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THE MARKET FOR RAILWAYS IN INDONESIA

INDONESIA INFRASTRUCTURE INITIATIVE

Indonesia Infrastructure Initiative

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Jakarta, December 2009

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ACRONYMS

DGR	Directorate General of Railways
DWT	Deadweight tonne
GoI	Government of Indonesia
MoT	Ministry of Transport
O-D	Origin and Destination
PTKA	PT Kereta Api (State-owned railway operator)
RMP	Railway Master Plan

Executive Summary

In general, railways are well suited to some specific transport tasks such as hauling large volumes of cargo over long distances, moving large numbers of passengers over medium distances and commuters in major cities. However, it is not easy for rail to play its proper role in the transport market and contribute to lower transport costs in the economy. First, it is necessary to have a good understanding of what exactly are the strengths and cost advantages of rail compared to other modes of transport. Second, it is necessary to ensure that rail is competing with other modes on a level playing field. Third, it is critical to understand the requirements of shippers and travellers in the transport markets.

An insufficient appreciation of the implications of the above three critical factors has largely contributed to rail losing market share on some of its main lines of business. This report found the traffic volumes in the order of several million tonnes/year are required to make railway operations economically viable. Assessing market demand for rail is more complex than estimating total demand and applying a modal split and a number of aspects require careful analysis. Some of these are considered below:

First, the transport requirements of the economy are not static but are undergoing continuous change in response to the evolving structure of the national and global economy. This is illustrated in the case of freight movements on the Java railway network where traffic has declined. Among other reasons, this is because major traditional shippers have relocated, or fundamentally changed their logistics supply or distribution chains. In contrast, on Sumatra and Kalimantan, the rapid expansion of coal production probably justifies rail investment by the private sector.

Second, in a largely deregulated market, businesses and travellers are deciding which transport tasks are performed by which mode and which operator. They not only consider the price of the service but many other factors, such as time in transit, waiting time, reliability, comfort, and security. This is confirmed by the finding that total volume carried by rail has been growing at a slower rate than that of other modes, indicating a declining market share.

Third, government establishes the rules that apply in the transport markets, mainly through policies relating to pricing, infrastructure charging, subsidy, investment, market entry and, in general, by the way it interprets and manages its relationship with the rail operator. Past government policies have not been conducive to enabling rail to fully exploit its comparative strengths. The indirect subsidy that heavily overloaded trucks enjoy as a result of fuel pricing policies and inadequate charging for road damage has provided road transport with a significant advantage. In regard to the transport of mining products, government could play a more effective role in facilitating rail investment by mining ventures.

In light of the above, this paper argues that a market assessment that will be helpful in turning around the fortunes of rail transport in Indonesia and enabling it to play its proper role in the transport market has to address a range of questions that are closely interrelated:

- on the supply side: (i) what are the core tasks for which rail is potentially able to provide cheaper services than other modes. In this regard, the outlook for freight is fundamentally different between Java and Sumatra/Kalimantan; and (ii) what are the noncommercial services for which there will be clear central/local government financial support;

- what is the impact of government policies affecting the competitiveness of rail and is there likely to be a change in government policies;
- in addition to comparative costs, what other factors should government consider (such as differences between the modes in adverse environmental impacts) and how should these factors be valued and incorporated in the decision making process; and
- how do the users of transport assess the differences in quality of service.

The paper recommends that the market assessment:

(a) focus on the four main transport tasks currently performed by rail and which account for 90 percent of the revenues of *PT Kereta Api* (PTKA), namely: Java passenger services, Java freight services, Jabotabek[1] passenger services and South Sumatra coal traffic;
(b) follow a micro approach, analysing potential demand market-by-market and service-by-service using, among other means, elasticity measures;
(c) be conducted in close collaboration with PTKA which, over the years, has developed a good understanding of the various markets in which it is operating; and
(d) for Jabotabek passenger services, be conducted as part of an integrated multimodal approach for meeting the transport demand of the Jakarta metropolitan area.

To bring about a transport system where rail plays its proper role in contributing to lower transport costs, the paper emphasises that there is a need for a number of institutional and operational reforms, including:

- at the level of PTKA, establishing business units endowed with managerial autonomy for each of the four main lines of business. For the South Sumatra railway this should be carried further by merging infrastructure with train operations and possibly divesting the entity through privatisation or sale to the mining company;
- for Java passenger services and Java freight services, establishing a coordinating mechanism between the infrastructure operating entity and the train operator to align infrastructure capacity with market demand; and
- for Jabotabek passenger transport, establishing a coordinating mechanism between the infrastructure operating entity and a metropolitan multimodal transport entity (to be established).

Under the above outlined policy and institutional framework, Java passenger and freight services should be self-financing on the basis of the corporate finance approach at the level of the train operator (PTKA). However, it will only be possible to progress to a multi-operator system once all the building blocks of the policy, institutional and regulatory framework are in place and government has established a credible record in implementing its policies and regulations.

Following establishment of a Jabotabek multimodal transport management entity, Jabotabek passenger services could be financed from the pool of financial resources mobilised for the entire metropolitan transportation system. The scope for value-capturing in the context of real estate development in combination with rail system improvement should be explored.

[1] Jabotabek: An acronym for the greater Jakarta metropolitan area incorporating the four main local government areas of Jakarta, Bogor, Tangerang, and Bekasi. More recently, Depok has been added to the acronym which is now known as Jabodetabek.

As long as infrastructure costs are not recouped through access charges, government will need to continue taking responsibility for financing capacity expansion of rail infrastructure. If external financing is available under tied procurement, it should only be taken up on condition that it will not impede the standardisation of equipment and facilities.

For the South Sumatra railway system, when infrastructure and train operations are consolidated in one entity (either stand-alone and government owned, privatised, or sold to the mining company) that contracts for transport with the mining company, the railway should be fully self-financing with no call on government funding. New coal railway lines in Sumatra and Kalimantan as part of a coal export logistics chain should also be entirely self-financing. But because of the many permits and clearances that need to be obtained from different central and local government entities, the MoT/Directorate General of Railways (DGR) should play a critical role in facilitating the development process for projects that are well justified.

Chapter 1: INTRODUCTION

Knowing the strengths of rail transport so as to pursue the right transport tasks

Rail transport is generally promoted for its ability to haul large volumes of cargo over long distances, move large numbers of passengers over medium distances and to move commuters in mega cities. However, it is not always immediately clear what advantages that rail has in a specific country context given the geography, the dispersion of economic centres of activity, the volumes to be transported and the strengths of other modes of transport. As part of the preparation of this Masterplan it is therefore opportune to explore the strengths of rail for different transport tasks.

Understanding the market for rail services so as to invest in the right capacity

A good assessment of the market is essential for the survival of any business, and this is particularly so in the rail business. In railways, a large part of the investment and production is location specific and cannot be moved to other locations if the demand forecast proves to be wrong. This is less so in many other businesses where the output can easily be shipped to meet demand in other parts of the country or the global economy if demand in one region does not meet expectations. It is also less the case in some other transportation modes, such as shipping and aviation, where the fixed infrastructure represents a smaller share of the total investment. Indeed, aircraft and shipping can be moved easily to markets where demand is strong.

Another aspect of the rail business is that the services it produces are not homogenous but are characterised by a great deal of product differentiation and are sold in a multitude of location-specific submarkets. These submarkets are for demand for transport from point A to point B at a specific point in time and each submarket has different quality of service characteristics. This aspect has important implications when rail is no longer a monopoly provider of services in these many submarkets and is facing fierce competition from other transport providers. Rail in Indonesia is now facing competition in most of its submarkets from road and air transport providers that are able to operate much more flexibly and commercially than rail.

Impact of government policies

In practice, understanding and assessing the market for rail services is not straightforward and is not simply an issue of knowing its intrinsic strengths. In a market economy such as Indonesia's, where travellers and businesses can freely buy transport services in the market based on the prices of these services and the quality of their service, the outcome in the market (traffic volume and modal shares) is likely to be very different from what the inherent strengths of rail would suggest. This is mainly an outcome of government actions and policies.

Government has used different policy instruments to pursue its goals in the transport sector such as, for example: price regulation or deregulation; subsidies for infrastructure or for operations; entry regulation in the various modes and transport markets; fostering competition and private sector participation to increase efficiency; capacity limitations; and developing the human resources of the sector. Several of the current policies are a legacy of goals pursued in the past, or of issues that have been faced and may no longer be relevant or suitable under current conditions. Government may also be deficient in the pursuit of policy goals that are becoming increasingly relevant such as, for example, taking into account the differences in external costs caused by the different modes of transport. In the

final analysis, whether relevant or not, these policies collectively establish the framework in which transport sector firms operate and make investment decisions and in which businesses and passengers buy transport services. This policy framework has profound consequences for the capacity of rail to achieve its potential and cannot, therefore, be ignored when developing a Masterplan for rail.

Implications for Masterplan preparation

Given the above, the Masterplan has to address a number of key questions:

- what is the role of rail in the transport market and what transport tasks should rail be pursuing;
- will government policies change in the future in a way that will affect the transport markets; and
- what markets/submarkets for rail transport are worth pursuing.

These are important questions for the government (Ministry of Transport – MoT) which, as the manager of the overall transport sector, is responsible for developing a transport system that is providing transport for the economy at the lowest possible cost.[2] These are also critical questions for the rail company (PTKA) and, potentially under a multi-operator regime, for other rail service operators.

Thus, to effectively assess the market for rail services requires a sound understanding of:

- the efficiency of rail for different transport tasks compared to other modes;
- the impact of the government's transport sector policies on the performance of the rail system;
- the external costs of rail transport compared to road transport (as road is currently the main competitor of rail); and
- the way transport firms and buyers of transport services react to conditions in the transport market.

These issues will be explored in the following sections of this paper as a basis for formulating recommendations towards an effective approach for assessing the market for rail transport. First, an overview will be provided of the performance of rail in its main existing tasks and an exploration of potential new tasks. This will be followed by a brief examination of the comparative costs of rail and road transport and of government policies affecting the competitive position of the various modes of transport.

[2] The market assessment needs, therefore, to be conducted from the point of view of the interests of the economy, that is as part of the overarching goal of lowering the cost of transport for the economy. This is important as Indonesia is still characterised as a high-cost economy with transport being one of the contributing factors. The point of view of the rail company is quite different. Its main mandate is to engage in profitable transport activities; additionally it is required to perform noncommercial transport tasks for the government at fares that do not cover costs for which it receives compensation.

Chapter 2: THE PERFORMANCE OF RAIL IN THE TRANSPORT MARKETS

2.1 Main lines of business – a diverse range of transport tasks

Inspection of PTKA revenues in 2008 indicates that the rail company is operating essentially four lines of business: (i) Java main line passenger services; (ii) South Sumatra coal traffic; (iii) Jabotabek passenger services; and (iv) Java freight services (Table 1). These four top lines of business account for almost 90 percent of revenues. Of the remaining 11 percent of revenues, Java local passenger services account for 4 percent.

Table 1: PTKA Revenues Main Lines of Business 2008 (%)

Business Sector	Proportion
Java Main Line Passenger Services	45
South Sumatra Coal	27
Jabotabek Passenger Services	9
Java Freight	8
Java Local Passenger Services	4
Other	7
Total	100

In addition to these existing tasks performed by PTKA on Java and Sumatra, there may be a potential role for rail in the shipment of coal in Kalimantan. Thus, there is a limited but very diverse range of existing and potential rail transport tasks, each having its own specific market assessment requirements.

2.2 Main line passenger services in Java

Because of its high population density, the concentration of population in half a dozen major urban agglomerations and the distances between these agglomerations, Java has great potential for rail passenger services. These services currently represent more than 95 percent of all passenger traffic on the Indonesian railway network. An indication of the performance of the railway on the Java main line passenger services can be obtained by examining the growth in passenger kilometres. Whereas traffic has grown at a respectable rate over the last four years (in excess of 7 percent per year), when viewed over a longer term, traffic and other indicators give a mixed picture of the performance of the railway in this market segment.

When compared to the year 2000, passenger traffic has hardly grown in terms of the number of passenger trips and has declined in terms of passenger kilometres. Over the period 2000–2008 Java main line (intercity) passenger traffic declined considerably, particularly in the economy and business services, while the executive services were able to continue to grow modestly. Local services and urban services continued to grow – in part due to the introduction of local business and urban commercial services. Considered over a longer period (1981–2008), overall traffic growth was more respectable at 4.4 percent. However, inspection of the growth figures indicates that this was mainly achieved due to strong growth during the 1990's for most services (Table 2).

Table 2: Growth in Passenger Traffic in Java

Passenger km/year (million)					Growth/year (%)			
Sector	1981	1991	2000	2008	1981-2008	1981-1991	1991-2000	2000-2008
Executive	196	489	2,499	2,645	10.1	9.6	19.9	0.7
Business	790	1,440	3,266	2,279	4.0	6.2	9.5	-4.4
Economy	3,639	5,801	8,517	6,223	2.0	4.8	4.4	-3.8
Total Main Line	4,625	7,730	14,282	11,147	3.3	5.3	7.1	-3.1
Local Economy	314	701	1 ,438	2,207	7.5	8.4	8.3	5.5
Local Business	-	-	-	295	-	-	-	-
Total Local	314	701	1,438	2,502	8.0	8.4	8.3	7.2
Jabotabek Economy	621	788	3,164	3,085	6.1	2.4	16.7	-0.3
Jabotabek Economy AC	-	-	-	336	-	-	-	-
Jabotabek Commercial	-	-	-	538	-	-	-	-
Total Jabotabek	621	788	3,164[3]	3,959	7.1	2.4	16.7	2.8
Total Passengers	5,560	9,219	18,884	17,608	4.4	5.2	8.3	-0.9

It is noteworthy that in recent years PTKA appears to have been able to diversify its services and to attract higher yielding traffic on local and urban services. Indicators on yields and average distances for Java passenger services (Table 3) underline the fact that Executive services are probably the only profitable line of business and that PTKA has acted rationally in developing this business while paying less attention to economy services.

Table 3: Java Passenger Services Yields And Average Distance (2008)

Sector	Yield* (Rp/passenger/km)	Average distance (km)
Main Line Average	147	413
Executive	307	434
Business	188	389
Economy	64	414
Local Average	52	62
Business	137	67
Economy	41	62
Jabotabek Average	82	31
Commercial	250	37
Economy	43	30
Economy AC	167	32
Java Average	119	91

These developments during the last eight years and over a longer time frame require more in-depth analysis to better understand the shifts that have taken place in the passenger markets. It is particularly important to ascertain the impact of deregulation in the airline industry and the continuing aggressive performance of road services as well as the effectiveness of the response from rail. There is also a need to better understand the dramatic decline in practically all types of traffic from 2000 to 2004 (a reduction of 20

[3] *Note:* Yields do not include PSO payments.

percent in passenger numbers and 25 percent in passenger/km) and the nature of the recovery in the following years.

2.3 Jabotabek passenger services

Jabotabek passenger services account for 9 percent of total PTKA revenues (Table 1) and on the order of 13 percent of total revenues when Public Service Obligation (PSO) payments are included. Overall, Jabotabek traffic has grown steadily over the past 25 years at an average annual rate of about 7 percent (Table 2). Growth was strongest, however, during the 1990's at more than 15 percent. In subsequent years growth declined and has only recovered since 2004. Total economy passenger traffic on the Jabotabek network in 2008 was still below the level achieved in 2000.

PTKA was able to make up for the decline in economy services by introducing commercial services and economy AC which have much better yields (Table 3). When these developments in traffic are viewed in light of the yields of the different segments (commercial, economy AC and economy) it is again clear that PTKA has tended to act rationally by pursuing business that is profit-making. Yields of Jabotabek economy services at Rp 43/passenger/km for an average distance of 30 km are indeed very low and it is doubtful that PSO payments can bring these yields to a level where they fully cover operating costs.

2.4 South Sumatra coal traffic

South Sumatra coal traffic accounts for 27 percent of PTKA revenues (Table 1) and for more than 91 percent of the South Sumatra freight traffic revenues (Table 4). The South Sumatra railway network carries two coal movements. The main one is supplying the Suralaya power plant in West Java. Coal is moved from the minehead at Tanjung Enim to the loading terminal at Tarahan on the southeastern tip of Sumatra, a distance of 410 km, from where it is carried by vessel to the unloading facilities near the Suralaya power plant. The second movement is from the minehead north to Kertapati near Palembang from where the coal is mostly shipped for export. Some 8.5 million tons of coal was transported to Tarahan in 2008 while 2 million tons was transported to Kertapati.

Table 4: South Sumatra Freight Revenue

Type of Freight	Proportion (%)
Suralaya Coal	81.7
Other Coal	9.7
Petroleum Products	5.4
Other	2.2
Cement/Clinker	1.0
Total	100.0

Traffic has grown from 5.1 million tonnes in 1991 to 10.5 million tonnes in 2008, an average annual growth of 4.4 percent (Table 5). This has been achieved through various capacity development investments in the infrastructure and rolling stock including a program to increase the number and length of the passing loops and signalisation investments. These rail investments are only one part of the total logistics chain which includes: loading facilities at the minehead, the rail infrastructure and rolling stock, the train unloading and vessel loading facilities at the port of Tarahan, and the maritime transport between the loading port and the port at the power plant.

Over the years, coal production and volumes transported over the two routes have tended to be below annual targets. When coal production and deliveries to clients are being stepped up, all the elements in the transportation chain need to be developed in a synchronised manner so as to ensure that capacity is adequate overall and that there are no bottlenecks in individual elements of the transportation chain. At times there have been capacity constraints in individual elements, such as at the train loading and unloading facilities which are owned by the mining company. This has necessitated a higher number of wagons than would have been the case with more efficient facilities. When such capacity issues have arisen, the mining company and the train operator have tended to blame each other for the inability of the system to carry the targeted volumes. This underlines the importance of having clear agreements between the mining company and the infrastructure and train operators on operations and production and transportation targets and a mechanism for quickly identifying and correcting issues when they arise. This is particularly important when coal production is being increased substantially, as currently appears to be the case in response to domestic and international demand for coal and several alternative transportation chains are being promoted by various parties (Section 2.6.1 below).

Table 5: South Sumatra Coal Traffic

Traffic	1991	2008	Growth in Traffic[4] (%)
Suralaya Coal			
Tonnes ('000)	4,172	8,480	4.3
Tonne/km (millions)	1,722	3,472	4.2
Revenue (millions of Rp)	54,604	867,008	
Kertapati Coal			
Tonnes ('000)	916	2,023	4.8
Tonne/km (millions)	151	328	4.7
Revenue (millions of Rp)	5,344	102,817	
Total			
Tonnes (000)	**5,088**	**10,503**	**4.4**
Tonne/km (millions)	**1,873**	**3,800**	**4.2**
Revenue (millions of Rp)	**59,948**	**969,825**	
Average yield (Rp/tonne/km)			
Suralaya Coal	32	250	n.a.
Kertapati Coal	35	313	n.a.
Average haul (km)			
Suralaya Coal	413	409	n.a.
Kertapati Coal	165	162	n.a.

2.5 Freight traffic in Java

Java freight traffic accounts for 8 percent of PTKA revenues (Table 1). Freight traffic on Java was steadily growing till 1996 when a peak was reached (Table 6). Some traffic such as cattle, steel and cane pulp appear to have ceased and fertiliser traffic has declined to a negligible volume. Since 1999 total traffic declined at an average annual rate of 0.8 percent. PTKA has developed some new activities such as express services which have longer hauling distances and which are not shown in Table 6.

[4] *Note:* Growth is only shown for tonnes and tonnes/km. following the unprecedented inflation between 1991 and 2008 growth in revenue and in average yield is not a meaningful indicator.

Table 6: Growth in Freight Traffic in Java[5]

	Tonnes km/year ('000)					% Change/year				
Type of Freight	1981	1991	1996	1999	2008	1981-1991	1991-1999	1999-2008	1981-2008	1996-2008
Petroleum	118,000	137,000	223,469	291,217	278,028	1.5	9.9	-0.5	3.2	1.8
International Containers	80,000	54,000	129,580	111,768	124,086	-3.9	9.5	1.2	1.6	-0.4
Coal	75,000	152,000	156,833	95,755	74,828	7.3	-5.6	-2.7	0.0	-6.0
Cement		145,000	228,559	137,184	65,695		-0.7	-7.9		-9.9
Fertiliser		236,000	135,848	72,159	769		-13.8	-39.6		-35.0
Domestic Containers			82,131	190,534	204,653			0.8		7.9
Parcels			189,893	159,596	95,100			-5.6		-5.6
Cattle			41,436	52,756				-100.0		
Quartz			64,076	42,913	8,100			-16.9		-15.8
Steel		111,000	140,183	34,430			-13.6	-100.0		
Cane Pulp			2,397							
Others	339,000	308,000	44,267	10,542	263,662	-1.0	-34.4	43.0	-0.9	16.0
Total	**612,000**	**1,143,000**	**1,438,672**	**1,198,854**	**1,114,921**	**6.4**	**0.6**	**-0.8**	**2.2**	**-2.1**

Inspection of the volumes, the yields and hauling distances (Table 7) suggests that very little traffic, with the exception of petroleum products, is likely to have a future in terms of contributing to their capital costs. This, of course, needs to be investigated further and informed through traffic-costing analyses. Should the traffic-costing analysis indicate that certain products are not covering their avoidable operating costs, PTKA – given its mission to earn a return on capital – should feel free to develop an immediate exit strategy. For those tasks that provide some contribution to their capital costs and infrastructure costs PTKA should feel free to contemplate an exit strategy when capital required for these tasks is up for replacement. The need to carefully carry out traffic-costing analyses followed by development of exit strategies for tasks that do not cover operating and capital costs are also very relevant for South Sumatra freight services (Table 8).

[5] *Note:* Except for the year 2008 for which data were available from PTKA, this table has been put together from different secondary sources with the main purpose of showing the long-term evolution of traffic. When available in the secondary sources, movements by commodity are also shown. Many cells are blank, *inter alia*, because traffic composition has changed over time and small movements were consolidated in the "others" category in the secondary sources.

Table 7: Java Freight Services Yields And Average Distance (2008)

Type of Freight	Yield (Rp/tonne/km)	Average distance (km)
Average Negotiated	**319**	**209**
Petroleum	553	140
Fertiliser	227	110
Cement/clinker	193	229
Coal	130	177
Antaboga container	110	721
Average Non-negotiated	**171**	**367**
Container	131	465
Quartz sand	160	279
B.C. [6]	137	705
B.H.P. [7]	993	578
Others	139	293
Overall Average	**254**	**258**

Note: The overall average for yield is a weighted average calculated by dividing the total revenue by the total number of tonnes/km. Average distance is calculated by dividing total tonnes/km by number of tonnes.

Table 8: South Sumatra Freight Services Yields And Average Distance (2008)

Type of Freight	Yield (Rp/tonne/km)	Average distance (km)
Average Negotiated	**262**	**351**
Petroleum	542	232
Fertiliser	156	307
Cement/clinker	192	172
Coal	313	162
Suralaya coal	250	409
Average Non-negotiated	**151**	**231**
Sugar	201	463
Tapioca	191	439
Rubber	216	305
Rice	210	480
Others	150	230
Overall Average	**258**	**345**

Note: The overall average for yield is a weighted average calculated by dividing the total revenue by the total number of tonnes/km. Average distance is calculated by dividing total tonnes/km by number of tonnes.

2.6 New railway lines

2.6.1 South Sumatra

There have been several proposals and plans at various times for massive increases in South Sumatra coal production and associated increases in the capacity of the existing logistics chain and/or development of alternative shipment routes. One such scheme involves the construction of a new rail line, some 85 kilometres in length, from a point on the existing line to Kertapati and development of a deepwater port at Tanjung Api Api, on the southern bank of the Banyuasin River, about 80 kilometres north of Palembang. The new port would be able to accommodate ships as large as 120,000 deadweight tonnes (DWT) which would make it suitable for export of large quantities of coal to major users in Japan or elsewhere in the world. The project would also require the construction of a large bridge across the Musi

[6] B.C. stands for *barang cepat* (express service for perishable goods).
[7] B.H.P stands for *barang hantaran penumpang* (goods checked in by passengers).

River. The scheme would require a volume of at least 10 million tonnes of coal in the first year of operation, increasing to 20 million tonnes, to guarantee its viability.[8]

Given the scope for increasing the capacity of the existing routes by several million tonnes/year, the financing of any major investment in a new transportation chain would require firm purchase commitments for at least 10 million tonnes of additional coal production. Clearly, the feasibility of such schemes is very much contingent on developments in supply and demand for various qualities of coal in the international coal market and the ability of the coal mining company (in this case PT Tambang Batubara Bukit Assam) to obtain purchase commitments for the required volumes. In the past, the lack of such commitments has been the main obstacle to major new capacity increases in the transportation chain.

This scheme, as well as several other schemes for railway lines serving mine sites that have been proposed or are under investigation in Sumatra, underlines the fact that rail is but one element of an overall investment scheme aimed at developing coal production in response to growth in the market. In other words, the rail line as well as the port and the bridge are integral parts of a coal mining project and their financing should be seen as forming an integral part of the coal development scheme.

2.6.2 Kalimantan

The question of the potential role for new coal lines is also very relevant in Kalimantan, where coal production has increased from 60 million tonnes in 1999 to more than 200 million tonnes in 2008. This production is transported by road or a combination of road and river barge to coastal terminals or offshore transshipment points, from where it is exported to Java and overseas markets. Until now, mining has been concentrated at concessions located relatively close to coastal areas or in the proximity of navigable rivers. With strong international demand and a concomitant increase in the price of coal, mining concessions that are further inland become viable.

The logistics chain from the minehead to a maritime loading terminal or offshore loading point is an integral part of the assessment of the viability of such mining concessions. The logistics chain is also the financial responsibility of the investor in the coal mine. With longer hauling distances from the mine to an ocean or river transshipment point, as well as greater production volumes, rail transport may become a competitive option or a lowest cost alternative for the transfer of coal from mining concessions located further inland.

There have also been a number of proposals for coal railway lines in Kalimantan but studies have tended to go no further than the prefeasibility stage. As is the case with proposals for new coal railway lines in Sumatra, rail is only one element in the total coal transport logistics chain, the development of which involves many elements and actors. Given the scale of current production levels in Kalimantan and anticipated further increases, the question could be raised why rail has so far not played any role in the coal transportation infrastructure. There appear to be three main reasons. First, transport distances: it has been possible so far to develop mines that are located close to coastal terminals and offshore transshipment points at distances where trucking or trucking and barging has been possible.

[8] According to news reports, South Sumatra Province is also understood to be promoting a new railway line from the Bukit Assam mine to the port of Lampung in Southern Sumatra – a distance of 300 kilometers. Construction of this line would enable PT. Bukit Assam to increase production by 20 million tonnes/year.

Second, firm off-take commitments: the ability to finance a major investment such as a railway line requires that a minimum volume and revenue be guaranteed and this has proven difficult given the need for cooperation between several mining companies that are not naturally inclined to cooperate. Finally, coordination between elements of the logistics chain: the logistics chain comprising transshipment facilities, roads, possibly railways, river ports, storage areas, barge transport, and possibly dredging, can only deliver when all elements have the required minimum capacity and this poses formidable challenges of coordination between the various public and private actors involved. This poses the question of the role of MoT and DGR in facilitating the realisation of least-cost outcomes. There is a clear need for a capacity to review and evaluate the different schemes being put forward and to facilitate the realisation of those that will contribute to maximising the contribution of the mining sector to the welfare of the nation without requiring any public funds.

2.7 Conclusions

The above rapid overview of the main rail transport tasks was not aimed at assessing the market share of rail in the transport markets. However, the fact that rail transport has been growing at a slower rate than the transport market as a whole indicates that rail has lost market share to competing modes; to road and air for passenger transport and to road for freight transport. This relates not only to the total market but also in some key interregional freight and passenger markets. In developing plans for the future of rail it is therefore important to better understand why these developments have taken place to ensure that any investments undertaken will directly support the future development of rail transport.

The performance of rail is the result of many factors, including: (i) its inherent advantages for particular tasks; (ii) government policies affecting its position compared to other modes; and (iii) the effectiveness of the strategies and policies pursued by the rail and train operators in other modes as they are confronted by changes in the structure and location of production, consumption and trade in the country and the world at large.

Transport is an integrated part of the way economies produce and consume, while technological advances in transport also have an impact on patterns of production, human settlement and consumption. Companies locate themselves in places where they have access to the resources they need (energy, labour, communications, space, and transport). Transport costs now constitute a smaller share of the total production and distribution costs than in earlier periods. Ease of access and time in transit factors play a much greater role in decisions on location and choice of mode. These developments tend to favour road when compared to rail as for most industries and businesses proximity to rail is no longer a key location factor. Road transport is inherently more flexible than rail transport, and can therefore adapt much faster to changes in manufacturing locations. Just-in-time logistics practices now drive many business decisions and minimisation of nominal transport costs is receiving lower priority.

Similarly, in regard to passenger transport, technological changes have brought about profound transformations in the spatial dispersion of human settlement and travel patterns. Trends over time in the performance of rail, in particular of freight transport, can be better understood when seen against the background of these developments. Clearly, when assessing the role of rail it is critical to have a good understanding of its strengths compared to other modes and to road in particular. This question will be explored in the following section.

Chapter 3: COST COMPARISON OF ROAD AND RAIL

To obtain a broad preliminary indication of the kind of transport tasks for which rail is well-suited, transport costs for general freight are compared between rail and road. In this regard, it is important to select scenarios that are representative of the kind of situations that are encountered in real life. A critical factor is whether or not there is an existing basic infrastructure. Accordingly, the most relevant situations with which decision makers are confronted are likely to be the following:

- no existing infrastructure for rail or for road;
- no existing infrastructure for rail and existing infrastructure for road; or
- existing infrastructure for rail and existing infrastructure for road.

Advantages of rail for freight transport

Rail is generally known to have a cost advantage over road for transporting large volumes over long distances. To obtain a better insight into what large volumes and long distances exactly mean in the Indonesian context, the comparative costs of rail and road transport are examined under different scenarios of cargo volumes and haul distances. The main assumptions are as shown in Table 9.

Table 9: Economic Costs of Rail and Road Freight Transport (Main Assumptions)

Factor	Assumption
Cargo volume alternatives	1 million tonnes/year 3 million tonnes/year 5 million tonnes/year
Haul distance alternatives	250 km 500 km
Cost of capital	4%
Rail	
Origin and destination alternatives	Siding to siding (short feeder rail track at origin and destination) Pickup and delivery cost of Rp 50,000/tonne
Construction cost of new line	Rp 20 billion/km
Cost of line rehabilitation	Rp 4 billion/km
Average infrastructure maintenance cost	Rp 150 million/km/year (1 million tonnes) Rp 200 million/km/year (3 million tonnes) Rp 250 million/km/year (5 million tonnes)
Avoidable operating cost	Rp 300 tonnes/km
Road	
Cost of new road	Rp 6 billion/km (1 million tonnes) Rp 7.5 billion/km (3 million tonnes) Rp 9 billion/km (5 million tonnes)
Average annual maintenance cost	Rp 200 million/year Rp 250 million/year Rp 300 million/year
Truck operating cost	Rp 400/tonne/km

The above cost assumptions are order-of-magnitude averages for a general freight railway in terrain conditions that are not unusually challenging and for the kind of cargo for which rail and road are competing. They are intended to reflect the relative costs of rail and road transport within the indicated range of traffic volume. The assumptions are not representative of the costs of a heavy duty rail line dedicated to hauling mining products

from minehead to a power plant or transshipment point. Construction costs of a high standard mining rail line in difficult terrain could be as high as US$ 10 million/km or higher, while avoidable operating costs on such a line could be as low as Rp 150/tonne/km depending on volumes, terrain, and standards (in particular axle loads) of the rail infrastructure.

A critical factor affecting the costs of freight transport by rail is whether the cargo is moving from siding to siding (that is when the origin and destination of the cargo is located along a short spur rail track connected to a main line) or whether there is a need for pickup and delivery at origin and destination. Hence, in the case of rail transport, it is necessary to examine the situation where the origin and the destination is on a railway siding and the alternative where there is a need for a pickup and delivery of the cargo by road transport. Another critical factor is the cargo volume as this affects the annual depreciation cost of the investment. Hence the analysis will examine the costs under three different assumptions of cargo volume.

Scenario analysis relating to cargo volume and haul distance

3.1.1 The impact of cargo volume and origin and destination costs

Case 1 – 500 km hauling distance – no rail and no road infrastructure

In the base case scenario where there is neither an existing road nor rail infrastructure and the transport by rail is from siding to siding over a hauling distance of 500 km, road is more economical for the transport of 1 million tonnes/year (Rp 1,040 tonne/km compared to Rp 1,380 tonne/km for rail) and comparable for the transport of 3 million tonnes (Rp 670/tonne/km compared to Rp 675/tonne/km). However, rail is lower cost at a volume of 5 million tonnes/year (Rp 535/tonne/km compared to Rp 590/tonne/km).

Case 2 – 500 km hauling distance – no rail but existing road

If it is assumed that there is an existing road but no rail infrastructure, road is lower cost even for a volume of up to 5 million tonnes. Rail transport is only able to compete on cost when rail infrastructure is also available and does not need to be rehabilitated; but a volume of 1 million tonnes is needed for rail (with existing infrastructure) to be lower cost than road (also with existing infrastructure).

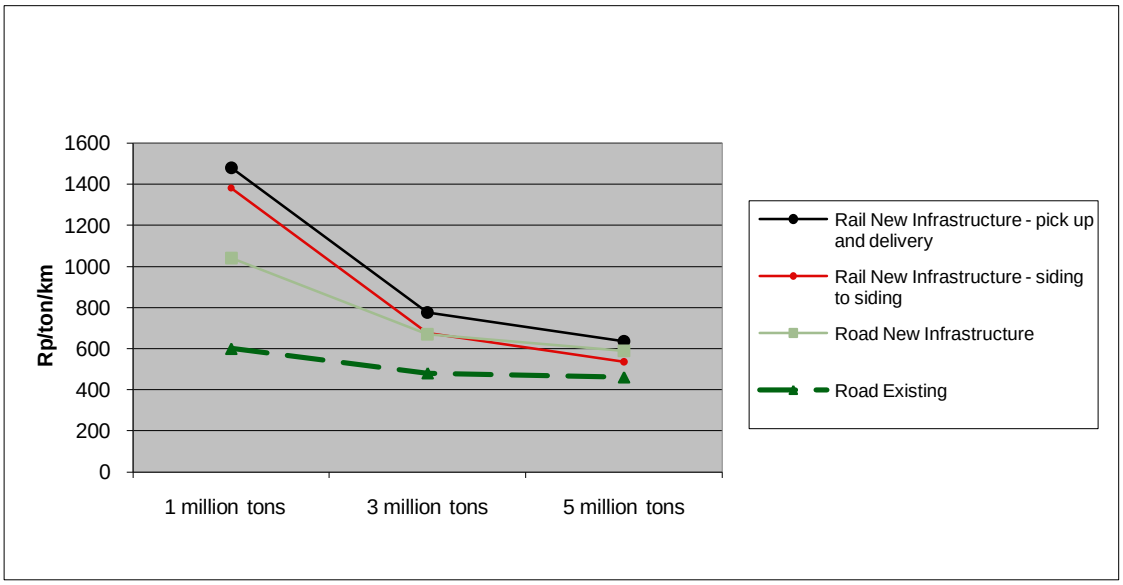
Case 3 – Same as Case 1 but rail pickup and delivery costs

When rail pickup and delivery costs are included in the comparison, the road transport alternative is lowest cost even at a volume of 5 million tonnes (Rp 590/tonne/km compared to Rp 635/tonne/km). These results are summarised in Table 10 and Figure 1 below.

Table 10: Five Hundred Kilometre Haul - Siding to Siding Versus Origin and Destination Costs (Rp/tonne/km)

Alternative Cases	1 million tonnes	3 million tonnes	5 million tonnes
Rail New Infrastructure - pickup and delivery	1,480	775	635
Rail New Infrastructure - siding to siding	1,380	675	535
Road New Infrastructure	1,040	670	590
Road Existing	600	480	460

Figure 1: Five Hundred Kilometre Haul – Siding to Siding Versus Pickup And Delivery Costs



3.1.2 The Impact of hauling distance

Case 4 – 250 km hauling distance, siding to siding versus pickup and delivery costs

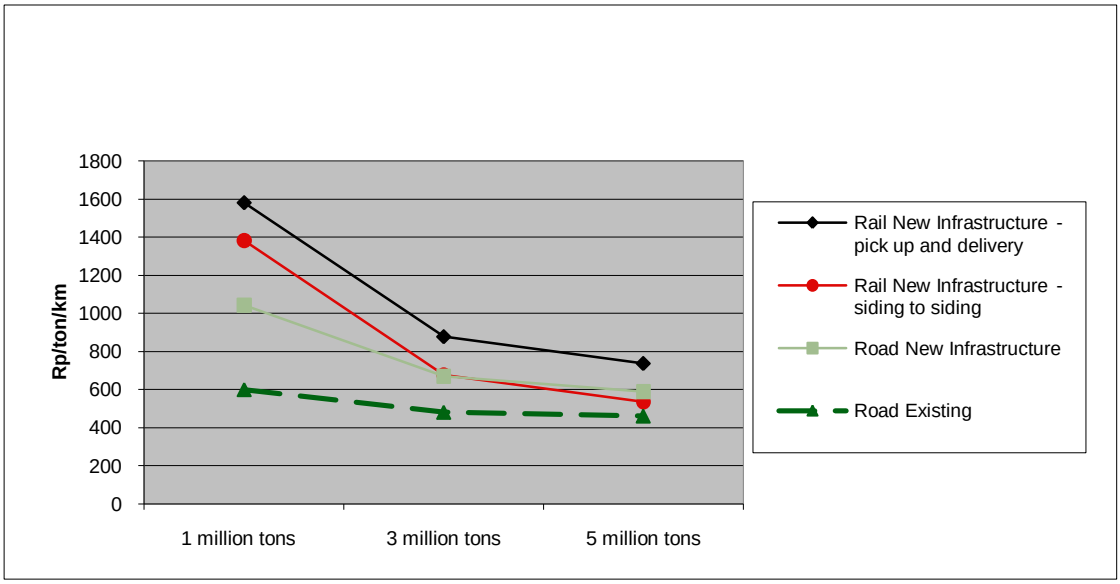
In the case of a haul distance of 250 km, the Rp 50,000 pickup and delivery cost translates to an additional cost of Rp 200 per tonne/km – a severe penalty imposed on rail. The result is that road is lower cost even at a volume of 5 million tonnes whether there is an existing infrastructure or not. Rail only becomes competitive with road when there is an existing rail infrastructure that can be rehabilitated and there is no road infrastructure. This is an unlikely situation in Indonesia today.

A haul distance of 250 km is probably representative as an average for Indonesia. In 2008 the average length of haul in Java was 258 km. For PTKA as a whole it was 280 km but this outcome is largely the effect of an average haul of 410 km for the Suralaya coal which distorts the total. The chart in **Annexe 1** shows the impact of length of haul on the market share of rail for different cargos in the USA. The impact of length of haul is summarised in Table 11 and Figure 2 below.

Table 11: Two Hundred and Fifty Kilometre Haul - Siding to Siding Versus Origin and Destination Costs (Rp/tonne/km)

Alternative Cases	1 million tonnes	3 million tonnes	5 million tonnes
Rail New Infrastructure - pickup and delivery	1,580	875	735
Rail New Infrastructure - siding to siding	1,380	675	535
Road New Infrastructure	1,040	670	590
Road Existing	600	480	460

Figure 2: Two Hundred and Fifty Kilometre Haul - Siding to Siding Versus Pickup And Delivery Costs



3.1.3 Summary

These findings under simplified assumptions and scenarios are intended to give an order of magnitude estimate of the resource costs for the economy of transport by rail and by road and to provide an indication of which mode is more advantageous from the economic point of view for different volume ranges and hauling distances.

For movements over a distance of 500 kilometres where there is no rail line and no road infrastructure, and rail transport is from siding to siding, road transport is more economical for a volume of up to 3 million tonnes/year. Rail is more economical at volumes of 5 million tonnes/year. When there is an existing road, road is more economical for a volume in excess of 5 million tonnes/year. When there are origin and destination costs for rail movements, road is more economical even at a volume of 5 million tonnes/year. This is even more so for movements over a distance of 250 km which involve pickup and delivery charges. A similar scenario analysis could be conducted for passenger services.

Lack of consistency between comparative costs and outcome in the market

The review of the performance of freight services in Java (and South Sumatra) found that for most cargos the volumes carried by rail are well below the identified thresholds where rail has the advantage (with a few exceptions such as Suralaya coal and petroleum products). The question can therefore be asked why the railway is carrying this traffic. The answer is, in

part, that infrastructure costs which form a large component of transport costs are not reflected in the tariffs paid by the shippers. This is because infrastructure costs are not recovered through access charges from the rail operator or through user charges from road operators[9] (Section 4.1). Rail and road are therefore competing on the basis mainly of the operating costs of the rail operators. It is also possible that the railway, because it is not actively engaged on traffic costing analyses, is not fully aware of the fact that most of the low-volume, low-yield traffic may not be covering even their avoidable operating costs. These factors cause the outcome in the market (which mode is carrying which traffic) to be different from what the total relative economic costs would dictate.

Furthermore, road and rail are not only competing on price but also on quality of the service provided. This means, inter alia, that rail has to compensate for the disadvantages it faces, such as the pickup and delivery charge when the transport is not from siding to siding and generally for a longer time in transit and a less reliable service as compared to road. With the advent of just-in-time manufacturing, the quality of service aspect has become increasingly important in the market for general cargo that is time sensitive. It follows that government, when making investment decisions, has to be well-informed about the impact of its policies in the transport market and to have a good appreciation of the kind of quality of service features that are appreciated by shippers.

Likewise, the brief discussion of the potential role of rail in the movement of coal production in Kalimantan noted that large volumes of coal are being hauled by road to river ports or to coastal transshipment points while the comparative costing suggests that rail would be lower cost. This raises the question of what needs to be done to ensure that the cost advantages of rail when they are present for particular transport tasks are fully exploited for the benefit of the economy.

How to ensure that the cost advantages of rail are exploited

Since the buyers of transport services ultimately decide in the market which mode they favour for their transport needs, the key to exploiting the advantages of rail has two dimensions. First, at the time of the investment decision and, second, at the level of transport sector policies. When investments in capacity expansion of rail or in new rail lines are being considered, it is critical that rail is only selected for transport tasks where it is effectively superior to road. The above indicative comparative cost estimates point to the kind of in-depth analysis needed during the preparation of the Railway Masterplan (RMP) in respect of proposals for investment in new railway lines or in capacity expansion of existing lines, and for proposals for replacement of assets used for existing traffic that do not cover their full operating costs. But knowledge of the cost advantages of rail for particular transport tasks and development of rail capacity for these tasks does not automatically ensure that rail will be favoured for these tasks in the transport market. This has much to do with transport sector policies, which should be such that the relative costs of the modes are reflected as much as possible in the transport rates. This point will be examined in the following section.

[9] In addition, from an economic point of view, road transport is benefiting from a fuel subsidy as pump prices are below the economic cost of fuel (Section 4.1).

Chapter 4: SECTOR POLICIES CONSISTENT WITH THE ADVANTAGES OF RAIL

The previous section suggested that transport sector policies have not been conducive to ensuring that rail is playing its proper role in the transport market. In other words, that in part because of inappropriate sector policies, the outcome in the market is not in agreement with the comparative costs of rail and road. Clearly, development of a rail Masterplan cannot ignore the impact of sector policies on the competitive condition of the various transport modes in the market and cannot escape the question whether sector policies are likely to change during the time frame of the Masterplan.

Sector policies impacting on the outcome in the market

Several transport sector policies have had an impact on the role the railway has come to play in the Indonesian transport sector in the past few decades.

4.1.1 Price regulation

Following an era characterised by stringent regulation, since the mid-1980's there has been a gradual move towards price deregulation. Operators in the different modes are now free to set prices for freight and for commercial passenger services. The government has, however, continued to regulate the prices of economy passenger services on socio-economic grounds. But except for rail economy fares, price regulation is not strictly enforced and operators deviate from the regulated fares when they are out of line with costs.

4.1.2 Subsidies for economy rail passenger services

The policy of controlling fares of economy rail passenger services to levels that do not cover costs, combined with the policy of transforming the railway into a commercial enterprise driven by the profit motive, has resulted in the need to compensate the railway for the shortfall in revenue. Price regulation of economy passenger services was initially achieved through various budgetary transfers and in-kind contributions (by way of rolling stock, spare parts or other facilities). Since the early 2000's it has become more formalised in the form of a PSO compensation mechanism. This mechanism, however, has not yet been fully implemented in accordance with its original design.

4.1.3 Capacity limitations for economy rail passenger services

The above pricing and subsidy policies have resulted in capacity of economy services being inadequate to meet demand being expressed at the controlled prices.

4.1.4 Market entry

In this area, a relatively open regime has been established for all modes, except so far for railway transport. However, Law No. 23/2007 on Railways opens the possibility of new operators entering the rail sector. In the aviation sector the very liberal market entry regime is now being tightened on safety grounds with the setting of higher standards for the approval of operating licences.

4.1.5 Infrastructure charging

Despite policy statements and good intentions to charge train operators for the use of the infrastructure and the wear and tear caused, de facto policies have hardly changed. The result is a regime where, in most situations, the initial investment in infrastructure is not being recovered and where even the variable or marginal cost of infrastructure use (the maintenance cost) is only being partially recovered.

The above issue is particularly serious for road transport in Indonesia as a result of fuel pricing policies. Most countries have traditionally used the fuel tax as the instrument of choice for charging road users for the cost of road use. However, Indonesia's fuel pricing policies (motivated largely on social grounds), have resulted in pump prices below the economic cost[10] and have frustrated the stated policy of charging for infrastructure use. When the pump price of fuels is below its economic cost, road transport is in effect contributing very little or may be enjoying a subsidy when the difference between the pump price and the economic cost is significant.

4.1.6 Relationship between government and the rail company

In the course of the past 20 years, the rail system has transitioned through the various stages of ownership, from state-owned enterprise, to government agency, a government enterprise without profit motive, to a state-owned limited liability company operating commercial services for profit and being compensated for noncommercial services that are not covering their costs. However, neither the train operating company nor the MoT have fully adjusted to the requirements and modus operandi deriving from PT Kereta Api's current status as a profit-driven limited liability company. Several aspects of approaches and practices in the areas of accounting, traffic costing, tariffication, decisions to continue serving certain loss-making traffic, new investment and infrastructure maintenance are a legacy of a previous era in the relationship between government and the train operator.

4.1.7 Policies motivated by external costs of transport

Until now, the GoI has not explicitly invoked external costs or differences in external costs between the various transport modes to justify subsidies for a particular mode or the imposition of charges on a mode. External costs are the negative impacts of transport – the costs to society – that are not included in the price paid for transport services by the traveller or the shipper of cargo. These negative impacts are more pronounced with road transport than with rail and waterborne transport and include congestion, accidents, air pollution, generation of greenhouse gases contributing to climate change, and noise pollution. The impacts of these factors are less easily quantifiable than the economic costs of transport services which can be estimated on the basis of the costs of the constituent inputs for which there are prices in the market. However, estimates have been made of the external costs by various institutions and organisations in the world and there is increasing awareness, including in Indonesia, of some of the negative impacts of transport, in particular the environmental impacts. Several countries have made a commitment to begin taking into account the external costs of transport in their transport policies and it would be opportune for Indonesia to also begin looking into this matter.

Recent studies in Europe assessing the impacts of the external costs and valuing these impacts conclude that: (i) efficiency improvements in rail operations will likely have a greater

[10] Economic cost is defined as the international border price plus transport and distribution costs.

impact on an improvement in the modal share of rail than the levying of charges on road transport to reflect the higher external costs in the tariffs; and (ii) the upper limit for the increase in cost per vehicle/km on account of charging for external costs would be of the order of 25 percent.

If the assumption of a 25 percent increase in trucking costs is used in the case of Indonesia, the corresponding increase would be of the order of Rp 1,000 tonne/km. For illustrative purposes, the implications of such an increase on the comparative total costs of road and rail for different scenarios of annual freight volume and hauling distances have been examined (**Annexe 2,** which discusses the issue of external costs in greater detail). Some particular implications are as follows:

- for hauling distances of 500 km, when the transport is siding to siding, rail is now clearly lower cost than road at a volume of 3 million tonnes;
- when rail transport involves origin and destination costs, the cost of rail becomes comparable to road at 3 million tonnes; and
- for hauling distances of 250 km, rail is lower cost when the transport is siding to siding at 3 million tonnes.

Impact of policies on modal shares

The policies relating to infrastructure charging, fuel pricing, subsidisation of noncommercial services and the legacy of the past relationship between the railway and government are estimated to have had a marked impact on the relative performance of rail and road in terms of market shares in a number of markets. In particular, road may have gained a larger market share than it deserves for certain tasks where rail has a good potential.

For certain medium-distance bulk traffic (over 250 km) of relatively large quantities, road transport has been able to compete by offering very low rates made possible by severe overloading – as much as 60 percent of the payload. With these practices, road transport is causing heavy damage to the road system for which it is not paying. It is, in effect, receiving an indirect subsidy in its competition with rail transport. In other words, there is no level playing field in the competition between the modes.

In the market for long-distance passenger travel, air transport may also have enjoyed some measure of advantage in that domestic air travel is not charged the full cost of the aviation sector infrastructure (airports, air traffic control at airports and navigation services) and, until recently, air transport operators have been allowed to operate to unsatisfactory safety standards and requirements and hence at lower costs than would otherwise have been the case.

Not all shifts in modal shares can be ascribed to distortions in the level playing field between rail and competing modes. The railway has sometimes been slow to react to changing requirements in the marketplace for transport. When it has attempted to offer an all-inclusive door-to-door service in association with private sector market players it may not have found the right formula or the right partner. In defense of the train operator, as a state-owned company it does not always have the same flexibility in the market as private sector players.

Bringing about a level playing field for rail

Because decisions on transport are now made freely in the transport market by travellers, commuters and shippers, the most effective way of ensuring that cost and other advantages

of rail (the lower external costs) are taken into account is to reflect them in the price of transport, that is in the passenger fares and cargo tariffs. This means that pricing is the instrument of choice through which to achieve the desired outcome. To avoid any distortion in the level playing field for the use of infrastructure between the different modes, the preferred approach is to charge all modes for their respective infrastructure costs or, at least, to charge the variable cost of use. This has been the GoI's stated policy for two decades but has proved difficult to implement.

In regard to the goal of ensuring that the superiority of rail in terms of lower external costs is recognised by the market, pricing is also the preferred approach. This can be achieved through the imposition of differential charges on each mode that represent (the value society/the government places on) the negative impacts caused by each mode. Thus, for example, the charge levied on road operators to reflect the cost to society of external costs would include an element representing CO_2 emissions.

For commercial passenger services and for freight, this approach is considered superior to an alternative consisting of providing compensatory subsidies to the mode which is favoured for one reason or another. While pricing is not the perfect tool, it has fewer drawbacks than subsidies. Subsidies to a particular mode do not guarantee that the businesses and passengers will buy more of the services being subsidised. Subsidies may also generate too much demand, creating other distortions in the market and becoming financially unsustainable. They also tend to become permanent and difficult to end when no longer justified. For economy services (intercity or commuter) the pricing mechanism is not suitable if government continues with its policy of controlling prices at levels that do not cover costs. Other options are, however, available for achieving the desired outcome.

This still leaves open the question of which factors are considered important and how they should be valued. This is, to a large extent, a question of political economy that has to be decided following consultations and debate between the different stakeholders involved. As discussed below, a first important step to initiate this debate consists of assembling the facts and presenting them for review by the stakeholders.

Will government policies change in the future?

The foregoing brief discussion underlines the fact that changes in government pricing and other policies affecting conditions in the market can have a marked impact on traffic carried by rail and other modes and hence on the capacity and investment requirements of the railway sector. In developing forecasts it will be important to evaluate what these implications would be compared to a status quo policy for the foreseeable future. It will also be important to develop assumptions as to the level of support that is likely to be provided by GoI for economy services which the railway has to provide at fares that do not cover costs.

Chapter 5: IMPLICATIONS FOR DEMAND FORECASTS AND MASTERPLAN DEVELOPMENT

The implications are different for each of the main lines of business discussed above and, for each of these, the main points will be highlighted in the following.

Java passenger services

5.1.1 Choice of demand forecasting approach

A main point emerging from the preliminary findings on the performance of passenger services is that while macro factors, such as population and incomes and growth in these factors are important in establishing the potential – or the upper limit – for future demand for passenger services, micro factors will be of much greater importance in determining future demand for rail services. Such factors include: (i) developments in relative prices and quality of service of door-to-door services by the competing modes; (ii) government pricing and subsidy policies; (iii) actions by competing modes/operators in the transport markets; and (iv) in the long term the changing patterns of housing settlements and road infrastructure development. The interactions between these various factors will also influence the outcome.

This point has implications for the kind of demand forecasting approach that is most appropriate, a multimodal modelling approach or a micro approach focused on the relevant rail markets. The preliminary findings strongly suggest that the multimodal approach is not well-suited to model the interactions and dynamics in the markets in which rail is competing, in particular in the case where rail represents only a small percentage of total transport activity. In contrast, an approach focused on analysing the specifics in these markets, including the origins and destinations of traffic, as well as elasticity measures will provide greater accuracy.

The multimodal approach also has other limitations, which are applicable in the current situation in Indonesia, including:

- *Need for detailed Origin and Destination (O-D) data.* The calibration of multimodal models requires detailed and comprehensive origin and destination information on all trips made, preferably from household survey data. Such data is not available from past O-D surveys in Indonesia. This is partly because these have been carried out separately for the different modes and have not been well-integrated in a countrywide O-D matrix covering all modes. In this regard, consideration should be given to examining how future O-D surveys can be better designed for demand forecasting purposes (**Annexe 3**).
- *Cost*. The comprehensive and detailed data requirements of the multimodal models mean that they are more costly to design and maintain.

Thus, given the nature of the forecasting requirements and the data availability, it is recommended that the further development of the Railway Masterplan not be based on forecasting railway demand using multimodal models that first estimate overall demand for transport and then move on to forecast the modal split based on factors affecting travel decisions.

Rather, forecasting on the basis of relationships between the observed demand for transport and explanatory variables such as developments in the income of particular segments of the travelling public, prices and service characteristics product-by-product is to be preferred. This has to be done in close cooperation with PTKA, because the train operator has developed a good understanding of the market as evidenced by its successful product differentiation of passenger services. The train operator also has detailed data on the origins and destinations, station by station, of passenger movements.

5.1.2 Demand forecasting focus

In general, railway traffic forecasts are needed for the planning of investments at three levels:

- at the level of a facility or an individual component or asset in the system, either existing or new, in order to determine the size or scale of the needed capacity;
- at the level of a transport corridor (or transport corridors), when the forecast is needed for the sizing of the many components making up the capacity of the corridor; and
- at the strategic level of a major part of the system or the whole system, to determine the capacity requirements and viability of alternative capacity development scenarios and the demand for capacity of related individual components.

It is recommended that at this juncture the forecasting be focused at the facility and corridor level. The reason is that the railway finds itself in a precarious situation where it is losing market share to other modes of transport and where major changes are underway in the institutional structure of the sector. Therefore:

- demand and traffic forecasts should be focused on the core passenger services that cover operating and capital costs, that is on: (i) commercial services; and (ii) noncommercial services for which the government (central or local) is contracting the train operating company under clear agreements; and
- these forecasts should be focused at the level of the facility and the corridor, that is forecasts that are required for investment decisions in individual facilities to eliminate bottlenecks and/or increase capacity and quality of service to meet the core business traffic.

Additionally, as emerges from the discussion of performance, transport sector policies and external costs, the traffic forecasts will need to be accompanied and underpinned by:

- traffic costing analyses for commercial services to confirm that these services cover their operating costs and full capital costs. Existing traffic that is prima facie not contributing to capital costs requires a careful analysis to establish whether it covers short-term avoidable operating cost. If it covers these costs and provides a contribution to capital costs then it can be worthwhile to continue carrying the traffic until the related capital assets reach the end of their life. At that point, business logic dictates that the traffic be discontinued;
- an evaluation of the scope for further product and price differentiation;
- in respect of price-regulated economy services, an evaluation of the scope to move over time to a regime of awarding concession contracts for service delivery based on the criterion of minimum subsidy; and

- assumptions as to: (i) whether there will be major changes in transport policies, in particular pricing policies for economy services and as to the amount of subsidy that is likely to be made available for economy services; and (ii) policies on charging for the differences in external costs of road and rail respectively.

Java freight services

5.1.3 Demand forecasting approach

The general points and recommendations in regard to demand assessment and forecasting for passenger services are also applicable for Java freight services. Macro factors, such as growth of industrial activity and of regional gross domestic product are important inputs for the development of demand forecasts – mainly by establishing the potential or upper limit for growth in demand. However, as the above review of performance of some market segments has revealed, they will be inadequate in explaining developments in traffic and in modal shifts and not very effective in predicting demand for particular transport tasks.

Specific market factors are of much greater importance for assessing the future demand for rail freight services in Java. These include: (i) developments in relative costs of door-to-door services of the competing modes; (ii) the performance of rail in meeting shippers' requirements; (iii) the changing patterns of industrial location and of business practices in a globalising economy; (iv) the actions by competing transport operators in the transport markets; and (v) the interactions between these various factors.

For the same reasons as discussed under passenger services, the macro multimodal modelling approach is not appropriate and it is recommended that a micro approach be taken, based on in-depth analyses of the client base, including the nature of their transport requirements and growth in these requirements, the options available to them, the quality of service delivered by operators in the competing modes, the door-to-door cost of the railway and competing alternatives.

5.1.4 Demand forecasting focus

For Java freight services it is also recommended, and for the same reasons, that the focus of the demand forecasts be geared towards the needs at the facility and corridor level. Therefore:

- demand and traffic forecasts should be focused on the core freight services that prima facie cover operating and capital costs; and
- the aim should be to identify bottlenecks and the scope for improving the quality of service in terms of customer requirements and the product offerings of the competition.

In addition, the traffic forecasts will need to be accompanied and underpinned by:

- traffic costing analyses to confirm that these core freight services are covering their operating costs and full capital costs. To ensure that major shippers will remain loyal for the longer term, it may be opportune to assess the potential for locking in commitments through financing/cost sharing by the client for the replacement of specialised rolling stock;

- for tasks that prima facie do not contribute to, or cover, their full capital costs, an examination of whether it is worthwhile to continue carrying the traffic until the capital asset has reached the end of its life and an exploration of exit strategies; and
- assumptions as to whether there will be major changes in transport policies on charging for infrastructure use and for the differences in external costs of road and rail transport.

The above points are equally applicable to general freight services on the three Sumatra railway lines.

South Sumatra coal traffic

Assessment of demand for South Sumatra coal traffic is also principally an issue of understanding the specifics of the particular client(s). As railway investments have very long lives, it is useful to distinguish between the long term and the medium term.

5.1.5 Long-term agreements

For the long term the approach should be geared towards developing a long-term agreement with the client(s). Unless such agreement is in place it is very risky for rail to expand capacity by improving the infrastructure or the rolling stock. The following are some of the key factors that come into play in assessing the credibility of demand commitments made by mining clients:

- the reserves in the area served by the line;
- the production costs in the area relative to the production cost in other parts of Indonesia;
- developments in Indonesian and world demand for coal;
- the alternative shipment routes from the mine to the ultimate client/user of the coal, and the all-inclusive cost of supplying the client over these routes. This means that all elements of the existing and alternative transport route(s) may need consideration. In the example of construction of a new line to a new deep sea port at Tanjung Api-Api, maritime transport is possible with much larger vessels, which can have implications for the all-inclusive cost; and
- investment in the development of an alternative route, involving a rail component, a port component and a maritime transport component, may only become feasible once a minimum production threshold has been reached.

5.1.6 Coordination for the medium term

Once a long-term agreement is in place, for the medium term the issue is one of coordination and synchronisation between the production planning of the mine and transport capacity planning of the railway. The less clear and firm the long-term agreement, the more difficult the synchronisation will become. This has been evident, for example, in the past in the relations between the train operator and the Bukit Assam mine. When loading and unloading facilities are owned by the mine (as was the case for the Bukit Assam coal shipped via Tarahan), the operations of the railway (turnaround of railcars and number of railcars required) are affected by the capacity of the loading and unloading facilities. As long as the issue of development of the alternative route via Tanjung Api Api was not settled, the mining company was reluctant to invest heavily in modernisation of the loading and unloading facilities and this had implications for investment requirements by the train operator in railcars.

Jabotabek rail services

Jabotabek rail services are essentially a suburban railway. In large metropolitan areas suburban railways can play a key role in serving the commuting needs of large population concentrations – both middle- and low-income commuters – living in the suburban areas. Their role has therefore to be assessed in the context of the metropolitan transportation system. This is also clearly the case for Jabotabek suburban rail. Therefore, the market assessment for these services should be conducted as part of an assessment of the Jabotabek transportation system.

5.1.7 Maximising the role of Jabotabek rail services in the metropolitan transportation system

Fortunately, the Study on the Integrated Transportation Masterplan for Jabodetabek (2004) examined the role of the Jabotabek rail services in the metropolitan transportation system and developed a set of recommendations aimed at promoting greater use of the public transportation system. The proposals assigned an important role to suburban rail services in the improvement of the efficiency of the overall metropolitan transportation system. The recommended strategy for the Jabotabek rail services as part of the integrated approach includes:

- a number of selective capacity increases of the suburban railway infrastructure;
- marked improvements in the level of service;
- organisational and financial separation of the entity operating the Jabotabek railway from the other railway services on Java;
- enhancement of intermodality through development of interchange facilities with other modes, development of bus feeder services and integration of the fare system;
- further development of an extensive public transportation network; and
- high-intensity land development in areas surrounding railway stations.

On the institutional side the Masterplan Study identified the need for major initiatives and recommended that a region-wide transportation administration be established with planning and implementation authority backed by central and regional government, combined with adequate financial autonomy through the establishment of arrangements to ensure stable funding sources.

These institutional and funding recommendations are well-justified. The Jabotabek rail services are already heavily engaged in serving diversified commuting markets – middle-income and low-income – but have been constrained in developing capacity further because of funding constraints. Alone, the railway is unable to maximise its role in the metropolitan transport system as this requires an integrated, system-wide approach, covering physical, schedule and fare coordination of the various modes making up the public transportation system.

5.1.8 Detailed recommendations for suburban rail in Jabodetabek Masterplan

The recommendations in the Jabodetabek Masterplan Study include specific proposals for development of railway capacity in the East-West corridor between Bekasi and Serpong as part of an integrated approach for development of the transportation system with urban development. The proposals for capacity increases and other technical aspects were developed to a considerable level of detail at the prefeasibility level. At this stage, these

recommendations can therefore be adopted as a major building block of the Railway Masterplan. In the same vein, the masterplans for future development of PTKA railway services in other major metropolitan areas should be examined in the context of the integrated transportation and urban development plans for these areas.

New railway lines

5.1.9 New general freight and passenger railway lines

It is recommended that attention should now be focused on the high-priority issues being faced in the four lines of business discussed above rather than on development of new publicly funded rail infrastructure. The main reason is that the railway sector in Indonesia is in a precarious situation because it is going through critical structural changes while being challenged by transport operators in other modes. In particular:

- existing general freight services are not, or are barely, covering operating costs and are losing traffic in many markets; and passenger services are facing critical challenges in their respective markets. The priority is to ensure and demonstrate that existing railway operations can be a profitable business;
- the examination of the comparative costs of rail and road highlighted that the minimum traffic thresholds are on the order of several million tonnes/year. There is no evidence that there will be demand for such traffic volumes in the transport market in the foreseeable future;
- for the next few years, the railway sector will need to successfully emerge from two major institutional transformations in pursuance of the new railway law: (i) the completion of the restructuring process of the railway sector itself, including agreement on an appropriate role for the government, the separation of infrastructure and operations, and the introduction of the concept of multi-operator and associated regulation; and (ii) the restructuring of the DGR to adjust itself to the new tasks resulting from the restructuring of the sector;
- during this time it will also be necessary to address and resolve the policy issue of establishing a more equitable playing field between rail and the other modes; and
- the government will need to establish a credible record in the area of effective implementation of its PSO policies as a precursor and test of a credible policy regime in regard to management and regulation of a multi-operator system.

For the multi-operator approach to be a key element of the future Indonesian railway sector, the essential building blocks of such a system mentioned above must be in place before any attempt can be made to launch new railway lines that can be operated profitably under a multi-operator system.

5.1.10 Dedicated (coal) mining lines

The prospects for dedicated mining railways to be viable are quite different from those for general freight railways. The section on the performance in developing new coal railway lines in South Sumatra and Kalimantan (Section 2.6) concluded that the traffic volumes required for a viable railway operation are available or potentially available and that financing should, and can, be entirely the financial responsibility of the mining interests. It also tentatively identified a number of obstacles or challenges that until now have stood in the way of projects moving forward in Kalimantan. These include:

- short transport distances. Until now it has been possible to develop a large number of mines that are located near coastal areas and navigable rivers so that the coal can be trucked to maritime terminals on the coast, or to river ports from where it is barged to offshore transshipment points. The dispersed location of these mines and the relatively short distances involved (mostly up to 150 km) favour road and mitigate against railway transport;
- the need for minimum transport volumes. A railway option, because it involves much higher initial investment than a trucking/road option, will only be able to secure financing from the private sector if it can obtain a firm commitment for a minimum volume that will make it financially viable. This has proven difficult in view of the need for coordination between several mining companies that are not naturally inclined to cooperate;
- the challenge of coordinated development of the logistics chain. The logistics chain comprising several transshipment facilities, roads, railways, river ports, storage areas, barge transport, and possible dredging will not materialise unless all elements that are required for the minimum throughput are brought on stream in a coordinated manner. This poses formidable challenges as many actors are involved at local and central government level and in different functional areas, covering mining, different transport modes and the environment; and
- a lack of a legal and regulatory framework for private sector financing of dedicated railway lines. With the enactment of the new railway law this issue has been resolved.

In regard to some of the above issues, the outlook for dedicated coal railway lines has definitely improved. There is continuing strong demand for coal in the world markets and the outlook for price levels bodes well for profitable operations. Coal reserves in the interior of Kalimantan are very substantial and well-conceived mining/logistics schemes can provide the basis for investment in rail on condition that the other issues are resolved.

The challenges of securing minimum off-take commitments and of coordinating the development of the entire logistics chain are somewhat different depending on the nature and the number of clients of the railway. With a view to identifying the key issues, two scenarios are considered: (i) a situation where one mining company has sufficient volume to undertake the investment in the railway; and (ii) alternatively, a situation where the output of more than one company is required. The project development process will be less complex if one mining company has sufficient volume (say 10–20 million tonnes/year) and is able to shoulder the preparatory work and the financing of a logistics chain project involving rail.

If a single mining company has a solid cash flow and a sound balance sheet, it can secure financing through traditional corporate finance, underpinned by its cash flow and balance sheet. For this scenario, most of the preliminary due diligence activities in regard to demand, technical and financial feasibility and financing will be the responsibility of the mining company and its advisors and financiers. The preparatory technical work for the logistics chain will likely proceed in parallel with the technical work for the exploitation of the mine itself and both would likely be part of the same overall financing scheme.

On the other hand, when several mining companies need to join forces to develop a viable logistics chain, the preparatory work will be much more complex and time-consuming. For one, financing will likely need to be secured through a special purpose company and a project finance approach. This implies that, at least in the initial stages, one of the stakeholders will need to take the initiative to set the project development process in

motion, including: (i) examining feasibility, minimum volumes required, organisational and financing options; (ii) bringing the mining companies involved in the scheme to an agreement as to their respective contribution to the scheme; and (iii) reaching an agreement on how to proceed with implementation. The stakeholder taking the initiative could be a local government or a partnership between a local government and central government. It will be essential, however, that this stakeholder be impartial in regard to the sometimes conflicting interests of the different mining companies or affected local governments.

The agreement on how to proceed will provide the basis for initiating the process of obtaining all the required business, operating and environmental permits and clearances from relevant central and local governments for the various elements of the logistics chain. This includes the permits and clearances at the various stages of development of the chain:

- land acquisition for the rail infrastructure and the other required facilities;
- construction of the railway itself and of the other facilities of the logistics chain, including storage areas, roads, transshipment facilities, possible barging and river terminals, marine terminals, and offshore loading point(s); and
- operation of the railway and of the other facilities.

Meeting all these requirements from different departments and agencies within a tight project development timeframe is undoubtedly a formidable challenge, particularly under a scenario where several mining companies need to join in a scheme to make a railway line financially viable. This will become even more daunting under the provisions of the new Law No. 4/2009 on Mining which was signed in January 2009. The law introduces a new licensing/permit regime for mining which is significantly different from the practice of the previous 40 years. The new law distinguishes between an exploration and a production operations permit. The exploration period covers general surveys, exploration and feasibility studies for a term of up to seven years. The production operations permit covers construction, mining, processing, transportation and sales for a period of up to 20 years, twice extendable for a maximum of 10 years. While the implementing regulations have not yet been issued, the main provisions regarding types of permits and related periods of validity appear firm. This implies that project development and implementation has to proceed during a compressed timeframe, lest there is hardly any time left for production under the term of the permit.

Unless some of the essential preparatory work for developing a logistics chain involving railway construction can be carried out during the exploration period, it is difficult to envisage that financing and development of a mining railway through a joint venture of several mining companies can materialise. In addition, it is difficult to envisage this being accomplished unless central and local government play an active role in facilitating and coordinating the project development process. It is recommended that central government consider playing this active role as the efficiency of an important sector of the economy is at stake. In this regard it is important to bear in mind that, depending on the prospective quantities of coal being hauled, a coal line could have a life in the order of 50 years. This introduces a great deal of uncertainty and reduces the operating period as the construction period of the logistics chain would form part of the mining operation permit. Furthermore, the preparatory work, including detailed engineering, will take longer and the initial investment will be much greater than under a road-only option. In sum, even though rail may be superior from the economic and financial point of view, a rail-based transportation chain may not materialise without some involvement of government. Suggestions in this regard are provided in Section 6.5.

Chapter 6: IMPLICATIONS FOR OPERATIONAL STRUCTURE AND FINANCING

In Section 3 it was argued that the cost advantage of rail for various transport tasks should guide the development of the Masterplan. It was also emphasised that transport markets have become very competitive, that government policies have affected the outcome in the market and that an optimal outcome will require some policies to be modified. The development of the investment program has to take all these factors into account so that rail transport capacity is created for services that are lowest cost in economic terms, while meeting demand in the market. Developing the Masterplan on the basis of these key principles, however, will not automatically guarantee an optimal outcome in the market. In practice there are a number of institutional and organisational measures that need to accompany the overall policy.

This section addresses two aspects of an appropriate institutional and operational framework enabling the railway to play its proper role in the transport system in accordance with its strengths. The first relates to the operational arrangements and the modus operandi between the government/infrastructure operator and the train operator(s). The second deals with the implications for the approach to financing the investment requirements that follow from the market assessment. Both aspects need special consideration owing to the policy option of vertical separation between infrastructure and train operations that has been confirmed in the Railway Law.

The principal requirement is that the institutional transformation of the railway sector should proceed rapidly towards a structure that is aligned with the main lines of business that have been identified in Section 2, namely: Java passenger services, Java freight services, South Sumatra coal traffic, and Jabotabek passenger services. These lines of business should have a high degree of management and commercial autonomy, and should have a strong focus on traffic costing and market analysis. It is also argued that each of the current four main lines of business requires a different organisational/operational and financing approach.

Java passenger services

6.1.1 Commercial services[11]

Most of these services are competing with other modes in their respective markets. To remain or become profitable, the train operator will need to continually improve efficiency and quality of service. Achieving this depends partly on the right infrastructure capacity being available. In this regard, the separation of infrastructure and train operations holds the risk that investment in railway infrastructure is not fully aligned with the capacity requirements of the train operator(s).[12]

[11] Commercial services are services for which the railway can set the tariff freely without government approval (in contrast to economy services where the tariff is regulated). At present, in practice, these are the executive and business class services.

[12] The separation, however, creates the possibility of introducing a multi-operator regime and competition in the market which is expected to lead to greater efficiencies and attention to the customer.

Thus, the principal requirement governing the modus operandi between the train operator and the government/infrastructure operator is good coordination and synchronisation. An arrangement should be established for discussing the capacity improvement and expansion requirements and for agreeing on the needed investments. An effective mechanism will require a number of initiatives and inputs on the part of the train operator. For commercial passenger services, this means that the train operator (at present PTKA) should establish a well-structured business unit.

Second, this business unit should take the lead in identifying the markets and market segments in which to operate and in determining the corresponding capacity requirements in terms of both rolling stock and infrastructure.[13] Sound forecasts of demand and capacity requirements will play a major role in setting the coordination mechanism on a sound footing. In this connection – as underlined in section 5.1.2 – it is useful to distinguish between forecasts at different levels: (i) at the level of the facility; (ii) at the level of the corridor; and (iii) at the level of an entire railway system. This distinction provides a convenient basis for targeting investments such that they contribute in the best possible way to removing capacity bottlenecks and growing the business while at the same time enhancing revenues and profitability. It will facilitate the prioritising of investments towards transport tasks in accordance with the contribution of these tasks to the business.

Third, the business unit of the train operator will need to engage extensively in traffic costing to obtain a good insight of whether a service is covering its operating costs and contributing to capital costs. It will allow the train operator to develop an empirical basis for advocating the investments in infrastructure that it is seeking from the infrastructure operator.

Fourth, the business unit will need to introduce separate accounting and operational reporting for this line of business, in order to underpin management autonomy and anticipate the introduction of track access charges. While these initiatives would normally be taken by any transport business that is subject to competition in the market, the train operator may still need to be encouraged in this direction because of practices and approaches inherited from an earlier period when the rail system was managed as a government agency with limited commercial orientation.

Under the policy, institutional and operations framework outlined above, the passenger train operator should be in a perfect position to self-finance its investment requirements through internal fund generation and borrowing in the capital market. It should also be afforded the freedom to select equipment and to standardise rolling stock without intervention from government. This can contribute to significant cost reductions in several key operational areas.

Equally, the government/infrastructure operating company should have the ability to standardise equipment (in particular telecommunications and signalling) as an important step towards cost reductions and streamlining of operations.

[13] At a future point in time, when the institutional and regulatory prerequisites for a multi-operator regime have been established, and a competent and knowledgeable infrastructure operator is up and running, the latter may be in a position to play a more important role in market assessment and development of capacity requirements. Furthermore, it is likely that the multi-operator system will first emerge in the form of local/regional operations that are contracted by local/regional governments rather than in the form of several operators competing on the same main line.

6.1.2 Economy services

For economy services the requirement of coordination and synchronisation between train operator and government/infrastructure operator is equally important. The financing of infrastructure has to be coordinated with the passenger transport tasks agreed under the PSO agreement. For this market segment, however, the government should take the lead in assessing the market and formulating the associated capacity requirements. To this end, it should develop a clear concept of: (i) the target population and the traffic that qualifies for subsidised services; (ii) the level of support that is justified on grounds of social benefit and that is financially sustainable; and (iii) an effective mechanism for delivery of the subsidy.[14]

Again, for the coordination mechanism to function effectively, a number of measures/ initiatives are required: (i) the train operator should establish a business unit for economy services; (ii) this unit should have a well-developed and credible traffic costing system which can provide the basis for determining the level of subsidy required from government; and (iii) as for commercial services, there should be separate accounting and financial reporting for the economy services line of business. At a more advanced stage of the railway sector reform process – once all the building blocks have been put in place and government has established a record as a credible partner in honoring its contractual commitments – the subsidised economy services could be awarded on a competitive basis. The threat of new entry in the market under this approach would provide further incentive for efficiency improvements.

The revenues from the economy services (fare box[15] plus subsidy payments or, alternatively, contractual payments by the government for the agreed scope of services) should be covering costs under efficient operations and enabling the business unit of the train operator to be financially self-sufficient. In particular, the operator should be able to procure the rolling stock that is most suitable for the services to be provided.

Apart from the need to establish all the institutional and regulatory arrangements to manage a multi-operator system, it will be difficult to introduce such a system unless there is: (i) detailed cost accounting for both commercial and economy services; (ii) separate accounting and financial reporting; (iii) a successful record of PSO payments; and (iv) a track record of providing infrastructure capacity needed to deliver the passenger services agreed under the PSO.

Java freight services

Java freight services constitute a distinct line of business. Most freight services are competing with road (and in a few cases with coastal shipping) and need to improve efficiency and quality of service to remain, or become, profitable. Achieving this goal is also critically dependent on infrastructure capacity being available for the tasks that have been identified as profitable or potentially profitable under the market assessment. Because of the separation between infrastructure and train operations, seamless coordination is the principal requirement for the modus operandi between the train operator and the government/infrastructure provider. The train operator (at present PTKA) should take the lead in identifying the markets and market segments in which to compete and should specify the corresponding capacity requirements.

[14] See papers on government policies in regard to passenger services provided under PSO.
[15] Fare box: The revenues collected from fares paid by passengers.

Effective coordination and synchronisation will require a number of initiatives on the part of the train operator. Again, while these actions would normally be pursued by the train operator in a competitive market, the operator may need to be encouraged by government policies. The suggested initiatives include:

- establishment of a freight services business unit with an adequate degree of managerial autonomy;
- forecasting of capacity requirements focused at the facility and corridor level;
- traffic costing by main commodity or client; and
- separate accounting and financial reporting for the line of business.

Under the policy, institutional and operational framework outlined above, the train operator should be in a position to self-finance its investment requirements through internal fund generation and borrowing in the capital markets. This financial self-sufficiency should enable the operator to procure rolling stock and other requirements that best fit the needs of its customers. It should also be able to negotiate cost-sharing arrangements with its main customers as a way of both securing adequate funding and guaranteeing the continued loyalty of these customers.

The above outlined approach – founded on exploiting the strengths of rail and on efficient operations by the train operator – should place the DGR/infrastructure operator in a good position to obtain adequate funding from central government. Ultimately, under a policy regime where infrastructure charges cover the full cost of infrastructure provision, infrastructure operations should also become self-financing.

South Sumatra coal traffic

The principles governing the operating structure of the South Sumatra Railway are derived from the fact that more than 91 percent of its revenues are generated by coal traffic and that the major part of the remaining 9 percent is related to mining operations. Given this predominance of mining traffic on the system, the key question for government/DGR is not about the proper role of rail in the transport market and how to bring about an allocation of traffic between modes in accordance with their respective strengths. Rather, the key transport issue lays squarely with the mining company, namely, the search for the least cost logistics chain for supplying its clients with coal. This is a task that, in principle, the mining company is perfectly able to resolve on its own. For historical reasons, however, the mining company is required to deal with government for the rail infrastructure and with PTKA as freight train operator.

At present, given this legacy of separation of infrastructure and train operations, the practical issue is again one of coordinating and synchronising capacity expansion of the railway (comprising the government as owner of the rail infrastructure and PTKA as the train operator) on the one hand with the transport requirements of the mining company on the other. While this should, in principle, be easier than in the case of Java passenger and freight services, the past record suggests that smooth coordination does not come about easily. Coordination gives rise to considerable transaction costs that could be avoided by adoption of a solution that is better adapted to the nature of the transport task at hand. The time and energy costs on the part of government/DGR can better be directed to the very challenging policy implementation agenda being faced for the Java rail system.

The South Sumatra railway is essentially a mining railway, which for historical reasons finds itself in a situation of vertical separation. It meets the conditions for being owned and run by the mining concern, and there is no overriding argument for a separation between

infrastructure and train operations. Given that the new Railway Law now provides for private sector ownership of railways, the question of alternative institutional arrangements for this particular railway operation should be addressed under the Railway Masterplan. The options range from establishment of a separate legal entity covering both infrastructure and train operations to privatising the railway or selling it to the mining company.[16] This, however, is a matter that will require agreement from several important stakeholders and should be settled quickly one way or the other as a stalemate will likely delay important capacity expansion investments which will be costly for all parties concerned.

In case the outcome is a status quo, the goal should be to work out an agreement between the three main parties covering the key parameters relating to volumes to be carried, operating procedures at transshipment points, operating indicators and cost sharing. The shorter the period covered by the agreement on volumes, the more the government/infrastructure operator and the train operator should negotiate for substantial cost sharing on the part of the mining company.

As to the question of financing, since the railway is essentially an integral part of a mining operation, it should be entirely self-financing in respect of both infrastructure and train operations. Mobilisation of finance from internal funds generation and from borrowing in the capital markets should be easier under all the alternative institutional options (separate government-owned legal entity, privatized operator, or mining company ownership) than under the current arrangements.

Jabotabek passenger services

In Section 5.4, dealing with demand forecasting and Masterplan development for the Jabotabek passenger services, it was argued that the role of the Jabotabek suburban railway has to be considered in the context of the entire metropolitan transportation system. To fully exploit its potential, the suburban railway needs to be integrated with the complete range of facilities and transport services of the metropolitan transportation system. It follows that complementarity and interconnectivity with the other modes are key factors in the assessment of demand and provision of services.

Under this integrated approach for determining and meeting the demand for railway services, the issue of aligning railway capacity (both infrastructure and train operations) with transport requirements is as equally crucial for Jabotabek services as it is for Java passenger and freight services. However, under the concept of an integrated metropolitan transportation system, the lead role in formulating the transport tasks expected from rail would be taken up by an entity[17] that is responsible for all transport in the Jabotabek area rather than by the train operator.

Different options can be envisaged for structuring the institutional and organisational set-up for managing the various elements of the metropolitan transportation system. The key responsibilities that need to be properly addressed under the management system include those for: (i) assessing demand for the services to be provided by the system; (ii) operating the infrastructure of the various modes; and (iii) performing the transport operations of the

[16] In the unlikely event that there would be a case for common carrier services on the railway – separate from the mining traffic which could not be provided more economically by road transport – the provision of such services can be negotiated as part of the agreement with the new entity to which ownership of the railway is transferred.

[17] The desirable model for such an entity would be a 'Jabotabek Transportation Authority'.

various modes. The option that is ultimately selected should be such that assessment of demand from the perspective of an integrated multimodal transport system is facilitated.

From the perspective of rail transport, an effective arrangement should include the following features: (i) as a minimum, establishment of a Jabotabek train operations business entity with wide-ranging managerial autonomy; (ii) that this business entity be structured so as to have a strong focus on traffic costing and thereby provide the basis for determining the level of subsidy payments as the fare box will likely not cover operating costs; and (iii) the business entity to have separate accounting and financial reporting.

Under this integrated approach for meeting transport demand in the metropolitan area, there is no requirement that the various modes and facilities be financially self-sufficient. Rather, the revenues raised from the various modes and from general metropolitan revenue generation are pooled for transport development and operation across the system. This pool of funds is allocated for investment and operations of the various modes in accordance with the role each mode has been assigned in the overall metropolitan transportation system. This will likely result in some degree of cross-subsidy between modes and/or in differential levels of cost recovery. This is considered acceptable and beneficial for the efficiency of the overall system.

The Jabodetabek study recommends that increased funding for transport be sought from five main sources:

- an increase in the allocation from the central government;
- an increase in the budget allocations by local governments;
- a gradual increase in the fuel tax;
- introduction of road pricing in the central city area; and
- an urban development tax.

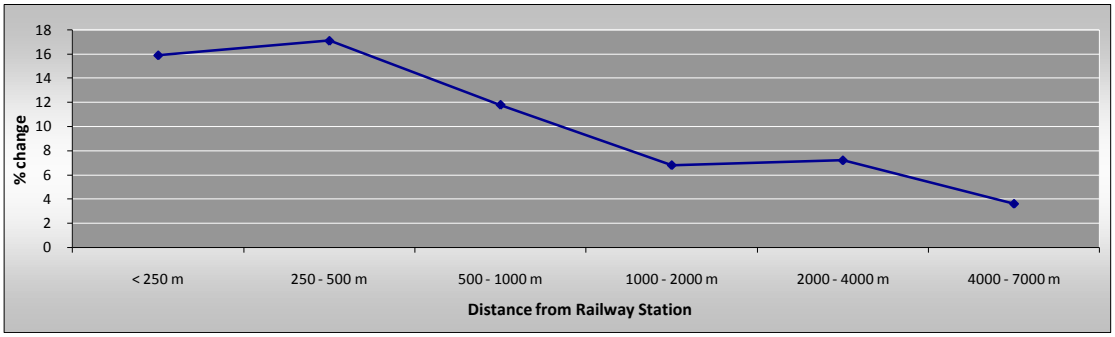
Integrated land use and transport planning

The role of rail in the metropolitan transportation system can be further enhanced by integrating transport planning with land use planning. Among other means, this can be achieved through transit-oriented urban/suburban development based on the concept of accessibility and as part of a strategy to promote public transportation. From the perspective of the railway, key elements of such a strategy include: (i) improving the quality of rail services on suburban lines: (ii) upgrading railway stations and intermodal connections at railway stations; and (iii) promoting high-density real estate development in the immediate vicinity of railway stations. This is a strategy that has been successfully pursued in many Japanese metropolitan areas and in Hong Kong. It is based on the finding that land values and real estate values are higher in the immediate vicinity of railway stations (typically within walking distances) than at locations further removed from railway stations.

The relationship between real estate values and accessibility has been documented in a number of studies across the world. The rise in real estate values following investments in accessibility provides the basis for ‘value capturing’ as a source of funding for transport infrastructure. A recent illustration of this relationship is provided by the findings of research recently conducted in the Netherlands on the impact of accessibility on real estate values of offices (de Graaff et al 2009). The graph below plots the increase in real estate values (based on rental income for otherwise equivalent office space) in relation to proximity to major

railway stations (from less than 250 metres to 7,000 metres) with the reference value comprising real estate located more than 7,000 metres from the railway station.[18]

Figure 3: Impact of Accessibility to Rail on Real Estate Values



Thus, an integrated approach to transport planning and land use planning at the level of the metropolitan area provides the potential to mobilise funding for suburban rail through land-based PPP approaches (Peterson 2009). These could involve, for example, urban development or redevelopment by real estate developers in the vicinity of railway stations with concomitant improvement of railway services and upgrading of railway stations. Such opportunities should be explored for the Jabotabek metropolitan area under the Railway Masterplan.

New (coal) railway lines

New coal railway lines – and more generally railway lines that are part of the logistics chain of extractive, industrial or agricultural schemes – do not present the kind of issues of operational structure and financing discussed above. Such railway lines would be vertically integrated, owned and managed by the mining concerns and hence should not need government financing. They may not materialise, however, even when they are technically and financially highly feasible. As indicated in Section 5.5, there are major issues at the project development stage, owing to the complex approval processes for the various elements of the logistics chain that can stand in the way of coal rail lines becoming a reality. This should be of concern to MoT/DGR in its role as promoter and facilitator of an efficient transport system – whether publicly or privately financed – that is serving the productive sectors of the economy.

There is a role to play for government at two critical stages in the process: first, at the time of identification of a potential logistics chain project; and second, during the initiation of project development. At the stage of identification of a project, MoT/DGR can play an important role in assessing the merits of a proposal by private parties. As such railway lines may also be promoted by regional/local governments, the task will include advising these governments on the key feasibility parameters of such projects. The outcome of this activity will consist of an informed decision as to whether the proposal is sound and deserves the facilitation support of government.

Once project development is initiated, the role of government will be to streamline and facilitate the approval processes. It is suggested that a possible mechanism for accomplishing this task is establishment of a Working Group/Task Force, preferably chaired

[18] As public transport is generally well-developed in the Netherlands, one could expect the impact of accessibility to a railway station to be more pronounced in situations where public transport is less well-developed.

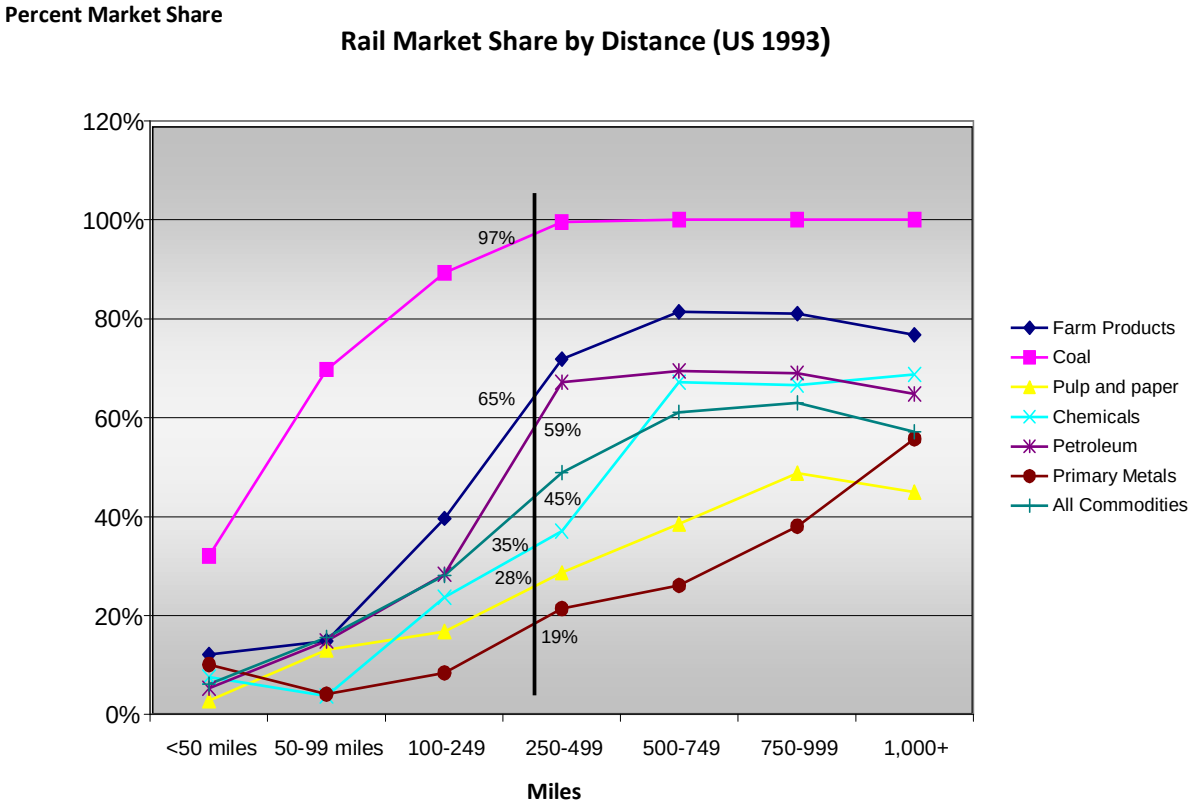
by the Ministry of Energy and Mineral Resources since this ministry issues the mining production operations permit, which includes the authorisation to organise transport. The Working Group should include members from all the central and local government agencies that are responsible for issuing permits and licences required for the development of the logistics chain. The Working Group should preferably have a subgroup comprised of MoT staff given that several directorates of MoT, such as those responsible for ports, river navigation, road transport and railways, will normally be involved. The group should be assisted by a small secretariat to carry out some of its administrative functions. The responsibilities and activities of the Working Group should focus on:

- providing a one-stop information window where all the permit requirements are consolidated;
- assisting in bringing the various stakeholders to an agreement on a project development process and implementation plan;
- when several mining companies are involved, bringing these companies to an agreement on their respective share in the special purpose entity;
- if needed, initiating and contracting for studies or advisory services to examine particular issues;
- tracking the progress of the scheme once a mining production operations permit has been issued; and
- following up with concerned directorates or agencies when issues arise and escalating issues to higher levels of government when needed.

The human resource/capacity building component of the Masterplan should include any required competency development on the part of MoT/DGR to carry out the above activities.

Annexe 1: IMPACT OF DISTANCE ON RAIL MARKET SHARE

The chart below illustrates the impact of hauling distance on the attractiveness of rail for different commodity groups. While for a hauling distance of 600 km practically all coal was being hauled by rail, in the case of primary metals this was only 20 percent.



Source: Developed from 1993 US Commodity Flow Survey.

Annexe 2: ENVIRONMENTAL IMPACTS AND OTHER EXTERNAL COSTS THAT MAY FAVOUR RAIL

The capacity of the railway to efficiently carry large volumes of freight over long distances and to move large numbers of passengers at low variable cost is not the only factor that in the view of GoI may merit consideration when examining the role of rail compared to other modes. Environmental impacts, congestion and accidents are factors that may have a bearing on the comparison between rail and road and are generally referred to as the external costs. These are the negative impacts of transport – the costs to society – that are not included in the price paid for transport services by the traveller or the shipper of cargo.

External costs are more pronounced with road transport than with rail and waterborne transport and include congestion, accidents, air pollution, generation of greenhouse gases, and noise pollution. The impacts of these factors are less easily quantifiable than the economic costs of transport services which can be estimated on the basis of the costs of the constituent inputs for which there are prices in the market. However, estimates have been made of these costs by various institutions and organisations. A report on the external costs of transport prepared for the European Commission in 2007 concluded that "Although the estimation of external costs has to consider several uncertainties, there is consensus at scientific level that external costs of transport can be measured by best practice approaches and that general figures are ready for policy use".

External costs of road and rail transport

No exhaustive investigation appears to have been made of the external costs of the different transport modes in Indonesia but various estimates have been prepared in the context of individual studies. For example, the Draft Railway Masterplan provides estimates of the energy consumption per passenger/km for travel by rail, bus and personal car. The Study on the Integrated Transportation Masterplan for Jabodetabek (2004) provides estimates of: (i) the economic loss due to congestion; (ii) the potential reduction of CO_2 emissions following rail improvements; and (iii) local air pollution. As the shares of railway and road transport in Indonesia and Europe are comparable in relative terms, to obtain an appreciation of what is at stake, it is instructive to examine estimates of external costs prepared for Europe.

Total External Costs of Road and Rail Transport in Europe (Billions of Euros)(2000)

External Cost	Road	Rail
Congestion	268	-
Air pollution	164	2.4
Accidents	156	0.3
Climate change	70	2.1
Noise	40	1.4
Total	698	6.2

Source: INFRAS and IWW (2004).

As can be seen in the above table, total external costs of rail in Europe were estimated at less than 1 percent those of road transport while rail carries between 6–10 percent of the total traffic. The same report estimated the average external cost of freight transport by road to be five times higher than by rail and by air transport at 15 times higher than by rail.

The environmental impacts of rail transport as compared to other modes can be illustrated further by looking at indicators such as CO_2 emissions, energy efficiency, local pollution and land take. Several of these indicators are provided by EcoTransIT, a web-based tool designed

to quantify the emissions from freight transport. The tool was an initiative started in 2000 by a number of European railway companies.

CO_2 emissions

EcoTransIT estimates that rail is 3-10 times less CO_2 intensive than road or air transport. This is a significant advantage when considering that transport is one of the few sectors where greenhouse gas emissions are rising. The Study on the Integrated Transportation Masterplan for Jabodetabek estimated that, with the proposed railway investments, the reduction of CO_2 emissions would amount to 360,000 tonnes in 2020. This was estimated to be worth Rp 30 billion when CO_2 reduction is valued at US$ 10/tonne.

Specific estimates by EcoTransIT for freight and passenger transport can also be instructive. The transport of 1,000 tonnes of cargo from Basel to Rotterdam, a distance of 700 km, is estimated to generate the following quantity of CO_2 (tonnes):

Truck	4.7
Inland waterway	2.4
Rail	0.6

A passenger travelling from Berlin to Frankfurt, a distance of 545 km is estimated to generate the following quantity of CO_2 (kg):

Car	98
Air	85
Rail	26

Energy efficiency

The draft Railway Masterplan gives estimates of energy consumption for passenger transport by different modes as follows:

Rail	0.0020 lt. per person/km
Bus	0.0125 lt. per person/km
Car	0.0200 lt. per person/km

Rail is estimated to be 2-5 times more energy efficient than road for freight transport. This is illustrated by EcoTransIT with the example of a shipment of 100 tonnes of cargo from Basel to Rotterdam, a distance of 700 km. The diesel litre equivalents are as follows:

Truck	1,779
Rail	770
Inland water	911

Local air pollution

The Study on the Integrated Transportation Masterplan for Jabodetabek (2004) found that 75 percent of the air quality survey stations registered PM10 concentrations exceeding the environmental standard, while almost one-third exceeded twice the standard. The impact on health costs was estimated at Rp 2,815 billion. The main cause of this pollution was from vehicular traffic. Rail, driven by electric power, is free of direct local air pollution. The indirect amount will, of course, depend on how the electric power is generated.

As another illustration, EcoTransIT estimates that the transport of 100 tonnes of cargo from Basel to Rotterdam generates 10 to 20 times less local pollution by rail than by road or

inland waterway transport. For a passenger travelling from Berlin to Frankfurt rail was also more than 10 times less polluting than private car or air travel.

Land take

In a densely populated region such as Java, land take for transport is of critical importance. The UNEP Report on the Railway Sector (2002) estimated that rail is two to three times more efficient in terms of land take per passenger or freight unit. This is illustrated by the indicator of capacity of urban transport per metre of infrastructure width.

Capacity of Urban Transport Per Metre of Infrastructure Width

Mode	Passengers/hour/metre
Rail	9,000
Bus lane	5,200
Bus	1,500
Car	200

Assessment and valuation of external costs of transport

The quantification of the external costs of transport and the incorporation of these costs in transport policy formulation and implementation is still in the early stages. As pointed out above, the matter has been researched extensively, values for the various costs are being estimated in the context of feasibility studies of individual projects and a number of countries intend to incorporate the external costs of transport in transport policy. The European Union (EU) is most advanced in policy formulation and is engaged in the development of a general approach that is intended to be applicable for all countries in the union as a basis for transport charges that reflect external costs. To this effect, the EU and other European organisations have commissioned a number of studies during the past several years to assess the external costs of transport.

A report prepared by INFRAS and IWW for the International Union of Railways (2004) made a comprehensive assessment of the total external costs of the various transport modes, including the costs of accidents, air pollution, noise, nature and landscape impacts, upstream and downstream processes, urban effects and climate change under a low and a high scenario. (Congestion externalities were not included as they are considered to be of a different nature, being in part borne by road users, and hence 'club internal', even though being 'individually external'). The findings are summarised in the table below (see also Figure 3 from INFRAS and IWW (2004) at the end of this Annexe). As can be seen, the external costs of road are estimated to be five times those of rail.

External Costs of Transport in EU 15 (Euros per tonne/km)

Road Freight	Rail	Aviation	Waterborne
0.0878	0.0179	0.2713	0.0225

Source: INFRAS and IWW (2004).

The Community of European Railway and Infrastructure Companies commissioned a study to assess the impact by the year 2020 on the modal shift from road to rail of the implementation of the EU policy of charging heavy goods vehicles for their external costs (IWW and Nestear 2009). The study examined different scopes and levels of charging for external costs under a base case scenario and three scenarios corresponding to different scopes and levels of charging. These range from a narrow scope (covering only congestion,

air pollution and noise), combined with a policy of capping amounts of discharges, to a wider scope (including impact of CO_2 emissions and accidents) and uncapped discharges.

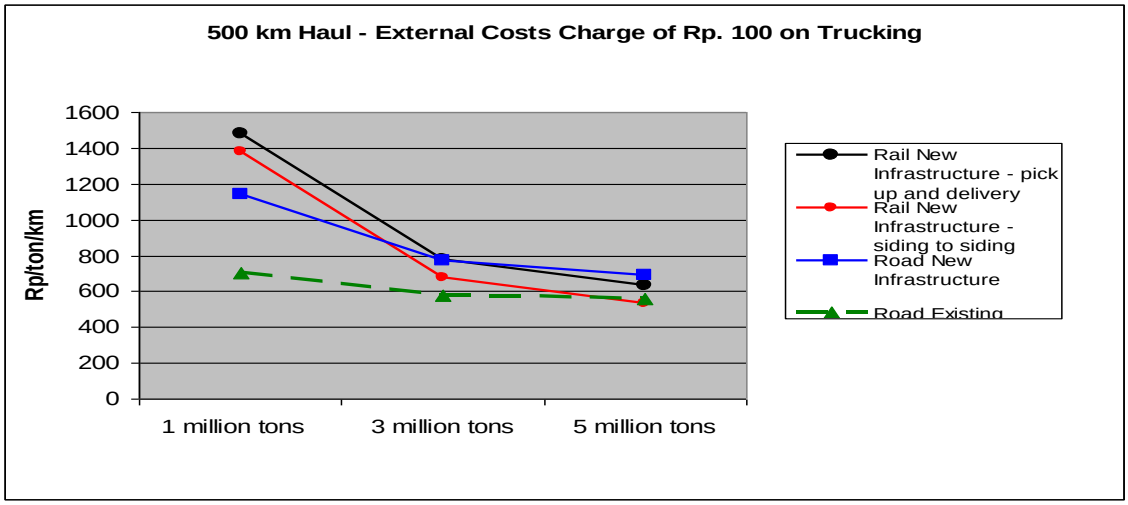
The increases in costs per vehicle/km corresponding to the different levels of charges are 3.7 percent, 11 percent, and 25.6 percent respectively. The finding of the study is that the effect on modal shares and reduction in carbon emissions of a policy based on the narrow scope and the capping of discharges would be minimal. However, when all external costs are included and the values of the assessed external costs are set at more realistic levels (no capping) the proportion of interregional traffic carried by rail would increase from 19 to 24 percent. Furthermore, if it is assumed that additional investment is made in the railway sector aimed at increasing its efficiency, the proportion of traffic carried by rail would increase to 31 percent.

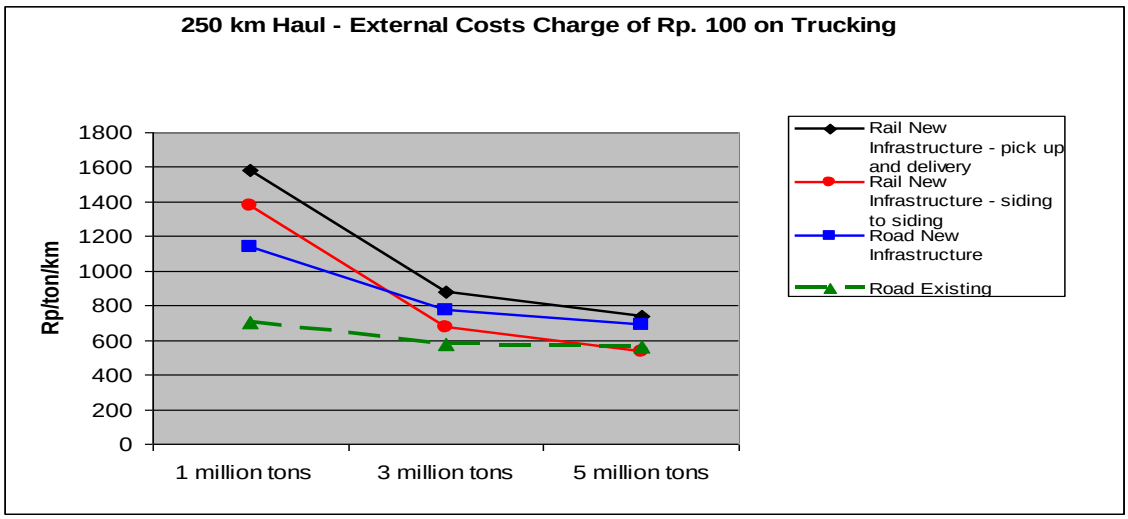
These findings underline the fact that efficiency improvements in rail operations will likely have a greater impact on an improvement in the modal share of rail than the levying of charges on road transport to reflect its higher external costs.

Impact on comparative costs of Indonesian road transport of charging for its higher external costs

For illustrative purposes, the analysis conducted in Section 2 comparing the costs of road and rail has been complemented with a scenario under which a charge would be imposed on road transport to reflect its higher external costs. It is considered that an increase of 25 percent in road operating costs, or Rp 1,000 tonne/km, would be an upper limit on the grounds that truck operating costs in Indonesia are significantly lower than in most European Union countries and that external costs in Indonesia would also be valued at correspondingly lower levels. The same assumptions of annual freight volume and hauling distances as in Section 2 were used to examine the implications of such an increase on the comparative total costs of road and rail for different scenarios. The main findings are summarised below.

- For hauling distances of 500 km, when the transport is siding to siding, rail is now clearly lower cost than road at a volume of 3 million tonnes.
- When rail transport involves origin and destination costs, rail becomes comparable to road at 3 million tonnes, whereas without the external cost imposed on road it is cheaper, even at 5 million tonnes.
- For hauling distances of 250 km, rail is lower cost when the transport is siding to siding at 3 million tonnes.





How to ensure that the advantages of rail are reflected in the modal split

The above examples of estimates of external costs in the European Union and the scenario analysis for Indonesia give an indication of the order of magnitude of charges that could potentially be imputed on road transport in the evaluation of investments and as a basis for infrastructure charging policies. To incorporate these factors in the evaluation of transport investments and rail investments in particular in Indonesia, a start will need to be made at systematically assessing the impacts of transport that cause external costs and valuing such negative impacts. At present, the advantages of rail are only beginning to be reflected in the evaluations of alternative investments involving different modes. As part of the Masterplan preparation it will be important to begin to assemble the findings under various studies in regard to impacts and the values placed on each of these negative impacts. This is an essential first step in a process leading to incorporation of external effects in any decision-making process.

The goal of achieving an outcome in the modal split in the transport markets is consistent with the advantages of rail. This is once again a process that has two steps: first, which mode is selected at the time of the investment; and second, which mode is selected by buyers in the market. Clearly, at the time of planning and the investment decision, the external cost factors have to be valued and these values have to be brought into the evaluation. For buyers in the market to be aligned in their choices with the advantages rail is offering to society, the government's pricing and charging policies also have to be consistent with the values placed by society on these factors.

As suggested above, incorporation of the external costs into investment decisions and sector policies is unlikely to fundamentally change the comparative costs of the different modes. However, in a number of specific market segments and transport tasks, incorporation of external costs could make a difference to the outcome.

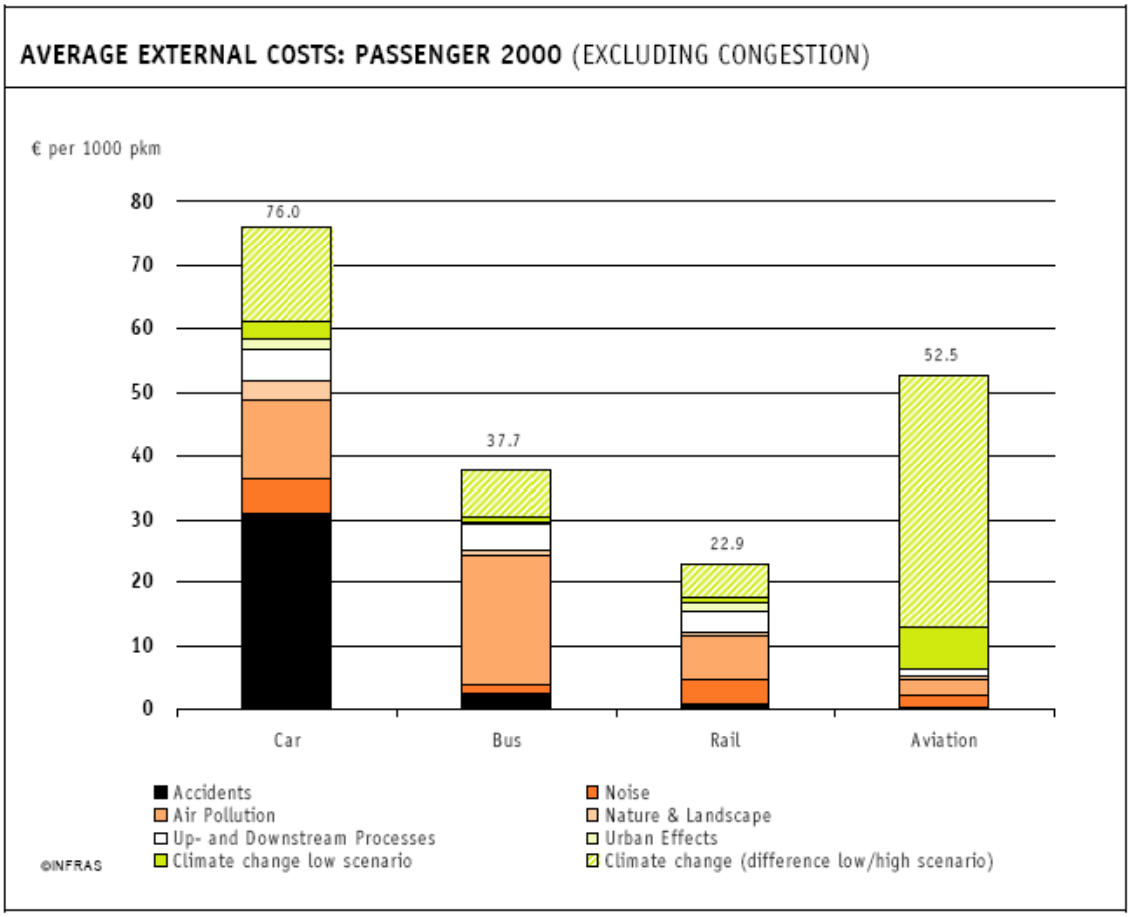


Figure 2 Average external costs 2000 (EU 17) by means of transport and cost category: Passenger transport. The high value of climate change costs in aviation is due to the higher global warming effect of aviation's CO_2 emissions at high altitude during flight (factor 2.5 used compared to the impacts of CO_2 emissions on the earth surface, based on IPCC 1999).

Source: INFRAS and IWW (2004).

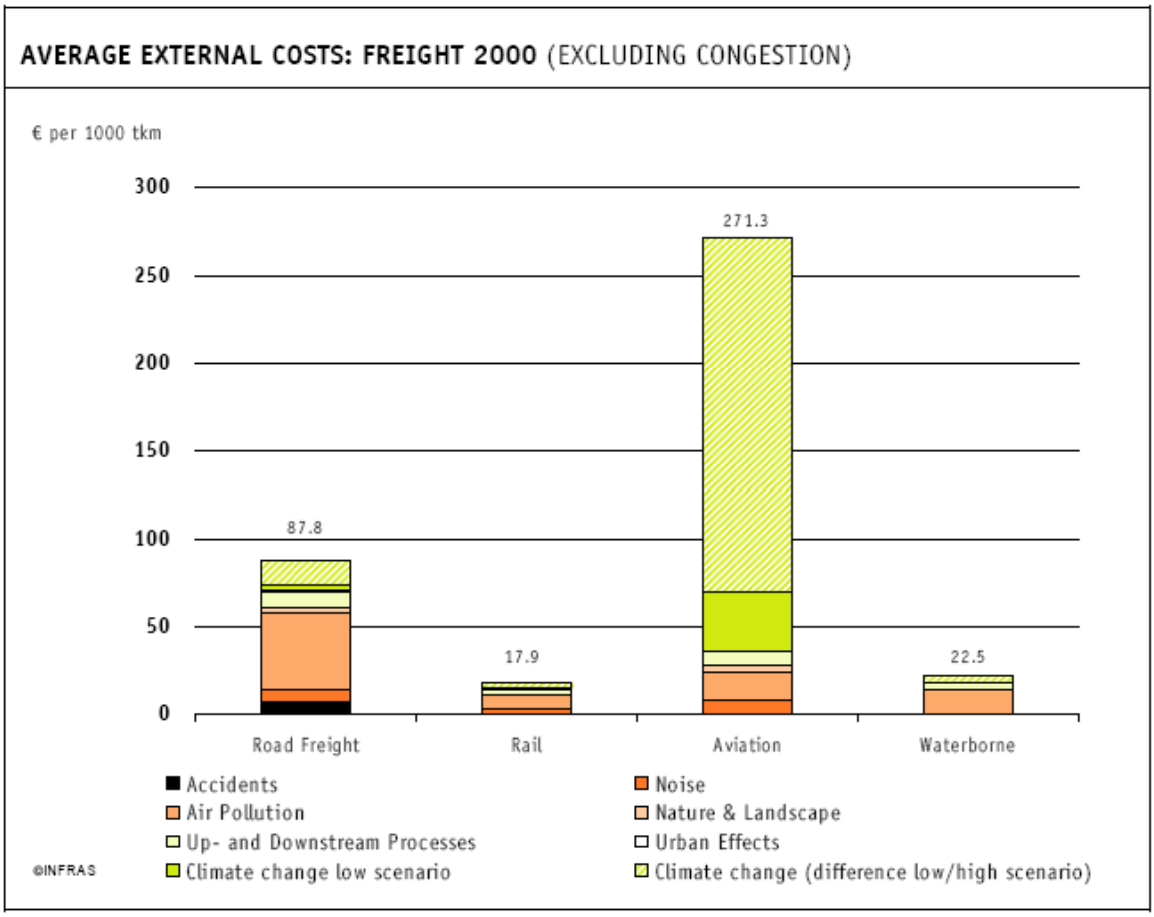


Figure 3 Average external costs 2000 (EU 17) by transport means and cost category: Freight transport. The high value of climate change costs in aviation are due to the higher global warming effect of aviation's CO_2 emissions at high altitude during flight (factor 2.5 used compared to the impacts of CO_2 emissions on the earth surface, based on IPCC 1999).

Source: INFRAS and IWW (2004).

Annexe 3: O–D SURVEYS AND DEMAND FORECASTING

O-D and other kinds of market surveys play a critical role in demand forecasting. The national O-D surveys conducted periodically (in principle every five years) appear to have had limited utility so far in improving the understanding of the factors influencing traffic demand and modal choice. It will be important to ensure that the next national O-D survey in 2011 incorporates design features to remedy this situation.

This should be aimed at obtaining the following information from a sample in each of the corridors that are important for rail passenger transport:

- passenger origin, destination, journey purpose;
- kind of access mode, cost and travel time on the access mode – so as to make possible an estimate of the total journey time and cost;
- frequency of travel on the particular route and information on any other modes used in the past;
- reasons for choosing rail and reasons for not selecting alternative modes;
- likelihood of selecting another mode in the future if improvements were made to such other modes;
- what would be the response to a change in the fare of 15 percent, 25 percent and 40 percent.

REFERENCES

de Graaff, T., G. Debrezion, and P. Rietveld. 2009. De invloed van bereikbaarheid op vastgoedwaarden van kantoren, (*The impact of accessibility on real estate values.* Tijdschrift Vervoerswetenschap, Delft.

INFRAS and IWW. 2004. *External Costs of Transport – Update Study, Final Report.* Study on behalf of International Union of Railways (UIC), Zürich.

INFRAS, C.E. Delft, Fraunhofer Gesellschaft–ISI, and University of Gdansk. 2008. Handbook on estimation of external costs in the transport sector. CE Delft, Delft.

IWW and Nestear. 2009. *Internalisation of External Costs of Transport: Impact on Rail.* Institute for Economic Policy Research (IWW) of the University of Karlsruhe and the *French Nouveaux Espaces de Transport en Europe - Applications de Recherche* (Nestear). On behalf of the CER, Brussels.

Pacific Consultants International, and Almac Corporation. 2004. The Study on Integrated Master Plan for Jabodetabek.

Peterson, G.E. 2009. *Unlocking Land Values to Finance Urban Infrastructure.* The World Bank/PPIAF, Washington D.C.

UNEP. 2002. Industry as a Partner for Sustainable Development: Railways. UNEP Publications, Paris.