, share-holding link contributes to managerial cooperation between the two entities.

5) Vertical Separation for Passenger/Freight Traffic

In this type of separation, the dominant railway, which provides services in the larger railway market, keeps an integrated structure and the tenant operating in the smaller market accesses the track of the dominant railway.

The main advantage of this type is promoting specialization focusing on its own rail market as it is examined in the railways in Japan, the US and Iran. Abolition of the excessive cross-subsidy between the passenger and the freight sectors secures investment funds for the prime sector where the railway retains competitiveness in the transport market.

The study revealed that the termination of the excessive cross-subsidy worked for, especially, the improvement of the traffic performance of the dominant railway

such as the case in the passenger companies in Japan and the private freight railroads in the US. And, as a consequence, it has resulted in the improvement of the railway sector as a whole. Thus this type of separation between passenger and freight is effective in case one of the sectors is dominant and potentially profitable enough to sustain the infrastructure.

Even though a tenant accesses the tracks, the relationship between the two operators is not competitive as their markets are different. The dominant integrated railway is only required to coordinate some operational factors such as timetabling with the tenant. In practice, the tenant tends to face some coordination problems due to separation of entities performing railway operation and those due to separation of finance, but they are confined only into the smaller/minor rail market. In the case of the US, another effect of the separation is defining the government's financial role for the tenant.

6) Complete Separation

European countries and Australia follow the regulation, which intends to open up the rail market to the new participants. In order to attain the aim to introduce within-rail competition, this type has separated all the *below rail* functions from the operator to the infrastructure manager both operationally and financially.[5]

Nash, C.A.(2007 p.75) notes that "this approach undoubtedly makes new entry easiest by removing all incentives for the infrastructure manager to favour one operator over another, but also leads to problems in coordination between the

[5] The study examined the type of "separation of slot-allocation" in the case of France and "separation with common ownership" in the case of Germany, both of which were introduced to follow the EU transport policy. There are strong opinions that fair competition is difficult to be attained under the condition that the dominant railway controls the infrastructure. In addition, despite the intention of keeping an integrated control by the main incumbent railway through these types, the new entrants face "complete separation" in their market as well. Thus, the type of "complete separation" increases in the market according as the new entrant participates in the segment of the market.(Nash, C.A., 2007). Based on this background, in this part, only the type of "complete separation" would be discussed as a type for introducing within-rail competition.

infrastructure manager and the train operating companies in terms of planning, investment, timetabling and day to day operations." In the case of open access, increase of the number of operators tends to lead coordination problems among them as well.

As it was examined in the case of Sweden, UK and Australia (ARTC), under this type of separation, the degree of the coordination problems becomes greatly enlarged especially in case the infrastructure capacity is limited with a number of trains and operators. Thus the benefits of the within-rail competition need to compensate for the costs of the above-mentioned coordination problems in order for there to be a case for this type of separation.

In this section advantages and disadvantages of vertical separation have been investigated according to the type of separation. The study showed that, generally, each type of vertical separation has certain advantages and disadvantages at the same time, and the most of them are commonly shared by more than one type of vertical separation. In addition, it was also identified that only the type of complete separation, different from other types, has the advantage of introducing competition and the disadvantage due to multiple operators particularly.

The study also identified that whether within-rail competition is aimed or not is one of the essential factors for determining the outline of vertical structure of the railway. This is because without this intention, in general, there are reasonable motives for integrating the "below rail" and "above rail" functions into the main operator operationally even though the financial responsibility is separated. On the other hand, the intention to introduce within-rail competition leads to separate the "below rail" and "above rail" functions not only in finance but also in operation in order to promote new entry into the market fairly.

This also means that without an intention to introduce within-rail competition,

since integrated operation is intended with reason at least in the main market, the essential aim of introducing vertical separation is separating the railway into the social division financed by the public sector and the commercial division financed by the railway in many cases.

Compared with subsidizing the railway without separation to cover its deficit, vertical separation has increased transparency in terms of identifying how the public money is used in the railway sector, whilst it leaves more management freedom to the railway as the commercial division. As it is also the case in the type of “complete separation”, the above-mentioned advantage to provide greater transparency is found to be common in most of the other types of separation.

Besides clarification of financial responsibility and making the usage of public funds transparent, the study identified that vertical separation accompanied/resulted in other advantages such as liberalization, private sector involvement, specialization of the operation and so on.

The case study in the former chapters compared the growth of rail traffic performances and that of the real-term GDP in order to distinguish the impact of the reform through vertical separation from that of the transition of national economy. Although it was shown that they follow the similar trends, the comparison also identified some cases that the period of reform has clearly changed the trend of rail traffic performance and picked it up, which can not be explained by the transition of the GDP. Since the study also identified this kind of cases even among the railways which have experienced railway reform without introducing within-rail competition, it is possible that the above-mentioned reform through liberalization, private sector involvement, specialization of the operation has contributed toward the improvement of the railway performance. This means that the stagnated railway can improve its operation by means of railway reform through vertical separation even without introducing within-rail competition.

9.5 Appropriate Form depending on Market Structure

Based on the study performed, this section discusses and proposes an appropriate form of vertical separation depending on several kinds of market structures. The study clarified that whether it is aimed to introduce within-rail competition or not outlines the structure of vertical separation, thus the form is investigated in each of the two directions.

9.5.1 Forms utilizing the Capabilities of the Incumbent/Reformed Operator

This type of reform aims to improve efficiency of the railway through revitalizing the incumbent/reformed operator. This type does not intend to introduce within-rail competition through the reform, and the way of reform tends to be moderate compared with another form, which accompanies within-rail competition. Nevertheless, as studied in the cases of Vietnam, USA and Japan, it is also possible to revitalize the stagnated railway through utilizing this type of reform.

This type is expected to be appropriate in the following conditions:

a) the incumbent operator retains high engineering and management capabilities, and it is reasonable to utilize its ability and exploit its potential for further improvement rather than relying on the capability of other new entrants.
b) the government does not have either enough knowledge or expertise for utilizing the capabilities of other new operators.
c) private participation in the market is not expected for some reasons such as immaturity of the railway industry, insufficiencies in regulations, and so on.

An appropriate form is investigated depending on the different types of market structures in the following.

1) Passenger/Freight Dominated Market

In case the dominant sector can afford the cost of infrastructure, as investigated in

the cases of Japan and USA, the study found vertical separation for passenger/freight traffic can be an appropriate structure. In this type, large coordination problems through vertical separation are confined into the minor/smaller market. If the railways can be profitable, as the main three JR Railways have been privatized, it is possible for them to promote private participation through public listing of shares. On the other hand, if the tenant is not profitable as investigated in the case of USA, it leads to introducing public sector's finance to it.

Nevertheless, in many cases, if the operator bears the costs of infrastructure the dominant rail transport market is not profitable either, and the public sector is obliged to play a certain financial role for the railways. Even if the infrastructure is owned by the public sector, the railway can be operated with the integrated manner in case the operator can afford the maintenance costs of it.[6] In case the operator can not afford the maintenance cost of the infrastructure, in addition to the ownership, the public sector is required to take a certain responsibility for the infrastructure maintenance financially.[7] In these cases, the public infrastructure is utilized for the incumbent/reformed operator. Thus in this type without competitive bidding, it is possible that certain kind of transparency/accountability is required for the access by the private sector. Further accountability appears to be requested when the public finance for the infrastructure maintenance is required regularly for the private railway's operation.

2) Railways where neither passenger nor freight is dominant

In this kind of market where the railway is required to reform, different from the former type, in general it is difficult that only one of the sectors, the passenger or the freight, bears the infrastructure costs. When the railway becomes deficit as a whole and is still required to operate for some reasons, the third party such as the public sector should bear a certain financial responsibility. The study investigated

6 This type was studied in the case of new Shinkansen lines.

7 This type was studied in the case of Aoimori Railway. In this type, in spite of separation of financial responsibility, as Chapter 7 examined, coordination problems through vertical separation are lessened by some means.

that the government owns the infrastructure and finances its maintenance in the cases of Vietnam and Tunisia. The cases showed that operation and management of the incumbent/reformed railways have become more market-oriented through the reform. The study revealed that, in addition to the change of vertical structure, various measures, such as corporatization, private participation, decentralization, line-of-business management, contributed to the revitalization of the railway management. Thus the study found that this kind of relationship between the railway and the government is effective in this kind of market as a form of vertical separation.

Even though some private companies have joined in the transport services in the above cases, they are not for promoting within-rail competition. The reforms have been performed mainly through revitalizing the incumbent/reformed operator.

9.5.2 Forms utilizing Competition / Capability of a New Participant

Different from the above type, in order to improve efficiency of the railway transport services this type promotes within-rail competition or utilizes capability of other professional operators to a large extent. In some cases, such as the cases in UK and Mexico, the former state-owned railway is disbanded and new operators commence their operation through competitive bidding or open access. From this viewpoint, the way of reform tends to be more radical than the former type.

This type is expected to be appropriate in the following conditions:

a) the incumbent operator has serious problems, and it is reasonable to utilize engineering and management capabilities of other professional operators for the development of rail transport services.
b) the government has knowledge or can obtain professional support for utilizing the capabilities of new operators.
c) private participation in the market can be expected with a mature rail market,

appropriate regulations, and so on.

An appropriate vertical structure of railways is investigated depending on the three types of railway transport market in the following.

1) Passenger Dominated Market

The study showed that, compared with the open access competition, competitive tendering has particular advantages as a way of introducing competitive pressures into the rail passengers services. As competitive tendering does not presuppose operational separation of infrastructure management, there are two distinct ways to promote private participation into the railway market through the tendering: 1) concession controlling both infrastructure and operation; 2) franchising controlling only operation. The study revealed that coordination problems between infrastructure and operation increase according as the degree of operational separation between them increases. Considering the market structure which the passenger sector is dominant, concession controlling both infrastructure and operation appears more advantageous especially for decreasing coordination problems in the dominant market.[8]

2) Freight Dominated Market

The study showed that there are two typical ways for professional operators to enter into the rail freight market: 1) open access; 2) concession.

The results of open access have been witnessed only in the rail freight markets in Europe and Australia, both of which have distinct characteristics.[9] The case in Australia (ARTC) showed that the freight transport has improved in this kind of freight dominated market. But the study also found that open access is beneficial only in the market where the benefits of introducing on-track competition can

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[8] An appropriate access condition in the freight sector varies depending on the network and market characteristics in the sector, and it is discussed in the following types.

[9] Section 5.2.3 summarizes the similarities of the background and characteristics of the market in the two regions.

compensate for the costs derived from the fragmented organizational structure.

Whereas the incumbent operator can also continue its operation under open access, concession is more radical way to promote private-sector involvement. Thompson, L. (2005 p.421) explains that "private-sector involvement has particular value when the existing railway is inefficient, financially burdensome, or unresponsive to market forces (often all three)". The study in the case of Mexico showed that the freight transport has improved in the freight dominated market through concession. As the concessionaire operates both *below rail* and *above rail* functions, in spite of the transaction costs of establishing the terms of concessions, this form does not raise coordination problems through vertical separation. Thus concession is especially adaptable to the network where infrastructure capacity is limited.

3) Railways where neither passenger nor freight is dominant

The study investigated this type of market in the case of railways in Europe, where the regulation stipulates that the body which is independent of any transport operator should be responsible for path allocation. In addition, to secure non-discrimination among operators, this type also ensures the account for transport service and one for railway infrastructure kept separate. The study revealed that this type of separation raises coordination problems, and these problems would be greatly enlarged when infrastructure capacity is limited.

In the freight sector, Europe has introduced open access and, certainly, it appears that the policy has contributed to increasing the transport. The study also found that the increase of the freight transport has occurred under the particular circumstances, where on-track competition promoted by new entry could develop the new rail market that used to be untapped. Thus it is essential to understand that the benefits of on-track competition need to compensate for the costs of operational separation in order for there to be a case for introducing open access in other markets.

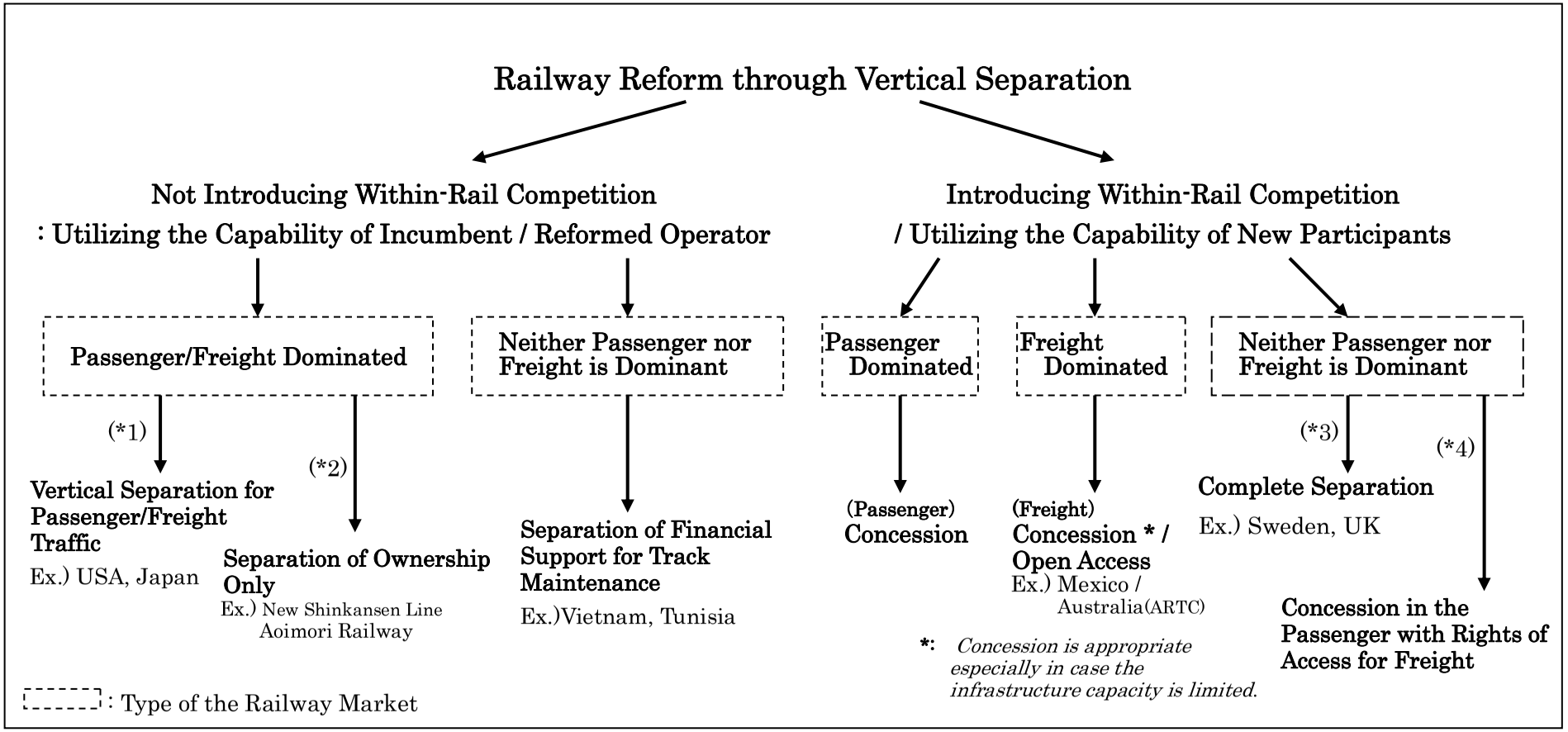
Regarding the passenger sector, Section 5.6.2.2 investigated that competitive tendering has particular advantages as a way of introducing competition rather than the open access competition. This can be adaptable to other markets for preserving an integrated network of rail services as well.

Through the investigation, the author expects the validity of another form of railways in this kind of market structure. Because of the above-mentioned regulation, European Railways have introduced vertical separation with franchising controlling only operation in the passenger sector.[10] Nevertheless, considering the fact that "in Britain calls for a return to vertical integration have been made by a number of train operating companies" (Nash, C.A., 2007 p.76), it is worthwhile to take account of the coordination problems derived from the operationally separated structure in order to plan an appropriate form of railways in other markets.

Gómez-Ibáñez, J.A. (2003 p.338) explains that unboundling is least attractive for passeger rail services because of : 1) their high percent of infrastructure costs critical to coordination; 2) less homogeneous/standardized services. He also explains that unboundling is more difficult in the passenger services than the freight services as the former requires coordination through negotiations, congestion pricing, or auction regime to a larger extent. Therefore, instead of European model which the infrastructure manager is independent from both sectors, concession with integrated passenger operation along with rights of access for freight operators is expected to be another candidate model for this kind of market structure where the railways do not need to follow the EU regulations. Even if access neutrality between the two sectors is required to be secured by stronger regulation, this type should reduce coordination problems within the passenger sector, which require more coordination than the freight.

The investigation in this section is summarized in Figure 9.1.

[10] Chapter 5 investigated there are diversified types such as "separation with common ownership" adopted in Germany and "separation of slot-allocation" adopted in France.



(*1) The dominant railway can afford the cost of infrastructure.
(*2) The dominant railway can not afford the cost of infrastructure.
(*3) The below rail functions are ensured to be independent to foster neutrality between the two sectors.
(*4) The below rail functions are integrated with the passenger operation.

Figure 9.1 Appropriate Forms depending on Different Market Structure
Source: Author

9.6 Conclusion

This chapter examined various advantages and disadvantages of vertical separation of railways, and investigated them according to the type of separation. An appropriate form is also discussed and investigated based on the different market structures. Results of the comparative study are summarized as follows.

- Advantages and disadvantages of each type of vertical separation vary to a large extent depending on the type of vertical separation. This means that the appropriate form of vertical separation is widely different according to the specific aim to achieve.

- Introducing within-rail competition is only one of the various advantages of vertical separation of railways. Most of the other advantages can be achieved even under integrated operation by the main railway. Even if the ownership and/or financial responsibility of the infrastructure is separated to a different entity, without an intention to introduce within-rail competition, in general, the sector takes measures to keep an integrated control with reason. It is because the integrated operation decreases coordination problems between the *below rail* and the *above rail* functions.

- Certain disadvantages are caused by the conflicts among different operators as well. Thus introducing new operators or separating into independent operators should have certain aims/advantages which can compensate the disadvantages. The potential advantages are:
  1) introducing on-track competition among operators;
  2) abolishing cross subsidies among different divisions such as between the passenger and the freight;
  3) concentration on the services within each market;
  4) introducing private participation with investment;
  5) sharing the track-access for economic reasons.

- The advantageous results of introducing within-rail competition are expected to largely depend on the circumstances of the railway industry such as existence of the rolling stock leasing companies and the untapped rail transport market. The derived costs of operational separation are also expected to largely depend on individual conditions such as traffic density. In addition to the coordination problems through vertical separation, the costs for the necessary regulation and those for the franchising/concession contract should also be taken account of. As the outcome of the reform through vertical separation should be evaluated including its advantages as well as disadvantages, the benefits of within-rail competition need to compensate for the derived costs in order for there to be a case for introducing it.

- Among various forms of vertical separation, the form of "complete separation" has a unique form in which all the *below rail* functions in both sectors are separated into the different institution operationally and financially. Whereas it has particular advantages to foster neutrality among operators, the study also revealed that "complete separation" generally faces larger degree of coordination problems even in the primary market compared with other types of vertical separation.

- Besides the intention whether within-rail competition is aimed or not, an appropriate form of railways also largely depends on the rail market structures. Based on the case study and succeeding analysis, the appropriate forms are proposed depending on the different kinds of market structures.[11]

[11] Based on the examination in this study, an appropriate form of vertical structure is summarized in Figure 9.1. Although the study did not find the case, the investigation referred the validity of the concession with integrated passenger operation along with rights of access for freight operators for the market where neither passenger nor freight is dominant.

CHAPTER 10:
CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

10.1 Introduction

Without subsidy from the government, nowadays, the number of profit-making integrated state-owned railways has become limited to a few. In addition to the deterioration of financial condition of railways caused by severe competition with other modes, many of the state-owned railways also face some problems such as lack of incentive to be cost-effective or to respond flexibly to the changes in user demand. They often had poorly defined goals and continued cross-subsidy between the social division and the commercial division.

In order to reform these stagnated state-owned railways, the railway sector has experienced various forms of vertical separation as a part of the restructuring process. Despite the abundant forms of vertical separation of railways, sufficient analysis has not been done partly because of the limited opportunities to share or obtain information due to scattered geographic locations in the world.

Based on the above background this thesis has examined various types of vertical separation, which the railway sector has experienced in the last few decades. The research has investigated them in terms of the four key issues:

1) aims of railway reform through vertical separation;
2) forms and implementation of vertical separation;
3) advantageous effects of vertical separation; and
4) disadvantageous effects of vertical separation.

Firstly, the study has investigated into each group of railways with a similar type of vertical separation. In order to distinguish their characteristics they are compared analytically among different types of vertical separation especially in terms of

operational responsibilities and financial responsibilities. Advantages and disadvantages are also examined in each case and compared among the different types. In addition to identifying the above-mentioned four key issues of each type of vertical separation, the investigation and comparison in the thesis resulted in clarifying the characteristics of each type of it. Then discussions and studies are performed to find out an appropriate form in different market structures.

As a conclusion of this research, this chapter summarizes the findings through the study and suggests the directions for further research based on the results of the study.

10.2 Summary of Findings

The main findings of the research are summarized as follows.

(Forms and implementation of vertical separation)

- The study revealed that there are a number of different forms of vertical separation in the railway sector. The investigation clarified forms and implementation of each type of it, and demonstrated that the degree of operational separation between infrastructure and operation varies to a large extent.[1]

- The study identified a number of reasons to introduce vertical separation. Without an intention to promote new entry into the rail market through open access or competitive bidding, the incumbent/reformed operator continues railway operation as a main operator. Lack of intention to introduce within-rail competition makes it easier to keep exclusive track access by the limited number of operators. In these types, even though railways require financial support through vertical separation, the study revealed that they endeavoured to lessen the coordination problems derived from vertical separation. The investigation

[1] This is examined in Section 8.2 and summarized in Table 8.1.

clarified that it is performed through:

1) assigning the below rail functions to the main operator;

2) share-holding link between infrastructure and operation to attain managerial cooperation;

3) confining operational separation only to the smaller/minor rail market.

- In case it is aimed to introduce within-rail competition promoting new entry into the market, it leads to separating responsibility for *below rail* functions, as the infrastructure manager should be non-discriminatory to any operator operationally (at least in slot-allocation) and financially. The study showed that in the type of "complete separation" *below rail* functions and *above rail* functions are performed by legally and financially independent institutions even in the prime market. The study revealed that, compared with other types, this type forms the highest degree of separation in terms of both financial and operational responsibilities.[2]

- Whether the reform aims to introduce within-rail competition or not largely outlines the way of railway operation as well as its form. The study showed typical comparative examples: the European railways introduced vertical separation in order to create on-track competition especially for cross-border rail operations, whereas Japanese railways tried to avoid vertical separation and have been promoting their passenger through-train services by means of reciprocal running.[3] This is because on-track competition is not intended in the latter case and they believe that close communication and cooperation between infrastructure and operation are pre-requisite for secure operation.

(Aims, advantages and disadvantages of vertical separation)

- The study showed that several reasons for failures inhere in monolithic state-owned railways, and that vertical separation has been utilized through the process of the reform along with some kinds of liberalization such as

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2 This is summarized in Table 8.1 and Table 8.2.

3 This is studied in Section 7.2.2.2.

corporatization/privatization of the railways. The aims of introducing vertical separation vary to a large extent depending on various factors such as the government's principle for transport, its financial condition, status of the railways, transport market structure, and so on.

- The study clarified that vertical separation has a number of advantages and can attain certain aims of the reform. The author categorized them into the five advantages, and examined them.[4] The study also revealed that the advantages vary to a large extent depending on the type of vertical separation, and that the principal exclusive aim in the type of "complete separation" is to introduce within-rail competition fostering neutrality even between the passenger and the freight.

- The study revealed that vertical separation raises a number of disadvantages as well, and the author categorized them into the three types of coordination problems and examined them.[5] It is revealed that disadvantages of vertical separation also vary to a great degree depending on the type of separation.

- Vertical separation, as one type of the structural separation, has an advantage to abolish cross-subsidy between the commercial and the social divisions of the railway. The study showed that abolition of cross-subsidy between them contributed to revitalizing the activity of the former division improving its competitiveness against other transport modes.

- The study showed that possibilities of coordination problems between infrastructure and operation can be investigated in terms of: 1) the degree of operational separation.[6] and 2) the degree of financial separation.[7] The study also showed that possibilities of conflicts among operators are likely to increase according as their relationship becomes competitive especially in the same

4 Section 9.2 examined the advantages of vertical separation.
5 Section 9.3 examined disadvantages of vertical separation.
6 The study is summarized in Table 8.1.
7 The study is summarized in Table 8.2.

sector.[8]

- The investigation verified the common view[9] that, within the type of "complete separation", coordination problems would be greatly enlarged when capacity of the infrastructure is limited with dense traffic. The study also showed that most of the disputes in this type are raised:
  1) in a case of coordinating timetable in limited infrastructure capacity;
  2) in a case of settling train delays by compensation; and
  3) in a case of sudden engineering works.

- The study revealed that, despite the fact that the type is the most appropriate for introducing new participants to the transport services to promote within-rail competition, "complete separation" makes coordination problems through vertical separation to the most extent even in the prime market. The study also disclosed that the benefits of within-rail competition need to compensate for the costs in order for there to be a case for introducing the form for it since, in general, other advantages can be also attained through different types of vertical separation.

(Forms of entry and private participation into a transport service)

- How to regulate access right is essential for performing the railway operation. The study showed that certain types practically permit infrastructure access only for the incumbent/reformed operator. Other types permit it for voluntary participants promoting within-rail competition.[10] And the study revealed that, in certain circumstances, traffic performance has been improved under franchising in the passenger sector and open access in the freight sector.

- The study showed that vertical separation serves for private participation, which plays a role to improve a rail transport service and make it more market-oriented. Some forms of private participation are attained in cooperation with the

8 The study is summarized in Table 8.3.
9 As examined in Section2.4.3, Campos, J. and Cantos, P.(2000) and Drew, J.(2006) also indicated this issue.
10 Section 8.4 studied various types of track access and summarized in Table 8.3.

incumbent main operator.[11] The other forms are performed in competition with the incumbent operator or after dissolution of the former state-owned railway.[12] The study showed that vertical separation also serves for public listing of shares, which is also one of the methods for private participation.[13]

(Other findings through the study)

- The study identified that vertical separation separates the railway into the social division financed by the public sector and the commercial division financed by the railway. The investigation showed the public sector bears various scope of financial responsibility,[14] and that the clarification of the responsibility also accompanied/resulted in other advantages such as liberalization of the main operator, private sector involvement and specialization of the operation. In addition, compared with subsidizing the railway without separation, vertical separation has increased transparency in identifying how the public money is used in the railway sector, whilst it leaves more management freedom to the railway as the commercial division.

- The study comparing the growth of rail traffic performances and that of the real-term GDP identified certain cases that the period of reform has clearly changed the trend of rail traffic performance and picked it up, which can not be explained by the transition of the GDP. The study also confirmed this kind of cases even among the railways which have experienced railway reform without introducing within-rail competition. This supports the fact that the stagnated railway can be improved by means of railway reform through vertical separation even without introducing within-rail competition.

- An appropriate vertical structure is discussed and investigated based on the

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11 Private participation through the management contract in the passenger sector in Tunisia and Iran, and that through joint-venture in Vietnam are examples of this case.

12 The study showed these forms in the railways in Europe, Australia, and Mexico.

13 Aoimori Railway and JR Passenger Companies in Japan are examples of this case.

14 Table 8.2 summarizes the results of investigation.

different market structures.[15] The investigation identified that an appropriate form of railway largely depends on: 1) the intention whether within-rail competition is aimed or not; and 2) the rail market structures.

For the most part, this thesis discussed the issues regarding vertical separation of railways mainly in terms of qualitative aspects rather than quantitative viewpoints. Nevertheless, the study clarified the characteristics of each type of vertical separation, and found that it accompanies varied advantages as well as disadvantages depending on the types. This represents that the appropriate form of vertical separation is influenced by the circumstances and objectives. Thus the results of this study lead to the conclusion that, facing regulatory reform through vertical separation, it is essential to clarify the specific aims for introducing it into the railway sector. This clarification makes it possible to design an appropriate railway structure suitable for conditions so as to attain the aims of the reform and avoid unexpected disadvantages.

10.3 Further Work based on the Research Outcomes

This thesis provides a significant contribution to the understanding concerning vertical separation of railways. For the further improvements of the related knowledge in the railway operation, the following directions in further works are suggested based on the results of the study.

- The freight sector has had relatively rich experiences of private sector participation by means of both long-run concessions and open access. Nevertheless, the characteristics of the market and railway operation are largely different between the passenger and the freight sectors, and the passenger sector did not have abundant experiences of open access. The background is that most of the rail passenger services are not commercially attractive, and competitive

[15] The study is summarized in Figure 9.1. It proposes the appropriate form of railways depending on the market structure.

tendering is considered to be more beneficial than open access competition due to some reasons such as preservation of an integrated network of service and minimizing the need of subsidies.(ECMT, 2005b) The study in the case of Germany also showed that open access competition in the passenger services may worsen the overall pattern of fares and services, and that the behaviour of "cream skimming" might result in increasing the need of subsidy. As the issue is significant in the sector, it is of value to examine the results of open access in the passenger sector more in detail to clarify its effects.

- In addition to the above clarification, further research comparing long-run concessions controlling the infrastructure and franchising without controlling the infrastructure appears to be of great value for future decision making in the passenger sector. This is because competitive tendering does not presuppose operational separation between *below-rail* and *above-rail* functions. It should be investigated more in detail in terms of efficiency, advantages, disadvantages, suitable market conditions, appropriate length of the contract, and so on.

- The type of "complete separation" appears to be more appropriate than other types to promote new entry to the railway market in that: 1) the infrastructure manager can be neutral to any operator in both the passenger and the freight sectors; 2) it is possible for an new operator to enter into the new market without large sunk costs or controlling infrastructure. Nevertheless, the study also revealed that this type raises coordination problems between infrastructure and operation, and the separated entities have more difficulties in planning investment, timetabling, and other daily operations. Since the type has both distinct advantages and disadvantages, it is essential to investigate into the nature of the coordination problems such as transaction costs among the separated entities. It is also of value to make a study for finding out effective regulation to overcome these problems.

- The investigation could not be performed into the form of the integrated

passenger operation through concessions along with rights of access for freight operators. If the above study finds out that it is difficult to overcome coordination problems raised by operational separation, it is reasonable to adopt integrated operation in the passenger sector, which requires more coordination than the freight sector. Therefore, even if the stronger regulation is needed in order to secure access neutrality between the passenger and the freight than the type of "complete separation", this form appears to have a potential to function in practice under the market which neither passenger nor freight is dominant. Therefore, it is of value to examine appropriate terms in the concession contract and necessary regulation to carry out this form of railway operation effectively.

- This thesis has not investigated operational efficiency at length in terms of ownership of the operators. Nevertheless, this is considered to be one of the most important factors which influence the management of railways. Even if the vertical structure is similar, it is expected that efficiency is so different between a state-owned railway and a private railway. For example, one of the most crucial reasons for the improvement of the railway performance in Japan and Mexico might be a change of the legal status of the operator, from the public to the private. If this factor is greater than other factors such as within-rail competition, the results would be influential for future decision making. This would mean that even a stagnated state-owned railway has a potential to improve its efficiency by means of private sector participation through public listing of shares as well as through concessions.

- In some cases, it might not be worthwhile to introduce within-rail competition practically, as it is premised on certain market conditions. For example, on-track competition practically requires enough infrastructure capacity and the rolling stock leasing industry, and franchising is in need of several potential bidders which can perform railway operation more efficiently than the incumbent operator. In case preferable results can not be expected through within-rail competition, some other means to improve efficiency of the incumbent operator should be

sought. Additionally, if a certain franchised operator continues its operation efficiently enough, it is not necessarily required to perform competitive tendering again at the end of the contract period as the tendering itself takes costs, and it has also some risks that a less efficient operator might succeed to the incumbent efficient one. Thus the following research areas about regulations appear to be beneficial to attain the better solutions in certain cases:

1) fare regulations which would provide railway operators with incentives to improve their efficiency. For example, price-cap regulations or fare regulations based on yard-stick competition might attain the aims;
2) regulations which can make it possible to enter into a service contract with a private operator with sufficient accountability other than competitive bidding. A certain objective bench-marking concerning operational efficiency and service evaluation might lead to the solution.

- In general, there are two options to promote private sector participation into the railway services keeping integrated operation controlling both infrastructure and operation. One is inviting a private concessionaire making a concession contract, and another is promoting public listing of shares of the incumbent railway. Despite their similarity in respect of the integrated operation, there are also large differences between them mainly in that the former is regulated by the concession contract and the latter is done by the government regulation. Thus it is of value to investigate advantages and disadvantages of each type further-more both in the freight sector and in the passenger sector. It is also beneficial to find out the underlying conditions for selecting the suitable type.

- The study showed that the rail freight transport has increased after introducing open access regulations in Europe and Australia. Nevertheless, it appears to be beneficial what kind of more specific factors have contributed to the increase. Under their traditional operation, the rail freight transport which crosses the border of countries/states was performed by more than one operator, and quality of the transport service had been worse in case their link were not smooth. In this

point of views, there are possibilities that service improvements by through-operation have contributed towards the increase. Another reason might be in the improvement of business attitude derived from the change of the organizational status of the operator.[16] In addition to the effects of on-track competition, these factors might have greatly contributed towards developing the untapped market. Therefore, it is of value to examine what kind of specific factors have practically increased the rail freight transport in these regions, and discriminate their effects. The results of examination should contribute to finding out whether the similar regulation to introduce *on*-track competition is beneficial to other regions or not.

In the above directions, it is expected that the study relating with this thesis would be developed further in the future research work.

10.4 Final Remarks

Based on the close examination into each case, this research has analysed various types of vertical separation of railways, and this thesis has made significant contributions to the understanding of vertical separation in the railway sector. The findings and lessons are summarized as follows.

- The study clarified the form and implementation of various types of vertical separation in the railway sector and showed that their degree of separation varies to a large extent. The study categorized various types of vertical separation in terms of the degree of operational separation between infrastructure and operation. On the other hand, the study also demonstrated that the public sector bears a different scope of financial responsibilities depending on the type of vertical separation. Therefore, vertical separation can be also classified in terms of the degree of financial separation between the railway and the public sector, and

[16] An example of the improvement of business attitude through corporatization was also discussed in the case of JR Freight in Section 6.5.2.1.

it can play a role to abolish cross-subsidy between the commercial and the social divisions. Thus, facing regulatory reform through vertical separation, it is vital to determine what part of the rail industry is aimed to revitalize as the commercial division.

- The comparative study demonstrated that whether it is aimed to introduce within-rail competition through vertical separation or not largely stipulates the outline of the industry structure. Without the above aim, the sector has a reasonable reason to retain an integrated operation by some means at least in the prime market since integrated operation lessens coordination problems between *below rail* and *above rail* functions.

- The research showed that only European Countries and Australia aimed to introduce within-rail competition into the railway industry by way of separating the *below rail* functions (at least slot allocation) and the account for them. Despite this unique aim, compared with other types of vertical separation, their form tends to raise a larger degree of coordination problems behind the background of its high degree of operational and financial separation. Furthermore, the effectiveness of within-rail competition has not been clarified yet sufficiently in other rail markets, and it is expected that the results vary to a large extent depending on the local circumstances of the railway industry such as existence of rolling stock leasing companies and capacity of the infrastructure. Thus, facing a railway reform especially where the EU and Australian regulations are not forced to adopt, the outcome of promoting within-rail competition and the cost for it should be deliberately taken account of.

- In general, it is recommended to develop and operate railways based on a social cost-benefit analysis, and many governments have an intention to realize better environment by making the most of the railways. In case external costs of other transport modes are not fully taken account of, there is a good reason for the government to subsidize its railway in many cases. In order to achieve their

intention it is required to maximize efficiency of the railway while preserving enough accountability for the subsidy and/or access to the public infrastructure. This research has disclosed that the appropriate structure of the rail industry for this purpose varies depending on certain conditions such as: 1) whether within-rail competition is aimed or not; 2) market structure of the rail transport. In addition, lessons learned from other countries' experiences, which are closely investigated in this thesis, would be of great value for future decision making.

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APPENDIX 1: OUTLINE OF INTERVIEWS / QUESTIONNAIRES

Reference Mark(*1)	Country	Name of Railway Organization	Methods of Inquiry	Date of First Inquiry	Subjects of Inquiry (*2)	Detail Description
1/IN	India	Indian Railways (IR)	Questionnaire	December, 2005	A member of staff in freight section.	Chapter 4
2/VN	Vietnam	Vietnam Railways Corporations (VNR)	Interviews	July, 2005	A manager in international relations dept.	
3/ID	Indonesia	Indonesian Railways (PT.KA)	Interviews	July, 2005	Managers in corporate planning dept.	
4/TN	Tunisia	Tunisian National Railways (SNCFT)	Interviews	July, 2005	Managers in control dept. & external relations dept.	
5/SE	Sweden	Banverket	Interviews	October, 2005	Staff in traffic div., infrastructure management dept .etc	Chapter 5
6/UK	UK	British Rail	Interviews	October, 2005	A retired expert	
7/DE	Germany	Deutsche Bahn AG (DB AG)	Interviews	December, 2005	Members of staff in external relations dept.	
8/FR	France	French National Railways(SNCF)	Interviews	December, 2005	A manager in development & strategy dept.	
9/AU	Australia	Australian Rail Track Corporation(ARTC)	Questionnaire	December, 2005	A retired expert working as a consultant	
10/IR	Iran	Railways of Islamic Republic of Iran (RAI)	Interviews	September, 2005	Managers in organisation & methods bureau	Chapter 6
11/JP	Japan	Japan Freight Railway Co. (JR Freight)	Interviews	June, 2006	An executive in investment planning dept.	
12/US	USA	Amtrak	Questionnaire	January, 2006	An expert in railway reform in the US and other countries	
13/MX-1	Mexico	A freight concessionaire (TFM)	Questionnaire	February, 2006	A member of staff in the concessionaire and an expert	Chapter 7
13/MX-2		A freight concessionaire (Ferromex)	Questionnaire	February, 2006	A member of staff in the concessionaire and an expert	
13/MX-3		The Mexico City Terminal Railway (TFVM)	Questionnaire	July, 2006	A consultant to the Mexican Government on rail reform	
14/JP	Japan	New Shinkansen Lines	Interviews	August, 2006	A manager in JR East engaged in the scheme	
15/JP	Japan	Aoimori Railway Company	Interviews	October, 2006	A manager in JR East engaged in the scheme	

(*1) In case the author refers the comment of interviews/inquiries, the reference mark is utilized to indicate a source of information.

(*2) Subjects of inquiries were edited to preserve anonymity of the interviewees.

Source: Author

APPENDIX 2: STRUCTURE OF QUESTIONNAIRES

The interviews/questionnaires were held based on the following questions.

Questionnaires

Q.1 Please answer the following questions about outline of vertical separation.

1-1. How has the vertical separation been introduced?

Ex). Which sector, freight or passenger, has the vertical separation been introduced?

1-2. What are the aims of railway reform through vertical separation in your railways?

Q.2 Please answer the following questions about the infrastructure.

2-1. Who is the owner of it?

2-2. Who invests in the infrastructure for new lines?

2-3. (Relating 2-2) How is it planned?

2-4. Who invests in improvement of the current lines?

2-5. (Relating 2-4) How is it planned?

Q.3 Please answer the following questions about the maintenance works of infrastructure and tracks.

3-1. Who orders the works, and who performs them?

3-2. How is it planned?

3-3. Who takes the responsibility for quality of the works and how?

Ex) The performance of the works is checked:

1) on the site 2) by report or 3) by other means.

3-4. Do you think vertical separation contributed to improvement of quality of the works and lowering maintenance costs?

Why? (Please describe how it has been done so.)

Q.4 Please answer the following questions about rolling stock.

4-1. Who is the owner of them?

4-2. Who invests in them, and how is it planned?

4-3. Who maintains them and how is it planned?

Q.5 Please answer the following questions about the timetable and daily operation.

5-1. Who makes the timetable?

5-2. How is the timetable planned? Are there some difficulties for the planning of the timetable?

(if "yes") What are the difficulties?

5-3. Who controls daily train operation and signalling?

Q.6 Please answer the following questions about operators on the track.

6-1. How many operators are on the same track?

6-2. How are the operators selected? What kind of regulation is stipulated for the railway market?

Ex) Franchising, Concession, Open access, License, Law, etc.

(If "franchising" or "concession", please answer questions 6-3 and 6-4)

6-3. How many years is the term of franchising / concession?

6-4. What is the criterion of selection of a railway in the franchising/ concession? Please describe briefly.

Ex) amount of proposed subsidy / proposed payment of premiums,
amount of planned investment, number of planned operating trains, etc.

6-5. Have there been new entrants after the introduction of the vertical separation?

(If "yes") How is it attained?

(What kind of regulation is stipulated for the new entry?)

(If the number is more than one in 6-1, please answer questions 6-6 and 6-7)

6-6. Are there some disputes between operators on the same track?

(If "yes") What are the disputes between them, and how are they resolved?

6-7. How is the relationship coordinated in terms of timetabling, fares, daily operation, information exchanges, etc. among operators?

Q.7 Please answer the following questions about the relationship between infrastructure and operator.

7-1. What is the outline of access charges? Please describe briefly.

7-2. Are there some disputes between the two?

(If "yes") What are the disputes?

7-3. How are they resolved?

Q.8 Please answer regarding safety.

8-1. How is responsibility for accidents determined?

8-2. How are disputes over accidents resolved?

8-3. Do you think the vertical separation is good for safety of railways?
Why do you think so?

Q.9 Please answer the following questions about the result of vertical separation.

9-1. (Relating Question 1) Have the aims been attained?
(If "no") Why have they not been attained?
Please explain by figures, if possible.

9-2. Has vertical separation helped promote rail investment? Why?

9-3. Has it helped improvement of the performance of the railway operation?
(i.e. ton-kilometers and passenger-kilometers)
Why?

9-4. Are there other advantages, which have been brought by the vertical separation?
What are they?

9-5. What are the problems / disadvantages, which have been raised by the vertical separation? (Please explain them by figures, if possible.)

In order for the better perception, I need the past and the current data of your railways such as structure of the organization, financial results (revenues and costs), length of lines, number of staffs, train in tracks (passenger-kms, tonne-kms), regulation by the government, subsidies, and so on.
Therefore, I will be pleased if you could provide me the information of them such as the annual reports of past several years.

Thank you very much for your cooperation for the questionnaires.

APPENDIX 3: Organizational Structure and Management of Railways

APPENDIX 3 -a: Infrastructure (1)

The owner		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	IR [1/IN]
	Vietnam (VNR)	Government [2/VN] (*1)
	Indonesia (PT.KA)	Government [3/IN] (*2)
	Tunisia (SNCFT)	Government [4/TN]
Group 2	Sweden (Banverket)	Banverket (BV) [5/SE]
	UK (Railtrack)	Railtrack [6/UK]
	Germany (DB Netz)	DB AG (DB Netz) (*3) [7/DE]
	France (RFF)	RFF [8/FR]
	Australia (ARTC)	ARTC [9/AU]
Group 3	Iran (Raja Co.)	RAI (*4) [10/IR]
	Japan(JR Freight)	Passenger integrated railway companies [11/JP]
	USA (Amtrak)	Freight integrated railway companies [12/US]
Group 4	Mexico(TFM, Ferromex)	Government [13/MX-1,2]
	Mexico (TFVM)	Government [13/MX-3]
	New Shinkansen Lines	JRTT [14/JP]
	Aoimori Railway	Aomori Prefecture [15/JP]

(*1) Government owns infrastructure including land, civil structures, track, stations, signalling and telecommunication systems.

(*2) Government owns civil structures, track, signalling and telecommunication systems and the land for them. Nevertheless, PT.KA retains the ownership of stations, depots, workshops and land for them.

(*3) There was a serious discussion about State's responsibilities in the railway infrastructure in planning the railway reform in Germany. It had reached the conclusion that the ownership would be transferred to DB AG, but it also made a regulation stipulating that the government owns more than half of the shares of the institution (DB Netz). Thus State's important responsibility for the railway infrastructure is one of the characteristics of railway reform in Germany, and this is the background of a State's important role in investment into the railway infrastructure. (Sakurai, T., 1996)

(*4) Government invests into railway projects, and the infrastructure is delivered to RAI after completion of the construction project. [10/IR]

APPENDIX3 -a: Infrastructure (2)

Investor for new lines

Group	Country (Railway)	Description
Group 1	India (IR)	Investment in new lines is made through internal generation of funds by IR as well as by the Government. Some lines which are strategic in nature are funded by the Central Government. [1/IN]
	Vietnam (VNR)	Government [2/VN]
	Indonesia (PT.KA)	Government [3/ID]
	Tunisia (SNCFT)	Government [4/TN]
Group 2	Sweden (Banverket)	Banverket (BV) (*1) [5/SE]
	UK (Railtrack)	Railtrack (*2) [6/UK]
	Germany (DB Netz)	Government finances most of the investment for the new lines, which contribute to public benefits. [7/DE]
	France (RFF)	Public sector along with RFF (*3) [8/FR]
	Australia (ARTC)	Funding arrangements vary. (*4) [9/AU]
Group 3	Iran (Raja Co.)	Government [10/IR]
	Japan(JR Freight)	Passenger integrated railway companies (*5) [11/JP]
	USA (Amtrak)	Freight integrated railway companies (*5) [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires [13/MX-1,2]
	Mexico (TFVM)	TFVM [13/MX-3]
	New Shinkansen Lines	National government and local governments invest based on the Nationwide Shinkansen Railway Development Law. [14/JP]
	Aoimori Railway	Aomori Prefecture (*6) [15/JP]

(*1) The State finances the most of BV's investment. There are small proportion of contribution from EU and local authorities. [5/SE]

(*2) Railtrack undertook investment at first, but the government took the place of the role then. [6/UK]

(*3) Large part of the project is financed by the public sector. RFF invests some parts of the project based on the negotiation with the public sector. [8/FR]

(*4) The most recently constructed new line was from Alice Springs to Darwin opened in 2004. This was undertaken as a PPP (Private-Public Partnership) between the Commonwealth, South Australian and Northern Territory Governments and the private sector consortium including financiers, major construction companies and a rail operator. [9/AU]

(*5) In some cases, where Amtrak needs more capacity on a freight line, Amtrak pays at least a share of the costs. This situation is also the case in JR Freight. [11/JP, 12/US]

(*6) As Aomori Prefecture has an intention to refrain from further investment, it has not done large investment since the establishment of Aoimori Railway. But it is planned that the Prefecture would buy the further segment of conventional line from JR East as described in the footnote in Section 7.2.3.2.[15/JP]

APPENDIX 3 -a: Infrastructure (3)

Way of planning for investing in new lines

Group	Country (Railway)	Description
Group 1	India (IR)	New lines are planned by IR in conjunction with the Ministry of Finance, Central Government and Planning Commission. They are planned in response to demands from users or from IR's internal demand forecasting process. But most of the big projects are in response to demands by various user groups like state governments requesting IR to set up new lines for reasons of socio-economic development. [1/IN]
	Vietnam (VNR)	Government and VNR make annual plans based on the long-term plan "the Master Plan on the Development of Vietnamese Railway Transport Sector Till 2020". [2/VN]
	Indonesia (PT.KA)	Government makes plans with PT.KA, and the plan is authorized by Parliament. [3/ID]
	Tunisia (SNCFT)	Government makes plans based on "10th Five-year Economic and Social Development Plan (2002-2006)". The plan stipulates that Government will invest 200 million US Dollars on its railways, and Government and SNCFT negotiate the budget each year. [4/TN]
Group 2	Sweden (Banverket)	BV performs most of the planning, such as feasibility study and so on. [5/SE] New investments are carried out based on the 10-year investment plans set by the government.(Bylund, B., 2002 p.19)
	UK (Railtrack)	Railtrack performed most of the planning. [6/UK]
	Germany (DB Netz)	DB AG performs most of the planning, and submits the plan to the government for the approval. [7/DE]
	France (RFF)	At least three parties negotiate each other until reaching an agreement. (*1) [8/FR]
	Australia (ARTC)	After extensive feasibility studies covering market demand, engineering, operational, financial and environmental considerations, a decision is taken at a political level. [9/AU]
Group 3	Iran (Raja Co.)	Government proposes a plan to the Assembly within the framework of a 5-year Development Programme.(*2) [10/IR]
	Japan(JR Freight)	Passenger railways plan the investment. (*3) [11/JP]
	USA (Amtrak)	Freight railways plan the investment. (*3) [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires plan based on the demand forecast and the contract with Government. [13/MX-1,2]
	Mexico (TFVM)	TFVM plans in negotiation with the operators (share-holders). [13/MX-3]
	New Shinkansen Lines	Nationwide Shinkansen Railway Development Law stipulates the future plan of the network. [14/JP]
	Aoimori Railway	Aomori Prefecture plans with Aoimori Railway and the plan would be passed to the council to be approved.[15/JP]

(*1) Before the reform of SNCF, only the two parties, the public sector and SNCF negotiated each other to reach an agreement. Nevertheless, after the reform RFF has become responsible for the infrastructure. And the public sector needs to understand how the train operation will be performed by SNCF after the completion of the project. Thus, the negotiation for the planning of the construction projects takes longer time and has become complex among three entities, the public sector, RFF and SNCF. [8/FR]

(*2) The Programme envisages detail scheme such as acquisition of locomotives, wagons, coaches, construction of specific lines and necessary costs for them.

(*3) Same as the Item (2).

APPENDIX 3 -a: Infrastructure (4)

Investor for improvement of the current lines		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	IR [1/IN]
	Vietnam (VNR)	Government [2/VN]
	Indonesia (PT.KA)	Government [3/ID]
	Tunisia (SNCFT)	Government [4/TN]
Group 2	Sweden (Banverket)	Banverket (BV) (*1) [5/SE]
	UK (Railtrack)	Railtrack (*1) [6/UK]
	Germany (DB Netz)	The government invests along with DB AG [7/DE]
	France (RFF)	RFF [8/FR]
	Australia (ARTC)	ARTC (*2) [9/AU]
Group 3	Iran (Raja Co.)	Government [10/IR]
	Japan(JR Freight)	Passenger railways (*1) [11/JP]
	USA (Amtrak)	Freight railways (*1) [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires [13/MX-1,2]
	Mexico (TFVM)	TFVM [13/MX-3]
	New Shinkansen Lines	A JR Passenger Company [14/JP]
	Aoimori Railway	Aomori Prefecture (*1) [15/JP]

(*1) Same as Item (2)

(*2) ARTC receives funding both from its internally generated income (access charges) and from specific interest-free grants from the Australian Government through the Government's *AusLink* land transport programme. [9/AU]

APPENDIX 3 -a: Infrastructure (5)

Way of planning for investing in the current lines

Group	Country (Railway)	Description
Group 1	India (IR)	It is through an internal planning process of IR. All improvements to the current lines are funded through the budgetary mechanisms of IR. The regional administrations request the funds in advance of the projects, and the railway board allocates the funds.[1/IN]
	Vietnam (VNR)	Same as that for new lines described in Item (3). VNR selects critical parts of the infrastructure, which require investment. [2/VN]
	Indonesia (PT.KA)	Same as Item (3) [3/ID]
	Tunisia (SNCFT)	Same as Item (3) [4/TN]
Group 2	Sweden (Banverket)	The planning procedure is similar to Item (3). In case the investment work is not so large and does not need land procurement/environmental assessment, the government's approval is not required. [5/SE]
	UK (Railtrack)	Railtrack performed most of the planning. It was originally planned that a project should be financed by Railtrack utilizing the access charges. [6/UK]
	Germany (DB Netz)	The planning procedure is similar to Item (3). [7/DE]
	France (RFF)	The planning procedure is similar to Item (3). (*1) [8/FR]
	Australia (ARTC)	It is planned on the basis of an extensive audit of infrastructure condition, studies including network simulation and input from rail operators and users. It is performed based on a medium-term plan. [9/AU]
Group 3	Iran (Raja Co.)	Same as that for new lines described in Item (3). [10/IR]
	Japan(JR Freight)	In general, passenger railways plan. [11/JP]
	USA (Amtrak)	In general, freight railways plan. (*2) [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires invest voluntarily for profitable projects. Some investments are stipulated in a concession contract. [13/MX-1,2]
	Mexico (TFVM)	TFVM plans in negotiation with operators. [13/MX-3]
	New Shinkansen Lines	A JR Passenger Company plans. [14/JP]
	Aoimori Railway	Aomori Prefecture plans with Aoimori Railway, and the council approves the plan. [15/JP]

(*1) As many of large stations belong to SNCF, it also plays a key role not only as a railway undertaking but also as an infrastructure manager in some station development projects. [8/FR]

(*2) Amtrak has the right to ask for permission to invest in the track of a freight railroad, and they have often actually made such investments: the actual work has been done by the owning railroad, and then charged to Amtrak. The problem has been: 1) Amtrak believes that the freight companies charge too much for the work done on Amtrak's behalf; 2) Amtrak has little or no control over costs. In addition, it takes time to reach mutual agreement because there has been the difference between what the freight railroad needs and what Amtrak requires. For example, freight carriers want slow service with very little super-elevation in the tracks: Amtrak wants higher quality track with more super-elevation. Each wants the other to pay. [12/US]

APPENDIX 3 -b: Maintenance Works of Infrastructure and Tracks (1)

The entity who orders the works and the entity who performs them.

Group	Country (Railway)	Description
Group 1	India (IR)	The works are planned and performed by the Engineering department of the various regional railway administrations of IR. [1/IN]
	Vietnam (VNR)	VNR performs the works utilizing the government's finance. [2/VN]
	Indonesia (PT.KA)	PT.KA performs the works utilizing the government's finance. [3/ID]
	Tunisia (SNCFT)	Government and SNCFT share the cost of maintenance works based on their transit scheme for the future. SNCFT performs the works.[4/TN]
Group 2	Sweden (Banverket)	The five regional divisions of Banverket contract out the works to engineering companies. [5/SE]
	UK (Railtrack)	Railtrack ordered the maintenance works, and contracted out all the works to specialized companies formed during the break-up of British Rail's infrastructure services. [6/UK]
	Germany (DB Netz)	DB Netz contracts out the works to engineering companies. [7/DE]
	France (RFF)	RFF orders all of the maintenance works to SNCF based on the contract between the two. [8/FR] (Explained in Section 5.3.4)
	Australia (ARTC)	ARTC contracts out the works to engineering companies. [9/AU]
Group 3	Iran (Raja Co.)	Regional divisions of RAI contract out the works to engineering companies. [10/IR]
	Japan(JR Freight)	JR Passenger Companies contract out the works to engineering companies. [11/JP]
	USA (Amtrak)	Freight railways contract out the works to engineering companies. [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires contract out the works to engineering companies. [13/MX-1,2]
	Mexico (TFVM)	TFVM contracts out the works. [13/MX-3]
	New Shinkansen Lines	A JR Passenger Company contracts out the works to engineering companies. [14/JP]
	Aoimori Railway	Aomori Prefecture contracts out the works to engineering companies. (*1) [15/JP]

(*1) As described at the footnote in Section 7.4.2, Aomori Prefecture plans to contract out the track maintenance to Aoimori Railway in order to decrease the coordination problems between them.[15/JP]

APPENDIX 3 -b: Maintenance Works of Infrastructure and Tracks (2)

The way of planning		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	The works are planned by the regional railway administrations. The Engineering dept., which is responsible for the maintenance, proposes the works. After an analysis of demands from all over the railways, the works are approved by the railway board. [1/IN]
	Vietnam (VNR)	VNR calculates the maintenance fee based on the annual programme. Provided full amount of the fee is not approved by Government, VNR revises the maintenance program of the year and re-calculate it for further negotiation with Government. [2/VN]
	Indonesia (PT.KA)	PT.KA calculates the maintenance fee, and requests it to Government. But full amount of the fee could not have been approved by Government because of shortage of Government's funds. (Explained in Section 4.7.2) [3/ID]
	Tunisia (SNCFT)	SNCFT calculates the maintenance fee based on its annual program. [4/TN]
Group 2	Sweden (Banverket)	The five regional divisions of BV plan the works. [5/SE]
	UK (Railtrack)	Railtrack planned the works considering the requests from TOCs. [6/UK]
	Germany (DB Netz)	DB Netz plans the works reflecting the requests from other operating dept. in DB AG and other private operators. [7/DE]
	France (RFF)	RFF only stipulates the quality of the works, and practically all the works are planned and performed by SNCF. [8/FR]
	Australia (ARTC)	ARTC plans the works. [9/AU]
Group 3	Iran (Raja Co.)	RAI plans the works. [10/IR]
	Japan(JR Freight)	Passenger railways plan the works.[11/JP]
	USA (Amtrak)	Freight railways plan the works.[12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires plan the works.[13/MX-1,2]
	Mexico (TFVM)	TFVM plans the works.[13/MX-3]
	New Shinkansen Lines	A JR Passenger Company plans the works.[14/JP]
	Aoimori Railway	Aomori Prefecture plans in negotiation with the contractor and Aoimori Railway.[15/JP]

APPENDIX 3 -b: Maintenance Works of Infrastructure and Tracks (3)

Responsibility of the Maintenance Works		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	Though most of the works are contracted out, the responsibility for the quality of works is taken by the Engineering department itself.[1/IN]
	Vietnam (VNR)	VNR takes responsibility for the works. [2/VN]
	Indonesia (PT.KA)	PT.KA takes responsibility for the works. [3/ID]
	Tunisia (SNCFT)	SNCFT takes responsibility for the works. [4/TN]
Group 2	Sweden (Banverket)	BV is responsible for the works. [5/SE]
	UK (Railtrack)	Railtrack was responsible for the works. Nevertheless, Railtrack lost the ability to check the performance of tracks carried out by other specialized companies. (*1) [6/UK]
	Germany (DB Netz)	DB Netz is responsible for the works. [7/DE]
	France (RFF)	SNCF takes responsibility for the works fundamentally. In general, a member of staff in RFF does not check the performance on engineering site.[8/FR]
	Australia (ARTC)	ARTC is responsible for the works. [9/AU]
Group 3	Iran (Raja Co.)	RAI takes responsibility.[10/IR]
	Japan(JR Freight)	Passenger railways take responsibility.[11/JP]
	USA (Amtrak)	Freight railways take responsibility.[12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires are responsible for the works. [13/MX-1,2]
	Mexico (TFVM)	TFVM is responsible for the works. [13/MX-3]
	New Shinkansen Lines	A JR Passenger Company is responsible for the works. [14/JP]
	Aoimori Railway	Aomori Prefecture is responsible for the works as an executing agency. (*2) [15/JP]

(*1) Network Rail brought the maintenance work back in-house by July 2004, enabling it cut costs and to exercise far greater control.[6/UK]

(*2) Aomori Prefecture does not have engineers who work on site, and Aoimori Railway has only 30 staff and does not have on-site engineers either. Thus the practical works including the on-site engineering management are contracted out to a different company, Hachinohe Rinkai Railway. (Aomori Prefecture, 2001)

APPENDIX 3 -b: Maintenance Works of Infrastructure and Tracks (4)

Quality of the maintenance works after the introduction of vertical separation		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	/
	Vietnam (VNR)	Maintenance quality seems to be improved with the active supports from Government. [2/VN]
	Indonesia (PT.KA)	Maintenance quality seems to be stable or to be deteriorating because of lack of sufficient funds for maintenance. [3/ID]
	Tunisia (SNCFT)	Maintenance quality seems to be improved in essential commercial lines partly because each division of SNCFT has been making efforts such as speeding up trains and developing service levels to increase the revenue. [4/TN]
Group 2	Sweden (Banverket)	Since 2002, BV has increased its efforts in connection with preventive maintenance and investments. Maintenance cost has increased about 45 % over the period 2001-2004. This resulted in positive effects on the condition of BV's railway network. For example, the number of train hours that follow on from the functional disruptions was a significant downswing during the period. (Banverket, 2004a)
	UK (Railtrack)	Once quality of tracks had become poor condition. (*1) [6/UK]
	Germany (DB Netz)	The quality of the works has been stable as they have been undertaken in accordance with established engineering standards for many years. [7/DE]
	France (RFF)	Practically, SNCF has been observing the track condition as an infrastructure manager. For example, when the condition of the track is below the standardized level, SNCF proposes necessary measures such as lowering the train speed. [8/FR] Track condition largely depends on the amount of finance for the maintenance. But in 2005 the Swiss Federal Institute of Technology in Lausanne published a report that notes the amount of finance on the network infrastructure is not enough to keep stable condition. (Le Figaro, 2005)
	Australia (ARTC)	In general, the quality of the works has been stable as they are undertaken in accordance with established engineering standards for many years. (*2) [9/AU]
Group 3	Iran (Raja Co.)	The situation has not changed much as tracks have been maintained by RAI as before. (*3) [10/IR]
	Japan(JR Freight)	The situation has not changed so much as the works are performed based on the technical standards. [11/JP]
	USA (Amtrak)	Vertical separation did not have unfavourable impact on quality of the work or the maintenance cost.[12/US]

Group 4	Mexico(TFM, Ferromex)	The quality has improved with less number of workers, partly because well-trained members of staff were hired by the concessionaires.[13/MX-1,2]
	Mexico (TFVM)	The tracks have been maintained in fair condition. [13/MX-3]
	New Shinkansen Lines	A JR Passenger Company manages the works based on technical standards like other lines.[14/JP]
	Aoimori Railway	The works are performed based on the technical standards stipulated. [15/JP]

(*1) More money is being spent on maintenance and renewal than ever before, and the subsidy has also gone up. Nevertheless, the interviewee thinks it was for the management of Railtrack and not for the vertical separation. He regards the reasons as follows [6/UK]:

1) The private company, Railtrack, lost important engineering knowledge.
2) It failed to manage quality controls of the engineering works performed by sub-contractors.
3) It failed to control financial management as well.

(*2) Vertical separation has increased the focus on efficiency of managing and maintaining the infrastructure, particularly in relation to minimizing track occupation times so that there are minimal impacts on "above rail" operators. The result has been considerably increased maintenance productivity. Much focus has also been placed on means of extending the life of track components by greater attention to formation, drainage and ballast condition, use of improved fastenings and rail grinding. [9/AU]

(*3) RAI expressed that it has become difficult to keep the condition of tracks because of other operators' ill-conditioned rolling stock, as studied in Section 6.6.2.[10/IR]

APPENDIX 3 -c: Rolling Stock (1)

The owner		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	IR [1/IN]
	Vietnam (VNR)	VNR (*1) [2/VN]
	Indonesia (PT.KA)	PT.KA [3/ID]
	Tunisia (SNCFT)	SNCFT (*1) [4/TN]
Group 2	Sweden	Varieties of entities. (*2) [5/SE]
	UK	3 Rolling Stock Companies (ROSCOs) [6/UK]
	Germany	Each operator in general. [7/DE]
	France	Trains for long-distance lines: SNCF Trains for regional lines: Regional governments [8/FR]
	Australia	Each operator in general. (*3) [9/AU]
Group 3	Iran (Raja Co.)	Till 2000 nearly all the rolling stock was owned by RAI. From the beginning of the 3rd development plan in 2000, RAI became authorized to assign its rolling stock including locomotives, wagons and coaches to the private sector. (Explained further in Section 6.5.1.) [10/IR]
	Japan(JR Freight)	JR Freight owns the rolling stock and standardized wagons. Private freighters own wagons specialized for its specific commodities. [11/JP]
	USA (Amtrak)	Amtrak (*4) [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires (*5) [13/MX-1,2]
	Mexico (TFVM)	TFVM also has some locomotives. [14/MX-3]
	New Shinkansen Lines	JR Passenger Companies [14/JP]
	Aoimori Railway	Aoimori Railway (*6) [15/JP]

(*1) In the appendix, each case of VNR and SNCFT itself is described. The cases of private companies are described in Section 4.6.2.

(*2) County Public Transport Authorities (CPTAs) provide their contacted operators with the necessary rolling stock for the railway services. ASJ (the remains of the business administration of SJ) also makes lease contracts of the rolling stock. Freight operators generally have to get their own rolling stock, with the exception of locomotive power. (CER, 2005 p.46)

(*3) However, in recent years, an active rolling stock leasing industry has developed in Australia that provides locomotives and freight wagons to rail operators on both a long and short term (casual) hire basis. [9/AU]

(*4) Rolling stock is often leased rather than owned. [12/US]

(*5) Some rolling stock is leased by the concessionaires. [13/MX-1,2]

(*6) As it is explained in Section 7.2.3.2, most of the trains are operated in the form of reciprocal running with IGR and JR East. In these cases, the rolling stock is owned and maintained by each railway. In 2006, Aoimori Railway owns only 2 trains. Aoimori Railway and IGR cooperate to have the same type of rolling stock considering the operation and maintenance works. IGR does the maintenance works of the rolling stock of Aoimori Railway as well. [15/JP]

APPENDIX 3 -c: Rolling Stock (2)

The entity who invests and maintains		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	(Investment) The planning is done in a centralized manner by the railway board. [1/IN] (Maintenance) The Mechanical & Electrical Engineering dept. of IR is responsible for the maintenance of locomotives, coaches and wagons. [1/IN]
	Vietnam (VNR)	VNR (*1) [2/VN]
	Indonesia (PT.KA)	PT.KA (*2) [3/ID]
	Tunisia (SNCFT)	SNCFT(*3) [4/TN]
Group 2	Sweden	(Investment) The owners [5/SE] (Maintenance) The owners in general [5/SE]
	UK	(Investment) ROSCOs [6/UK] (Maintenance) Train operator or ROSCOs order maintenance works based on the contract. [6/UK]
	Germany	Each operator [7/DE]
	France	The owners described in Item (1). (*4) [8/FR]
	Australia	Generally, the railway operators (*5) [9/AU]
Group 3	Iran (Raja Co.)	The private sector started to invest in/maintain rolling stock. (Explained further in Section 6.5.1.) [10/IR]
	Japan(JR Freight)	JR Freight. The private sector also purchases its own wagons. The private sector, often, maintains its own wagons. In these cases JR Freight checks quality of the maintenance works. [11/JP]
	USA (Amtrak)	Amtrak (*6) [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires [13/MX-1,2]
	Mexico (TFVM)	TFVM does for its own locomotives. [13/MX-3]
	New Shinkansen Lines	JR Passenger Companies [14/JP]
	Aoimori Railway	Aoimori Railway [15/JP] (*7)

(*1) Government provides VNR with preferential loans from the Fund for Development Support to purchase new locomotives and rolling stock. Government shall also be a guarantor of VNR for obtaining the ODA funds to purchase them. However, this support is limited. [2/VN]

(*2) In exceptional cases, Government buys rolling stock, for example with ODA funds, and transfers the assets to PT.KA. This is one type of subsidies from Government.[3/ID]

(*3) Some suburban trains are bought by Government as suburban rail transport is regarded as social obligation. [4/TN]

(*4) Regional governments contract out the maintenance for their rolling stock to SNCF. [8/FR]

(*5) It is getting to be common for operators to lease rolling stock, both for long and short periods, including casual hire sometimes for as short as one day. The type of rolling stock must be approved by ARTC before it can be operated on the ARTC network. [9/AU]
The rail operators either undertake routine maintenance using their own staff or may have a contract with an experienced service provider to undertake the work. [9/AU]

(*6) Rolling stock is often leased rather than owned. [12/US]

(*7) As indicated in the footnote in the item (1), Aoimori Railway contracts out the maintenance works to IGR. [15/JP]

APPENDIX 3-d: Timetable and Operation (1)

The entity who makes a timetable		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	Operating department of IR. [1/IN]
	Vietnam (VNR)	VNR makes a timetable without interference from Government. [2/VN]
	Indonesia (PT.KA)	PT.KA makes a timetable and Government approves it. [3/ID]
	Tunisia (SNCFT)	SNCFT makes a timetable and Government approves it. [4/TN]
Group 2	Sweden (Banverket)	Banverket [5/SE]
	UK (Railtrack)	Railtrack [6/UK]
	Germany (DB Netz)	DB Netz [7/DE]
	France (RFF)	RFF is in charge of allocating infrastructure capacities. (*1) [8/FR]
	Australia (ARTC)	ARTC [9/AU]
Group 3	Iran (Raja Co.)	RAI makes a timetable negotiating with Raja Co. [10/IR]
	Japan(JR Freight)	JR Passenger Companies make a timetable negotiating with JR Freight. [11/JP]
	USA (Amtrak)	Freight operators make a timetable negotiating with Amtrak. [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires [13/MX-1,2]
	Mexico (TFVM)	TFVM [13/MX-3]
	New Shinkansen Lines	A JR Passenger Company [14/JP]
	Aoimori Railway	Aoimori Railway [15/JP]

(*1) The Transportation Decree of 7 March 2003 states that "RFF is in charge of allocating infrastructure capacities on the national rail network and paths to applicants." (CER, 2005 p.99) The procedure for timetabling is discussed in Section 5.5.2.

APPENDIX 3-d: Timetable and Operation (2)

The way of planning and problems		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	Timetable planning is a coordinated exercise once a year where all the regional railway administrations send their timetable experts. The timetables of trains which have their journey beginning and ending in more than one railway administrative zones are decided by mutual consultation. [1/IN]
	Vietnam (VNR)	VNR makes a timetable independently and there is no particular problem relating vertical separation. [2/VN]
	Indonesia (PT.KA)	PT.KA makes a timetable. (Problems) Timetable depends on the condition of maintenance and investment. PT.KA often wishes to shorten traveling time to increase the revenue, but sometimes it can not be achieved because of insufficient maintenance and safety reasons. [3/ID]
	Tunisia (SNCFT)	SNCFT makes and coordinates timetables by itself and there is no particular problem relating to vertical separation. [4/TN]
Group 2	Sweden (Banverket)	The train traffic control unit of BV coordinates the timetable based on the application from each operator. Usually, the meetings for planning timetable are held twice a year at the time of changing the timetable. At the time of fixing timetable, different operators insist on getting their own time slots. BV has difficulties to coordinate the operators' application especially in the following cases[5/SE]: 1) in a case infrastructure capacity is limited; 2) in a case several operators apply the same slots of timetable; 3) in a case time schedule for maintenance works is difficult to be secured. (described Section 5.5.2)
	UK (Railtrack)	Railtrack coordinated the timetable based on the application from each operator. (Problems) The same as Sweden. (*1) [6/UK]
	Germany (DB Netz)	DB Netz coordinates the timetable based on the application from each operator and train operating departments within DB AG. (Problems) The same as Sweden. [7/DE]
	France (RFF)	Based on the slot allocation made by RFF, SNCF makes detail timetable called "working timetable". Thus, information flow has become more complicated compared with the situation before the reform. [8/FR]
	Australia (ARTC)	Each rail operator applies time-slots to ARTC. Then ARTC allocates train paths in accordance with decision

		rules that ARTC is required to abide by. (Problems) The same as Sweden. [9/AU]
Group 3	Iran (Raja Co.)	The timetable is set up on the priority of passenger trains. As RAI and Raja Co. plan the timetable in cooperation, there is no particular problem relating vertical separation. [10/IR]
	Japan(JR Freight)	The timetable is planned by a JR Passenger Company in negotiation with JR Freight. In many cases, infrastructure capacity is limited because of a number of passenger trains and maintenance works. Thus, JR Freight frequently faces large difficulties to get time slots for the trains. [11/JP]
	USA (Amtrak)	The timetable is planned by the freight railroads in negotiation with Amtrak. Amtrak trains' long-standing schedules cause some problems on freight lines that are approaching capacity. (*2) [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires plan the timetable centrally. <Problems> There are some difficulties in case other operators have track-age rights.[13MX-2]
	Mexico (TFVM)	TFVM plans the timetable. [13/MX-3]
	New Shinkansen Lines	The timetable is planned by a JR Passenger Company without interference from the (local) government. Along with the timetable of other lines, it is only required to report to the government based on the Railway Business Law. [14/JP]
	Aoimori Railway	Aoimori Railway plans it in close negotiation with the maintenance contractor and other railways such as JR-Freight, IGR and JR East. [15/JP]

(*1) For example, if a certain operator tries to operate a faster train it means to reduce the infrastructure capacity. In order to achieve this, sometimes other operators were forced to cut some slower trains. An operator can appeal it to the Regulator, and this happened sometimes in UK. [6/UK]

(*2) "By law, freight railroads must grant Amtrak access to their track upon request and give priority status to Amtrak trains over other customers."(AAR, 2006 p.8) Nevertheless, as a general matter, Amtrak trains are not given proper priority on freight lines and they suffer serious on-time reliability. [12/US]

APPENDIX 3-d: Timetable and Operation (3)

The entity who directs trains and controls signalling		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	Operating department of IR. [1/IN]
	Vietnam (VNR)	VNR [2/VN]
	Indonesia (PT.KA)	PT.KA [3/ID]
	Tunisia (SNCFT)	SNCFT [4/TN]
Group 2	Sweden (Banverket)	Banverket (BV) [5/SE]
	UK (Railtrack)	Railtrack [6/UK]
	Germany (DB Netz)	DB Netz [7/DE]
	France (RFF)	SNCF [8/FR]
	Australia (ARTC)	ARTC [9/AU]
Group 3	Iran (Raja Co.)	RAI [10/IR]
	Japan(JR Freight)	JR Passenger Companies [11/JP]
	USA (Amtrak)	Freight railroads provide access to the track. [12/US]
Group 4	Mexico(TFM, Ferromex)	Each concessionaire [13/MX-1,2]
	Mexico (TFVM)	TFVM controls within its territory. [13/MX-3]
	New Shinkansen Lines	A JR Passenger Company. [14/JP]
	Aoimori Railway	Aoimori Railway contracts out these works to IGR (*1) [15/JP]

(*1) Aoimori Railway contracts out the controlling and signalling because of the following reasons:
(1) Most of the trains run through the network of Aoimori Railway and IGR in the form of reciprocal running.
(2) The control centre is in the facility of IGR, and the control systems of the two railways are actually integrated.
Aoimori Railway plans to have its own control system at the time of line extension to Aomori City. (Aomori Prefecture, 2001)

[Source for Appendix 3]

・Author, based on the interviews/inquiries to the railway. [1/IN, 2/VN, 3/IN, 4/TN, 5/SE, 6/UK, 7/DE, 8/FR, 9/AU, 10/IR, 11/JP, 12/US, 13/MX, 14/JP, 15/JP]

APPENDIX 4: Relationship Among Different Parties and Relevant Issues

APPENDIX 4:-a: Relationship between Operators on the Same Track (1)

The main operator and Regulation for the selection		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	(Passenger and Freight) IR
	Vietnam (VNR)	(Passenger and Freight) VNR **<Regulation>** Railway Act in 2005.
	Indonesia (PT.KA)	(Passenger and Freight) PT.KA **<Regulation>** Railway Act.
	Tunisia (SNCFT)	(Passenger and Freight) SNCFT **<Regulation>** The laws in 1998 stipulating the railway reform.
(*1) **Group 2**	Sweden (Banverket)	SJ holds monopoly on profitable inter-regional lines. Operators are completely independent from infrastructure.
	UK (Railtrack)	Operators are completely independent from infrastructure.
	Germany (DB Netz)	DB AG keeps holding structure with infrastructure.
	France (RFF)	SNCF maintains and controls infrastructure based on a contract with RFF.
	Australia (ARTC)	Operators are completely independent from infrastructure.
Group 3	Iran (Raja Co.)	(Passenger) Raja Co. (Freight) RAI **<Regulation>** Raja Co. was established based on the law stipulated in 1996. (*2) [10/IR]
	Japan(JR Freight)	(Freight) JR Freight. (Passenger) A JR Passenger Company in each region operates on its own infrastructure. **<Regulation>** JR Freight was established based on the Law for JNR Restructuring stipulated in1986. [11/JP]
	USA (Amtrak)	(Passenger) Amtrak (Freight) Each freight operator operates on its own infrastructure. **<Regulation>** Amtrak was established and has access on the freight lines by Rail Passenger Service Act enacted in 1970. [12/US]
Group 4	Mexico(TFM, Ferromex)	Each concessionaire operates within its concessioned network. (*3) **<Regulation>** 50 years concession. (It is renewable for another similar period.) [13/MX-1,2]
	Mexico (TFVM)	3 concessionaires access the tracks managed by TFVM. **<Regulation>** Operators (concessionaires) are the shareholder of TFVM. [13-MX-3]

	New Shinkansen Lines	(Passenger) A designated JR Passenger Company (Freight) Service is not provided. **<Regulation>** The Nationwide Shinkansen Railway Development Law [14/JP]
	Aoimori Railway	(Passenger) Aoimori Railway (Freight) JR Freight **<Regulation>** In the passenger sector, a joint-venture between infrastructure and the private sector was established [15/JP]

(*1) As studied in Chapter5, the transport policy aims to ensure the management independence of railway undertakings fostering competitive neutrality between rail operators. Thus this part mainly lists some characteristic of railways such as a certain relationship with infrastructure. Regulation for an entry to the services is described in Item (2).

(*2) It also stipulates private participation based on open access regime, but there is no competitive access to RAI's tracks yet. [10/IR]

(*3) In some cases other operators have track-age rights. These rights in the Mexican regulation framework may be classified as follows (Federal Competition Commission, 2001 p.12):

- Compulsory track-age and haulage rights in specific stretches, where access to other concessionaires is necessary for efficiency purposes, were stipulated in the concession titles;
- The law provides for the possibility that concessionaires voluntarily and at their own convenience negotiate additional track-age and haulage rights;
- After a specific period of exclusivity (20 to 30 years) the regulatory agency may impose additional track-age and haulage rights based upon economic and technical feasibility, international regulation trends and reciprocity, especially in those cases where international agreements are concerned.

APPENDIX 4:-a: Relationship between Operators on the Same Track (2)

Number of new operators and the way of their entry to the market		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	Concor and other container concessionaires (*1) [3/ID]
	Vietnam (VNR)	One private firm has entered to the passenger market through establishing a joint-venture with VNR. [2/VN]
	Indonesia (PT.KA)	There is no new entrant. [3/ID]
	Tunisia (SNCFT)	One private firm entered to the passenger market. The law stipulates that SNCFT has concessioning rights on the government's network. Private companies are required to make an agreement with SNCFT in order to enter the railway market. [4/TN]
Group 2 (*2)	Sweden (Banverket)	(Freight) 18 undertakings operate based on open access. (Passenger) 11 companies operate based on franchising. (2 companies are mixed operators.)
	UK (Railtrack)	(Freight) 4 undertakings based on open access. (Passenger) 25 TOCs operate based on franchising.
	Germany (DB Netz)	(Freight) 103 undertakings operate through open access. (Passenger) 72 operators operate. (*3)
	France (RFF)	(Freight) Besides SNCF, 8 undertakings operate through open access. (Passenger) SNCF holds monopoly.
	Australia (ARTC)	(Freight) 12 undertakings operate based on open access. (Passenger) 2 passenger operators. (*4) [9/AU]
Group 3	Iran (Raja Co.)	There are four new entrants in the passenger sector, and the number has been increasing. Entry is attained through establishing a contract with Raja Co. [10/IR]
	Japan(JR Freight)	JR Freight is the only freight operator established by law and accesses JR Passenger Companies' tracks. [11/JP]
	USA (Amtrak)	Amtrak is a sole inter-city passenger operator established by law and accesses freight railways' tracks. [12/US]
Group 4	Mexico(TFM, Ferromex)	A sole concessionaire is selected through a competitive bidding. [13/MX-1,2]
	Mexico (TFVM)	The three concessionaires are also the share-holders of TFVM. [13/MX-3]
	New Shinkansen Lines	A JR Passenger Company in the region is designated as a sole operator. [14/JP]
	Aoimori Railway	<Freight> Only JR Freight continues to use the line. <Passenger> Only Aoimori Railway operates since the management separation from JR East. [15/JP]

(*1) There is a multimodal operator, Concor, which can provide wagons, but the haulage is done by IR by its own locomotives. At present, there is a policy of permitting more Concor type operators but haulage will be still taken by IR only. [1/IN] But this paper regards IR as an integrated railway, and do not discuss these new entrants.

(*2) The number of operators is referred to: European Railway Agency (2007), JRTT (2006). It is expected to increase especially in the European freight market with open access.

(*3) 70 operators are for regional passenger services, and 2 operators are for inter-city passenger services.(JRTT, 2006) As only one operator can receive subsidy from the regional authority, despite the regulation of open access, it is not common that the other operators perform regional passenger services without subsidies.[7/DE]

(*4) From ARTC's perspective, open access also applies to the passenger sector. But except one purely commercial operator, other services are heavily subsidized by State Governments. With minor exceptions, the two operators use different parts of the network. [9/AU]

APPENDIX 4:-a: Relationship between Operators on the Same Track (3)

Disputes and relationship among operators		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	(IR is an integrated railway)
	Vietnam (VNR)	As the new operator is a joint-venture with VNR, there is no particular dispute with VNR. They co-operate each other in various issues such as timetabling. [2/VN]
	Indonesia (PT.KA)	None (Only PT.KA performs railway operation.) [3/ID]
	Tunisia (SNCFT)	As the new operator has a contract with SNCFT, there is no particular dispute with SNCFT. They co-operate each other in various issues such as timetabling.[4/TN]
Group 2	Sweden (Banverket)	When traffic delays are raised by a specific operator, sometimes the settlement takes time and energy. (*1) [5/SE]
	UK (Railtrack)	Mainly, disputes come from lack of infrastructure capacity. [6/UK]
	Germany (DB Netz)	Some disputes come from delays of other operator's trains. [7/DE]
	France (RFF)	As a new operator drives only a few trains on the French network, there is no serious dispute with SNCF. (*2) [8/FR]
	Australia (ARTC)	Minor disputes sometimes occur between ARTC and operators and/or between operators in the course of normal daily operations, usually in the form of differing interpretations of ARTC's decision rules for train priority. (*3) [9/AU]
Group 3	Iran (Raja Co.)	There has been no particular dispute among operators, as RAI and Raja Co. cooperate to coordinate a timetable. If in any case it occurs, the Board of Director of RAI will manage to settle the dispute. New entrants in the passenger sector also cooperate with Raja Co. [10/IR]
	Japan(JR Freight)	JR Freight and JR Passenger Companies cooperate to coordinate a timetable. Additionally, JR Freight has been making efforts by some measures for gaining its time-slots so as to prevent disputes with JR Passenger Companies. [11/JP]
	USA (Amtrak)	Disputes on the freight lines are common. In principle, the Surface Transportation Board (STB) can resolve disputes: in practice, Amtrak has only little power to force better treatment from the freight railways. [12/US]
Group 4	Mexico(TFM, Ferromex)	Without other operators' track-age rights, a sole concessionaire operates on the track. [13/MX-1,2]
	Mexico (TFVM)	- (TFVM is an infrastructure manager)

	New Shinkansen Lines	None. (One of the JR Passenger Companies is designated as an operator for the line) [14/JP]
	Aoimori Railway	A passenger operator and a freight operator make efforts to cooperate, and there is no particular dispute among them. [15/JP]

(*1) They have a regulation to settle the conflicts. When operators do not satisfy the settlement, firstly, they ask BV for settlement. If it is not settled in BV, they ask it to the Railway Agency, a government body, and finally they sue it to the court. Over the period 2003-2005 there were three cases, which they took the conflicts into the court. [5/SE]

(*2) At the time of the interview in Dec. 2005, only one new entrant performed the operation and SNCF practically helped for the training such as safety measures and so on. [8/FR] But the number of operators has increased since then.

(*3) Some problems also come from capacity constrains of some corridors. This prevents to allocate further train paths at desired times.

These are normally resolved by ARTC train control staff or operation supervisors. The ARTC Access Undertaking, a document approved by the Australian Competition and Consumer Commission, includes a dispute resolution procedure which has been applied occasionally.

In case the ARTC's dispute resolution procedure prove ineffective in a particular case (this has not occurred in any significant way to date), the parties in dispute would have recourse to normal legal processes. [9/AU]

APPENDIX 4 -b: Relationship between Infrastructure and Operators (1)

Outline of track access charges		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	(IR is an integrated railway)
	Vietnam (VNR)	VNR pays 10 % of the VNR's annual transport revenues to Government as track access charges. (*1) [2/VN]
	Indonesia (PT.KA)	Government should pay the specified Net Value to PT.KA. [3/IN] (Explained in Section 4.7.2)
	Tunisia (SNCFT)	Although payment of access charges is expected, SNCFT does not pay them to Government based on the transit scheme between them. [4/TN]
Group 2	Sweden (Banverket)	Under legislation in 1988, track access charges were reduced substantially to improve rail's ability to compete with road. The main principle is that they should amount to the incurred marginal costs of BV in terms of track operation and maintenance. (CER, 2005) (*2)
	UK (Railtrack)	The British government proposed to establish Railtrack as a commercial organization which would in due course be privatized itself. Access charges were set as follows: (Passenger sector) Regulator has set. (Freight sector) Decided based on the negotiations, and Regulator approved it.
	Germany (DB Netz)	The basic approach is "to allocate total cost (excluding those investment and renewal costs borne directly by Government) to market segments, and then to price at average cost."(ECMT, 2005b p.99)
	France (RFF)	The basic approach is based on short run marginal costs. "In financial terms, RFF report that it is their aim to achieve an operational balance – whereby it covers its operating and daily maintenance costs in full – by 2008." (ECMT, 2005b p.96)
	Australia (ARTC)	Access charges cover large part of total costs of ARTC, but ARTC receives subsidy from the Commonwealth to implement a program. (ARTC, 2005)
Group 3	Iran (Raja Co.)	In the passenger sector, operators do not pay access charges. (*3) [10/IR]
	Japan(JR Freight)	JR Freight pays "avoidable costs" aiming to shoulder only those inherent to freight transportation. (*4) [11/JP]
	USA (Amtrak)	On freight lines, Amtrak is supposed to pay "variable cost" for its access. (*5) [12/US]
Group 4	Mexico(TFM, Ferromex)	A concessionaire has rights to access the infrastructure based on a concession contract. The concessionaire does not pay the access charge except in the lines where there is track-age right. [13/MX-1,2]
	Mexico (TFVM)	The three freight concessionaires pay their access

		charges, which cover the maintenance costs of the Terminal. [13/MX-3]
	New Shinkansen Lines	The burden of the operator is kept within the limits of the corresponding benefits.(JR East, 2004a) (Examined in Section 7.5.3)
	Aoimori Railway	Access charging is stipulated so as to cover the maintenance costs of the infrastructure.(*6) [15/JP]

(*1) According to VNR, this amount is calculated by 20-25 % of the State supplied budget for the management and maintenance of the railway infrastructure. [2/VN]

(*2) In 2003, the total income from track charges corresponds to 12 % of Banverket's total funds directed to operation and maintenance. (CER, 2005 p.50)

(*3) In order to promote private participation, access charges are stipulated so as to guarantee profits for the new entrants, and it is discharged now. In the freight sector, the tariff for wagons is based on the weight, capacity and length of wagons, commodities, route and so on. On an average it is about 20 % of the transport income. [10/IR]

(*4) This scheme has been working for balanced management of JR Freight. For non-JR Companies JR Freight pays access charges so as to cover the maintenance costs of the infrastructure as explained in the case of Aoimori Railway.(Footnote in Section 7.5.4)

(*5) The early intent of Congress was that this payment would be small as there was considerable excess line capacity in 1970. In general, Amtrak has negotiated access charges with the freight railways that are acceptable. However, as lines have approached capacity in the last few years, freight railroads are trying to charge Amtrak more to allow for the impact on capacity of Amtrak's operations. [12/US]

(*6) The maintenance cost which comes from train operation is planned to be beard by the operators, Aoimori Railway and JR Freight. The cost for exchange of infrastructure assets resulted from life-span aging is planned to be beard by Aomori Prefecture.
In practice, Aoimori Railway can not pay the stipulated access charges because of the shortage of the annual income. (This issue is studied in Section 7.5.4)

APPENDIX 4 -b: Relationship between Infrastructure and Operators (2)

Disputes between infrastructure and operator		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	(IR is an integrated railway)
	Vietnam (VNR)	There is no particular dispute between the two entities. [2/VN]
	Indonesia (PT.KA)	So far the stipulated Net Value could not be paid because of shortage of the Government funds. This is the main cause of disputes between the two entities. (Explained in Section 4.7) [3/ID]
	Tunisia (SNCFT)	There is no particular dispute between the two entities.[4/TN]
Group 2	Sweden (Banverket)	The most of disputes are raised by the following cases [5/SE]: ▪ in a case of coordinating timetable especially in limited infrastructure capacity; ▪ in a case of settling train delays by compensation; ▪ in a case of sudden engineering works. (*1)
	UK (Railtrack)	Usually, disputes were raised when trains could not be operated punctually. The most problems have resulted from the following reasons [6/UK]: ▪ lack of infrastructure capacity; ▪ delays caused by other operators or infrastructure.
	Germany (DB Netz)	In the passenger sector, some new entrants complained that enough information of their train service has not been provided for passengers. This issue has been one of the serious discussions in the passenger sector. [7/DE]
	France (RFF)	SNCF thinks that the access charges claimed by RFF are too expensive. [8/FR] Sometimes, there are conflicts between SNCF and RFF. (The issue is described in Section 5.5.2)
	Australia (ARTC)	Even though most disputes are settled amicably there are sometimes disputes between infrastructure and operator. Disputes are raised in the following cases [9/AU]: ▪ In case things go wrong and an underlying cause is in dispute. For example, train derailments when the problem might not be clear cut and seem to be in an interaction between track and rolling stock. (*2) ▪ Train control decisions regarding relative priority of trains belonging different operators. (*3) ▪ At the time of issuing new timetables, an increase in train numbers requires adjustments to existing service to accommodate a new service. In these circumstances, sometimes an operator may believe he

		is being disadvantaged relative to another operator. (*4)
Group 3	Iran (Raja Co.)	At present, there is no particular dispute as RAI and Raja Co. cooperate to coordinate important factors of railway operation. [10/IR]
	Japan(JR Freight)	JR Freight must follow the control and signalling by JR Passenger Companies even in the case of train delays. JR Freight obeys the control, and there have not been serious disputes. [11/JP]
	USA (Amtrak)	There are some disputes about slot allocation and access charges as described in the former item. The STB has a role to solve the disputes. [12/US]
Group 4	Mexico(TFM, Ferromex)	On the routes with track-age rights, there are disagreements about the amount of infrastructure charges. (*5) [13/MX-1,2]
	Mexico (TFVM)	There is no particular dispute between the two entities.[13/MX-3]
	New Shinkansen Lines	There is no particular dispute between the two entities. But there are potential risks that future economic and social changes enforce modification of the initial scheme. [14/JP]
	Aoimori Railway	There were some negotiations about the payment of the access charges. Aomori Prefecture increased the access charges for JR Freight so as to cover the maintenance costs. (Studied in Section 7.5.) [15/JP]

(*1) When engineering works need cancel of some trains, it should be planned in advance of regulating timetable. Sudden planning of engineering works results in cutting scheduled trains, and it sometimes becomes a cause of disputes among the two entities.[5/SE]

(*2) However, all such incidents are now independently investigated by the Australian Transport Safety Bureau (ATSB) and their findings usually stand. [9/AU]

(*3) ARTC has clear protocols and procedures for train priority, but sometimes these decisions still rest on an individual's judgment and may be called into question. [9/AU]

(*4) These issues are usually resolved through negotiation, and ARTC's published Access Undertaking has defined dispute resolution processes if normal negotiation cannot resolve the matter. [9/AU]

(*5) "The huge difference in the bids made by each concessionaire and, particularly the lack of a detailed methodology on how to translate these differences into the access prices was the major controversial issue that had prevented a previous agreement. The regulations developed by the sectoral law (LRSF) were not very detailed and only requested the inclusion of the maintenance and operating costs, the incremental costs associated to the other firm's operation, depreciation and a reasonable profit for the provider of access." (Campos, J., 2001 p.93)

APPENDIX 4 -c: Safety Issues (1)

Responsibility of railway operation		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	IR is responsible for safety issues. Accidents not involving passengers are investigated by an internal inter-departmental team of IR. Major accidents involving passenger trains are investigated by the Commissioner of the Railway Safety, which is a statutory authority independent of the Ministry of Railways. [1/IN]
	Vietnam (VNR)	VNR takes a responsibility for safety. The Railway Act stipulates that "railway operators shall be responsible for railway safety and order within their operational location." (Vietnam Railways, 2005a p.2)
	Indonesia (PT.KA)	PT.KA takes the responsibility for safety. [3/ID]
	Tunisia (SNCFT)	SNCFT takes the responsibility for safety. [4/TN]
Group 2	Sweden (Banverket)	Responsibility for each accident should be determined individually whether an operator or BV is responsible for it. [5/SE]
	UK (Railtrack)	Responsibility for each accident had been determined individually whether an operator or Railtrack was responsible for it. [6/UK]
	Germany (DB Netz)	Responsibility for each accident should be determined individually. [7/DE]
	France (RFF)	As SNCF performs train operation and also maintains infrastructure, fundamentally SNCF is responsible for safety. Nevertheless, RFF will be also responsible for some accidents when a member of staff in SNCF has performed proper works. [8/FR]
	Australia (ARTC)	Responsibility for each accident should be determined individually whether an operator or ARTC is responsible for it. [9/AU]
Group 3	Iran (Raja Co.)	RAI takes responsibility for the signalling and infrastructure. [10/IR]
	Japan(JR Freight)	JR Passenger Companies take responsibility for the signalling and infrastructure. [11/JP]
	USA (Amtrak)	Freight railways take responsibility for the signalling and infrastructure. [12/US]
Group 4	Mexico(TFM, Ferromex)	Concessionaires take responsibility. [13/MX-1,2]
	Mexico (TFVM)	TFVM is responsible for the signalling and infrastructure. [13/MX-3]
	New Shinkansen Lines	A JR passenger company takes responsibility. [14/JP]
	Aoimori Railway	Aoimori Railway is responsible for the operation. Aomori Prefecture is responsible for the infrastructure such as judgment of the infrastructure usage. [15/JP]

APPENDIX 4 -c: Safety Issues (2)

Disputes / Opinion about safety issues		
Group	**Country (Railway)**	**Description**
Group 1	India (IR)	Accident disputes are resolved through internal arbitration process of IR. [1/IN]
	Vietnam (VNR)	There is no particular dispute about safety raised from vertical separation. [2/VN]
	Indonesia (PT.KA)	Safety in railway operation largely depends on track maintenance, but it is difficult for PT.KA to secure sufficient funds for the required work. (Opinion) Whether the vertical separation functions well or not largely depends on the financial support from Government. [3/IN]
	Tunisia (SNCFT)	There is no particular dispute about safety raised from vertical separation. [4/TN]
Group 2	Sweden (Banverket)	BV has a dedicated section for settling conflicts raised by an accident. (*1) (Opinion) As the government invests sufficiently in infrastructure, safety standard has been kept stable in good status. [5/SE]
	UK (Railtrack)	Frequently, the neutral body, independent from operators and infrastructure, had been involved for settling the disputes.[6/UK]
	Germany (DB Netz)	Conflicts are tried to be settled down based on the contract between an operator and DB Netz. Facing serious accidents, an independent regulator will inspect the accidents. [7/DE]
	France (RFF)	So far serious accidents have not happened. Facing an accident, SNCF and RFF try to settle down responsibility of it together. (Opinion) Not only the responsibility of accidents but also the process to keep safety has become more complicated through the introduction of vertical separation. [8/FR]
	Australia (ARTC)	The way to solve the disputes depends upon the seriousness of the accident. (*2) (Opinion) Provided appropriate measures are in place, there should be no negative effects on safety. (*3) [9/AU]
Group 3	Iran (Raja Co.)	RAI complains that several operators, sometimes, operate ill-conditioned rolling stock without caring about tracks. This tends to result in damages of the tracks. [10/IR]
	Japan(JR Freight)	There is no particular dispute about safety raised from vertical separation. JR Freight runs trains based on the stipulation of each

		line. JR Freight checks the condition of its own rolling stock and the private freighters' wagons as well. [11/JP]
	USA (Amtrak)	The interviewee does not think the vertical separation has had any effect on safety in the US. All railroads try to operate safely, no matter whether they are owners or tenants. [12/US]
Group 4	Mexico(TFM, Ferromex)	The disputes are settled by the insurance companies. <Opinion> The result of concessioning is satisfactory. Better signalling and control equipment are provided, and accidents have been reduced. [13/MX-2]
	Mexico (TFVM)	There is no particular dispute. [13/MX-3]
	New Shinkansen Lines	There is no particular dispute as only one JR Passenger Company is responsible for the safety and operation. [14/JP]
	Aoimori Railway	There is no particular dispute about safety issues so far partly because of the few years' experience. [15/JP]

(*1) For settling conflicts they have regulations. Both an operator and BV gather for determining the cause of accidents. When accidents are severe the Railway Agency inspects the accidents. [5/SE]

(*2) Minor accidents and incidents are jointly investigated by ARTC and the operator concerned and responsibility is allocated by agreement if at all possible.
Since 1999, more serious rail incidents and accidents have been investigated by the Australian Transport Safety Bureau (ATSB), which is an independent organization with expertise to investigate and determine the cause of rail accidents and to recommend measures to avoid a recurrence. In some cases, there have been protracted disputes, particularly where multiple parties are involved. Such disputes are rare but when they occur, independent experts are brought in to advise the parties and if this does not break the deadlock, prolonged and expensive litigation through the courts can result. [9/AU]

(*3) Overall, safety performance on the ARTC network continues to steadily improve and this trend has been fairly consistent in the periods prior to vertical separation and since. In part, this may be due to the rigorous safety accreditation and audit process that exists in Australia and the independent accident investigation process managed by ATSB since 1999. Unlike experience in the United Kingdom with the former Railtrack company, ARTC has also retained considerable "in house" engineering expertise which is considered essential in order to successfully manage its maintenance contractors. [9/AU]

[Source for Appendix 4]

- Author, based on the interviews/inquiries to the Railways [1/IN, 2/VN, 3/IN, 4/TN, 5/SE, 6/UK, 7/DE, 8/FR, 9/AU, 10/IR, 11/JP, 12/US, 13/MX, 14/JP, 15/JP]