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Transport Development Priorities in Papua and West Papua



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Transport Development Priorities in Papua and West Papua



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INDONESIA PAPUA BARAT AND PAPUA PROVINCES

-  MAIN AIRPORTS
-  MAIN PORTS
-  PROVINCE CAPITALS
-  REGENCY (KABUPATEN) CAPITALS
-  MAIN CITIES/TOWNS
-  INTERNATIONAL BOUNDARIES
-  PROVINCE BOUNDARIES

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Currency Equivalents

Currency unit	=	Indonesian Rupiah (IDR)
USD	=	IDR 10,204 (July 1, 2009 - assumed 10,000)
IDR 10,000	=	USD 0.98 (July 1, 2009 - assumed 1.00)

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This report is intended as a companion piece to the broader World Bank report: *Investing in the Future of Papua and West Papua – How Can Infrastructure Contribute to Sustainable Development in Indonesia's Most Remote Region*. This report was drafted alongside that report using all of the same missions, meetings and resources.

The team is grateful to the representatives of the central, provincial and kabupaten/kota governments and members of the private sector and civil society that made time to meet and provide guidance during the preparation of this report.

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Preface

The Province of Papua of the Republic of Indonesia was provided Special Autonomy under Law 21/2001 in recognition of the fact that “the management and use of the natural wealth of Tanah Papua has not yet been optimally utilized to enhance the living standard of the natives, causing a deep gap between the Papua Province and the other regions, and violations of the basic rights of the Papuan people.” The goal of Special Autonomy was to help Papua and Papuans catch up to the rest of Indonesia in terms of living standards and opportunities.

Yet, now almost a decade later – and after the split into two provinces: Papua and West Papua – progress toward this goal has been slow. In recognition of this, the Indonesian central government issued Presidential Instruction 5/2007 (Inpres 5/2007) on the Acceleration of Development of Papua and West Papua instructing all relevant technical ministries to devote special attention to the two provinces and to coordinate their programs with the governors of both provinces.

Transport is a key piece of the development puzzle and is a high priority for all levels of government in Papua and West Papua. Yet, despite this, and large amounts of investment channeled toward the sector, the people of Papua and West Papua are not receiving substantially better transportation services than they were before Special Autonomy.

This report aims to set out a set of priorities that transport development must follow in Papua and West Papua if investments are to be productive and remain useful for their entire design life.

Chapter 1

Status of the Sector

1.1 Sectoral Overview and Challenges

All modes, roads, aviation, coastal shipping and river navigation play a role in the sector. Local road networks have been developed mainly to serve economic activity in and around enclave centers established mostly along the coast line and in and around a few centers in the highlands. Aviation links most of the centers of activity with each other and with other regions of Indonesia and the world. It is the means of transport for most passenger movements and for a major part of the cargo movements to and within the highlands. In this regard Papua and West Papua share characteristics with Alaska where geography has shaped a transport system heavily reliant on aviation. Coastal shipping and inland river transport are not being used to their full potential

The public sector is owner of the fixed infrastructures and is involved in managing and operating most of the fixed infrastructures. The transportation of cargo and passengers is mostly by private sector firms and state owned corporations selling their services in the market.

In their policy statements on transport, the central and regional governments recognize the critical role of transport for the development of Papua and West Papua and this is reflected in the level of funding for transport including for access to remote communities. Great emphasis is placed on developing a Trans-Papua arterial road network and to linking all Kabupaten with this network. However, Papua and West Papua have not been in a position so far to carefully develop a strategy to achieve the stated goals from the perspective of the overall economic efficiency of the Papua and West Papua transport system. With greater regional autonomy this now becomes possible.

1.1.1 High Transport Costs

While Indonesia, when compared to neighboring countries, is noted for its high transport costs¹, Papua and West Papua are impacted by additional handicaps. First, the mere effect of distance owing to a location at the outskirts of the Indonesian geographic space adds to costs of inputs; second, the thin cargo volumes contribute further to higher costs; and finally, these factors are compounded in much of the interior of Papua and West Papua owing to the difficult geology and terrain, the climatic conditions and the poor state of the infrastructure or the lack of it. As a result, transport infrastructure is costly to build and maintain; transporting goods in and out of Papua and West Papua costs more than in other regions of Indonesia, and transport within the Papua and West Papua geographic space is more costly than in other regions. For example, the indicative shipping cost from Jakarta to Jayapura at IDR 4,800,000/ton is higher than for any other destination in the archipelago. A bag of cement which costs IDR 50,000 in Jakarta or Surabaya will cost IDR 75,000 in Jayapura and IDR500,000 in Wamena. As the economy of Papua and West Papua is in the early stages of development, its growth is dependent on exchanges with other regions of Indonesia and the world and these exchanges are penalized when transport costs are high.

Owing to these factors, the key task of the sector – to ensure that low cost² and appropriate transport is available to serve the needs of the economy at the right place and the right time takes on unique challenges for decision makers.

1.1.2 Improving Access for Remote Communities

The majority of the population of Papua and West Papua is living dispersed in the rural areas. To ensure that this population has access to essential services and economic opportunities at an affordable cost to society is another major challenge owing to the nature of the geography and terrain, the dispersed settlement pattern and the low density of population. It involves selecting the most cost effective transport mode and technology, finding the right balance in allocating funds to this task, and the right implementation approach.

1.1.3 Transport for Extractive Industries and Logging

The transport requirements of extractive industries and logging activities present a different challenge. The Papua and West Papua governments are not only faced with the question to what extent and how they should become involved in providing transport infrastructure to facilitate or promote extractive, industrial and logging activities, they are also being solicited by private parties who propose to provide infrastructure in exchange for mining or logging rights covering huge geographic areas. This challenge involves finding the right approach and the right balance between the role of regional/local government and the private sector in matters that will have consequences for generations to come.

1.1.4 Institutional Change

Decentralization, while providing opportunities for more effective development has also brought with it daunting challenges for the newly empowered local governments. The rapid increase in the number

1 The high transport and logistics costs affecting Indonesia's foreign and domestic trade are the result of many factors, but it is generally recognized that government regulatory policies in the past have been the major contributing factor. Government is beginning to address the issues but it will take time before these efforts deliver results.

2 Transport costs are considered here from the point of view of the PWP economy, including the costs of both infrastructure provision and of operations. This cost concept is different from the price paid by users of transport for transport services (freight rates for goods transport and tariffs for passenger transport). In the case of road transport for example, these prices do not include the cost of the infrastructure as in Indonesia road user charges in the form of taxes on vehicles, fuels and other inputs and fees only cover a small fraction of the cost of the road. Thus, when the price of goods for consumers is lowered following costly road construction the cost for the economy can have been increased if an alternative transport solution would have been more economical.

of local governments, from 11 in 1999 to 38 in 2009, combined with a dramatic increase over the same period of their expenditure authority has presented these newly created entities with the challenge to start functioning without the benefit of all the essential physical and human resources, and often without adequate institutional readiness. Such a development would have overwhelmed the institutional capacity of even the most experienced local government.

1.2 Roads and Road Transport

1.2.1 The Road Network

Three levels of government are involved in the management of the road network as can be seen in tables 1 and 2. Data on the road network by administrative class have been in a state of flux in recent years following new construction and changes in administrative status³. Based on provincial data, the network in Papua Province was 16,899 km in length in 2006 including some 13,489 km of Kabupaten roads while in West Papua the network was 5,184 km in length in 2007 of which 3,882 Kabupaten roads (Tables 1 and 2). In addition, there are village roads which are estimated to total about half that of Kabupaten roads, or some 7,500 km. Table 3 shows the length of the Papua and West Papua road system in 2006 based on data from Bina Marga and consolidated data from the two provinces for 2006/07. Some proportion of these roads, in particular Kabupaten roads, may not be in use because of impassable sections. In light of these figures, and for evaluation purposes, it is assumed that the extent of the Papua and West Papua road network amounts to some 20,000 km at end 2008. When related to population, this gives a road density (road km per 1000 people) of 6.7 which is well above the average for Indonesia (1.3) and other Asian countries. However, road density in terms of total land area (road km per 1000 km²) at 47.6 is well below the average for Indonesia (174) and most other Asian countries.

Table 1: Road Network - Papua Province (km)

Year	Administrative Class			Surface type				Total
	National	Provincial	Kabupaten	Asphalt	Gravel	Earth	No Data	
2004	267	576	2,029					2872
2005								
2006	1848	1562	13489	3222	4457	6131	3089	16899
2007								

Source: Papua in Figures

Table 2: Road Network West Papua Province (km)

Year	Administrative Class			Surface type				Total
	National	Provincial	Kabupaten	Asphalt	Gravel	Earth	No Data	
2004								
2005	345	487	1115					1947
2006	345	488	1122					1955
2007	616	686	3882	1137	2226	1804	17	5184
2008								

Source: West Papua in Figures

³ Based on Bina Marga data, the following changes occurred in the length of the road network between 2000 and 2006: nationwide, national roads increased from 26,271 km to 34,629 km, provincial roads decreased from 46,032 km to 33,612 km, and district roads increased from 223,318 km to 249,080 km. In PWP national roads increased from 1,702 to 2,303 km, provincial roads decreased from 1,873 km to 1,210 km, and Kabupaten roads increased from 9,140 km to 12,438 km.

1.2.2 Road Surface and Condition

Based on the provincial data some 4,350 km of roads or 22% are paved (asphalt surface) while 15,650 km or 78 % are unpaved (gravel and earth surface). This indicates that the percentage of paved roads is below the average for Indonesia (55%) and most other regions of the world.

Table 3: Road Network - Papua and West Papua (km)

Year	Administrative Class			Surface type				Total
	National	Provincial	Kabupaten	Asphalt	Gravel	Earth	No Data	
2006*	2,303	1,210	12,438					15,951
2006/2007**	2,464	2,248	17,371	4,359	6,683	7,935	3,106	22,083

* Bina Marga data

** Provincial data

Information from three different sources on the condition of the Papua and West Papua road network is not conclusive. Data for a subset of 9,358 km of roads in Papua Province (Table 4) indicate that 31 % of the roads are in good condition while 41% are in bad condition. For West Papua Province, condition data for a subset of 964 km of national and provincial roads indicate that 22% are in good condition and 57% in poor and bad condition. The Indonesian Road Management System (IRMS), which has a nationwide database for national and provincial roads, also provides information on road condition. Information for the year 2004 and relating to a total of 3,011 km of road covering both Papua and West Papua provinces suggest that if the subsets of data are fully representative there would not be a significant difference between the road condition in Papua/West Papua and the average for Indonesia. Finally, data for the year 2006 prepared by Bina Program, suggest that the condition of the Papua and West Papua road network is significantly below the average for Indonesia: 70 % of the roads are in poor or bad condition compared to 49 % for Indonesia as a whole. Furthermore, data from the same source for national roads for the period 2000 – 2006 indicate that on average 15 % of national roads were in poor to bad condition in the country as a whole whereas the percentage for Papua and West Papua was 55%.

Table 4: Condition of the Road Network - Papua and West Papua and Nationwide (by source)

Data Source	Road Length (km)			Condition (%)					Total
	National	Provincial	Kabupaten	Good	Fair	Poor	Bad	No Data	
IRMS 2004 Indonesia	26,828	45,519		29	52	11	2	6	100
IRMS 2004 Papua and West Papua	1706	1305		24	63	10	0	3	100
Papua Subset	1411	1298	6650	31		28	41		100
W Papua Subset	964			22	21	25	32		100
Bina Program Indonesia 2006	34,506	33,612	249,080	22	29	31	18		100
Bina Program Papua and West Papua 2006	2,303	1,211	12,438	12	18	28	42		100

1.2.3 Road Construction

Qualitative data suggest that there is a higher incidence of early road failures than in other regions of Indonesia and most of the world. This is understood to be caused by a combination of several factors including: engineering designs that are not appropriate for the difficult terrain and soil conditions; resulting cost estimates and budgets that are inadequate; poor construction quality and construction supervision the impact of which is subsequently compounded by inadequate maintenance.

Topography, soils and climate have a major impact on road construction. Almost 25 % of the total land area is covered with mangrove, swampy forest and swampy shrub, accounting for the fact that about 22 % of the land area is comprised of peat soils (also referred to as histosols). In addition, more than a quarter of the land area is estimated to be made up of entisols which are very young soils occurring mainly on recent alluvium or on steep slopes where soil erosion takes place, or on coastal deposits. The prevalence of these soil conditions combined with the topography of the terrain and the heavy rainfall suggest that there is a higher incidence of very fragile soils than in the rest of Indonesia and most other parts of the world. This characteristic of the soils clearly has important implications for the selection of road building corridors, designs and on road building costs.

Poor construction quality is in part caused by weaknesses of the contracting industry. But the industry itself is faced by several issues which constrain its development and which among other result in significantly higher costs for road works in Papua and West Papua than in the rest of Indonesia, estimated to be on the order of 35%⁴. These issues include: (i) the high costs of inputs in general, a factor which is exacerbated in the highlands where the cost of some inputs can be a multiple of that in the coastal ports; (ii) delays in payments which affect the contractors' cash flow, and his ability to fully utilize his resources (iii) the relatively small size of most contracts which impacts the ability of the contractor to bring expensive, but more efficient, equipment to the work site.

1.2.4 Road Use

The fleet of passenger cars, trucks and buses of Papua and West Papua totaled some 59,333 units in 2006/7 (table 5) with over half of the vehicles in the truck and bus category which is an indication that the economy is at an early stage of development. Motorization is still low at 19.8 vehicles per 1000 of population compared to 43.9 for Indonesia as a whole. In terms of vehicles per km of road, at a level of 3, motorization is also very low compared to the average for Indonesia which was 24.6.

Table 5: Number of Motor Vehicles by Type - Papua and West Papua

	Cars	Trucks	Buses	Sub Total	Motor Cycles	Total
Papua 06	21,577	11,821	14,371	47,769	195,485	243,254
W Papua 07	5,228	4,127	2,149	11,564	58,756	70,320
Total Papua and West Papua	26,865	15,948	16,520	59,333	254,241	313,574

As can be expected from the above figures on the vehicle fleet, average traffic levels on the Papua and West Papua roads remain low compared to other regions of Indonesia. But there are huge differences between the different parts of the network. Traffic levels on the main roads in the urban and sub-urban areas of the larger cities are in a range of 5,000 – 10,000 vehicles/day and in a range of 1,000 to 5,000 in a second tier of cities. On roads in the rural areas traffic levels are estimated to be in a range of 10 -150 vehicles/day.

⁴ Under the World Bank EIRTP project, costs of road rehabilitation works in PWP were estimated to be 36% higher than in other parts of Eastern Indonesia, while for betterment works costs in PWP were found to be 40% higher.

1.3 Waterborne Transport

In Papua and West Papua waterborne transport comprises a variety of elements including: ports, domestic inter-island shipping, coastal shipping, ferry crossings and inland navigation. While the two provinces are dependent on waterborne transport (and aviation) to a much greater extent than regions that are part of a continental land mass where road transport and rail play a much more significant role, the potential of the natural and associated man-made assets is insufficiently exploited.

1.3.1 Ports

There are 21 commercial ports equipped with quay facilities in Papua and West Papua of which 10 in Papua province and 11 in West Papua. In addition there are about an equal number of Pioneer ports. The 21 ports are relatively small with total quay length exceeding 200 m only in Jayapura, Merauke and Sorong. Traffic volumes in most of these ports remain modest in the range of 50,000 to 750,000 tons per year. Only in Jayapura is there a significant amount of container traffic on the order of 50,000 TEU/year.

Table 6: Ports in Papua and West Papua

Quay length (m)	Papua		West Papua	
	Commercial ports	Pioneer Ports	Commercial Ports	Pioneer Ports
< 50	3	8	2	
50 < < 100	4	3	5	14
100 < < 200	1		3	
200 <	2		1	
Total	10	11	11	14

Source: Papua Province: Dinas Perhubungan Papua
West Papua Province: Studi Transportasi Irian Jaya Barat, December 2007

Six of the 21 commercial ports in Papua and West Papua are part of Indonesia Port Corporation IV (Sorong, Jayapura, Biak, Merauke, Manokwari, Fakfak) while the remaining ports are administered by the Directorate General of Sea Transport (DGST) of the Ministry of Transport (MOT). These port administration arrangements may change at some point in the future following implementation of Shipping Law 17/2008 (section 1.2.3). Responsibility for navigation infrastructures outside of the port basin, such as access channels and breakwaters are the responsibility of the central government and the related harbor charges are collected by central government. This arrangement is expected to continue in the future.

1.3.2 Shipping

Several shipping lines have regular cargo operations in Papua and West Papua. For passengers, P.T. Pelni the state owned shipping line is by far the main player operating scheduled passenger ships serving the main Papua and West Papua ports. Shipping – whether inter-island or coastal – is affected by conditions in the Indonesian shipping industry in general the efficiency of which is below best practice. Many factors have contributed to this situation, and in particular the maritime sector policies pursued in the past. Regulations covering many aspects of the industry, including on entry and exit, routes and tariffs, vessel age, vessel specifications and vessel sourcing have stifled entrepreneurship and innovation. Other factors include the failure to modernize the legal (ship mortgage) and financial sector framework affecting ship finance, and ineffective policies relating to the ancillary service industries such as ship building and ship repair. Indicative of the unsatisfactory state of the shipping industry is that the general cargo fleet

registered in Indonesia around 2004 was composed predominantly of small and relatively old vessels with almost half of the fleet less than 1000 DWT and about two thirds being more than 25 years old.⁵

The new shipping law is addressing some of these issues and simplifies licensing for inter-island and coastal shipping somewhat. However, in regard to liner services the law provides for continuation of the current system requiring the shipping companies to be part of a system-wide network of routes serving the whole archipelago, and to be determined jointly by DGST and the national association of shipping lines

Freight rates for goods are unregulated and can be agreed by shipping lines and cargo owners on a commercial basis. Indicative freight rates are as follows: Jayapura - Surabaya IDR 3,965,000/ton, Manokwari - Surabaya IDR 3,090,000/ton and Jayapura - Manokwari IDR 875,000/ton. Economy passenger fares are regulated by DGST. PT Pelni, a state owned enterprise, is the main provider of passenger services and has been receiving government support mainly by way of equity injections in the form of vessels entered on its books at no charge to the company. The fare on the Pelni services for economy class travel from Jayapura to Sorong is IDR 286,000. The new Shipping Law reaffirms the current regime whereby freight rates for goods can be agreed freely between the shipping company and the shipper. For passenger fares the law reaffirms the powers given to DGST to set passenger fares for economy class passengers.

1.3.3 Pioneer Shipping

Indonesia has had a long standing policy of providing subsidized shipping services through a program called Pioneer Shipping with the objective of providing access and transporting essential goods to remote regions at affordable rates. Pioneer shipping is mainly concentrated in Eastern Indonesia and Papua and West Papua routes figure prominently in the program. In 2002/2003, 4 of the 21 base ports were located in Papua and West Papua and about 20 of the 49 routes were making calls in Papua and West Papua ports. The routes are reviewed periodically in relation to needs and available funds which are provided under the APBN budget of DGST. While the objective is worthwhile in itself, the subsidy mechanism that has been employed has not been effective. This consists of paying the shipping company operating a route the difference between: (i) pro-forma calculated total operating costs plus a 10% profit margin; and (ii) the revenues as reported by the shipping company. This formula enables the companies to receive subsidies covering their total costs regardless of operating efficiency, the amount of cargo and passengers carried and the quality of service. A review of the performance of Pioneer Shipping carried out under the Stramindo Study⁶ for the period 1994-2002 found that load factors were very low and that the average revenue represented not more than 11% of the subsidy received.

Tariffs are regulated by Minister of Transport Decree, the latest having been issued in 2002 (KM 86/2002). Under this tariff schedule a 250 mile (460 km) trip would cost IDR 22,650. Cargo for the same trip would be charged IDR 20,385/ton/m³ (90% of the adult fare). This is no doubt a very affordable fare but given the poor service provided by Pioneer shipping it is doubtful that Papua and West Papua and the other regions in Eastern Indonesia are well served by the program in its present form. That the services are not up to expectations is evidenced by the fact that over the 9 year period covered by the analysis on average only 279,000 passengers and 93,000 tons were carried annually by the 37 vessels deployed with an average of 22,000 DWT in total. The new shipping law reaffirms the commitment to Pioneer Shipping services to remote areas where commercial operations are not viable with sufficient frequency, reliability and safety. The law allows contracting out of the services on the basis of long term contracts. This may provide an opening for introducing a more effective mechanism for awarding the contracts competitively

5 Indonesia Country Report: Promoting Efficient and Competitive Intra-ASEAN Shipping Services, March 2005. ASEAN Secretariat.

6 Study on the Development of Domestic Sea Transportation and Maritime Industry in the Republic of Indonesia, 2004.

based on minimum subsidy requested and clear performance criteria along the lines of a public service obligation.

1.3.4 Ferries

Ferries represent another important element of the Papua and West Papua transport system. These are considered as land bridges connecting roads on different islands and come under the authority of the Directorate General of Land Transport (DGLT) but with DGST responsible for the licensing of the vessels. The DGLT goal is to increase the number of ferry routes providing regular services and connecting the Papua and West Papua mainland and the smaller islands along its coast line. It also has a program of subsidized Pioneer Ferry routes which are operated by ASDP the publicly owned ferry transport corporation. Out of a total of 106 routes in operation in 2007, 68 were Pioneer routes. The total subsidy amounted to IDR 85,900 million.

1.3.5 Inland Navigation

In contrast to inter-island and coastal shipping, inland navigation is not well developed in Papua and West Papua but is beginning to receive greater attention. Studies have recently been initiated to assess the situation and the scope for development of river navigation in a number of areas. At present, commercial navigation on the Digul and Mamberamo rivers is not well developed, port facilities are very rudimentary and navigation aids are practically non-existent. There is also small scale river navigation using traditional boats and speed boats on dozens of smaller rivers all along Papua and West Papua's coast line. A first reconnaissance study on river transport in Papua and West Papua was completed in early 2009.

For freight, tariffs are not governed by Government Decree and can be negotiated between cargo owners and transport operators. Rates are variable depending on many factors, including season of the year, navigation conditions, and type of cargo. Tariffs for passenger transport are set by Government Decree

There is also potential for expansion of navigation on Lake Sentani through establishment of services connecting the various communities living on the shores of the lake and introduction of better frequencies in the services. This is currently being considered by the local government.

1.4 Air Transport

1.4.1 Airports

Papua and West Papua are heavily reliant on air transport as is evidenced by the fact that out of the 188⁷ airports forming part of Indonesia's public air transport system 91, or 48 % are located in Papua and West Papua while the land area of Papua and West Papua is 22 % and the population is just over 1 % in the total. Papua and West Papua have a density of 30 airports per million people as compared to 0.8 for Indonesia as a whole. In terms of airports per land area (per 10,000 km²) the density is 2.2 whereas for Indonesia it is 1. Most of the airports, however, are small and are of the category of Pioneer Airports. This is illustrated in Tables 1 and 2 below for Papua and West Papua Provinces

⁷ As reported in the Master Plan Study of the Air Transport Sector in the Republic of Indonesia, 2004. This total includes Timika airport which was developed and is operated by PT Freeport Indonesia, but is in public use.

Table 7: Airports in Papua Province by Category, Runway Length and Runway Surface

Runway Length	Airports				Pioneer Airports				
	Total	Asphalt	Penetration Macadam	Other	Total	Asphalt	Penetration Macadam	Grass	Concrete
L < 800	10	4	5	1	27	2	11	14	
800 < L < 1200	3		3		2		2		
1200 < L < 1800	4	3	1		2		1		1
1800 < L < 2400	4	4							
2400 < L < 3000									
3000 < L	1	1							
Total	22	12	9	1	31	2	14	14	1

Source: Dinas Perhubungan, Jayapura 2008.

Table 8: Airports in West Papua Province by Category, Runway Length and Runway Surface

Runway Length	Airports				Pioneer Airports				
	Total	Asphalt	Penetration Macadam	Other	Total	Asphalt	Gravel	Grass	Other
L < 800					31	1	1	24	4
800 < L < 1200	1	1			2		2		1
1200 < L < 1800	1	1			1	1			
1800 < L < 2400	2	2							
2400 < L < 3000									
3000 < L									
Total	4	4			34	2	3	24	5

Source: Dinas Perhubungan dan Komunikasi, Manokwari, 2008

In addition there are several hundred airstrips scattered over the territory catering for small aircraft with a carrying capacity of up to 15 passengers, which have been developed by local communities, non profit (mainly religious) organizations and recently also by local governments. These often play an essential role in providing access to small isolated communities.

Four airports – Biak, Jayapura, Sorong and Timika - have traffic volumes greater than 200,000 passengers per year with Jayapura well in excess of 500,000. A second group of four airports – Manokwari, Nabire, Merauke, and Wamena – have traffic volumes in the range of 50,000 – 200,000 passengers per year. The remaining airports have much lower traffic with many only a few thousand passengers per year.

With the exception of the airports of Biak and Timika all airports in Papua and West Papua are administered by the Directorate General of Air Transport (DGAT). The airport of Biak forms part of Airport Corporation II while the airport of Timika is a privately developed and operated airport which is also in public use. These airport administration arrangements may change at some point in the future (section 1.2.4).

Regional governments and the users of air transport are primarily concerned with airport facilities and the quality of air transport services. However, in addition to the landside and airside facilities of airports, an air transport system comprises many elements which need to function in a well coordinated and integrated manner, including: visual landing facilities, air traffic management, communications, navigation and surveillance. These are part of a national system on which regional government has no or little control. A whole range of advanced technologies, which are rapidly evolving, are used in these various elements. In

addition, technologies and procedures in these areas are governed by international standards, norms and guidelines with a focus on aviation safety and these are necessarily managed at the national level.

1.4.2 Airlines and Airline Deregulation

Following deregulation of the airline industry in 2001 (Ministerial Decree KM 11/2001 on Commercial Airlines) the number of scheduled and charter airlines has increased rapidly. In 2000 there were 117 aircraft in operation and in 2006 this number had grown to 226 with 31 registered airlines. Some 15 airlines have operations in Papua and West Papua including the two airlines operated by missionary organizations. In 2008 11 airlines had operations at Wamena airport.

Deregulation of the airline industry also brought about a major reduction in fares and tariffs in the aviation sector in Indonesia. In the years following deregulation airlines started offering economy fares that were below the official tariffs promulgated by the Ministry. In the event, in February 2006 the Ministry issued a Decree with revised economy fares that were on average 46% lower than the fares indicated in the Decree of February 2002. Actual fares, however, will depend heavily on conditions in the market and can be close to the new reference fares or much above. So, for example, while the economy return fare between Jayapura and Wamena is in the range of IDR 1,000,000 – 1,500,000⁸, the reference fare based on the 2006 Decree is only IDR 358,000. For freight, the tariff between Jayapura and Wamena is on the order of IDR 9,000/kg which in terms of ton/km is on the order of IDR 37,000. These rates could come down further judging by air cargo rates under efficient operations in other countries⁹.

The deregulation policy that was pursued at the national level since the late 1990s established an environment that was relatively liberal and allowed the airline industry to expand and serve the needs of a growing economy. It was not accompanied, however, with sufficient attention to aviation safety issues. This is being corrected as evidenced by enactment of a new aviation law in December 2008, which has a strong focus on aviation safety. For Papua and West Papua this is particularly important given its heavy reliance on air transport.

1.4.3 Pioneer Services

In aviation government has also had a long standing policy to improve access to communities in remote areas by operating or providing support for so-called Pioneer services. These are services on routes that are not commercially viable and require a subsidy. At present these are contracted out annually to commercial airlines on the basis of a competitive selection. The current indicative plan of the Dinas Perhubungan of Papua Province expects a gradual reduction of the number of Pioneer services following annual evaluation of the routes and upgrading of some to a commercial route.

The fares for Pioneer services are set by Ministerial Decree, are heavily subsidized and are intended to be affordable for the people living in the remote locations. They are adjusted periodically to reflect inflation. Under the tariff that became effective in May 2008 the fare, for example, from Jayapura to Oksibil a distance of about 250 km is IDR 131,000 and cargo is charged at IDR 1000/kg. The fare from Wamena to Dekai is IDR 50,000 and for cargo it is IDR 400/kg. The new aviation law (Section 1.2.2.2) provides for continuation of the long standing policy to improve access to communities in remote areas by operating or providing support for so-called Pioneer services.

⁸ This fare level is comparable to fares under competitive conditions in other countries.

⁹ In Alaska cargo rates can be in a range of IDR 10,000 – 25,000 ton/km depending on volume and route.

Chapter 2

Recent Developments

2.1 Past Government Expenditures in Transport

2.1.1 Sector Overview

Transport has received high priority in government expenditures. Total expenditures on all transport modes combined are estimated to have totaled some IDR 4.6 Trillion in 2007 representing almost 20 % of total expenditures in the two provinces (Table 1). Available data suggest that expenditures on transport have grown faster than total expenditures of all levels of government combined. The expenditure data also indicate a very strong emphasis on road development, with road expenditures accounting for almost 15 % of total government expenditures and about 75 % of transport sector expenditures. In recent years one of the main manifestations of this emphasis has been the construction of road sections as part of a number of Trans Papua links. The pursuit of such road works can be understandable when viewed from some development experiences in other regions of Indonesia and the world at large where population density is high and economic activity is already spread more evenly across the territory. In the case of Papua and West Papua, the key question is whether the transport needs of the productive sectors and improved access for remote communities cannot be better served through a different combination of investments and whether road building projects on a massive scale are the best use of available resources at this point in time.

Table 9: Total Expenditures and Expenditures in the Transport Sector - Papua and West Papua

IDR billion		2004	2005	2006	2007
Total Expenditures by Source of funds	APBD total	8,379	8,347	12,695	18,694
	Deconcentration	1,312	973	992	930
	Central Govt	0	2,065	3,378	4,023
	Total	9,691	11,386	17,064	23,647
Roads Expenditures	APBD Public Works Exp	520	1,115	2,737	4,031
	Share Roads ¹⁰	0.70	0.70	0.70	0.70
	APBD Roads Exp (Estimated)	364	781	1,916	2,821
	Central Govt	241	278	418	478
	Total Roads	605	1,058	2,333	3,299
	Roads as % of total exp	6.2%	9.3%	13.7%	14.0%
Other Transport Modes Expenditures	APBD	87	114	170	637
	Central Govt	352	268	495	644
	Total Transport (MOT)	439	382	665	1,281
	Transport as % of total exp	4.5%	3.4%	3.9%	5.4%
Total roads and other modes of transport		1,044	1,440	2,998	4,580
Roads and Transport as % of total expenditures		10.8%	12.6%	17.6%	19.4%

Source: Based on MOF data

2.1.2 Roads

Estimated Papua and West Papua expenditures on road works experienced a strong increase in 2006 and 2007 reaching almost IDR 3 Trillion. Expenditures were mainly directed at expanding the size of the road network. The increased allocations to road works do not appear to have been matched by improvement in road condition.

Information at the project level indicates that road works are implemented on the basis of a large number of small contracts which are executed in parallel. This approach results in a significant loss in benefits compared to an alternative where projects are prioritized and then implemented sequentially through larger contracts and at a faster pace (section 3.4.1.4).

The available aggregate data do not permit to separate out the funds allocated to road maintenance, but information provided by staff at various levels indicates that maintenance expenditures, in particular routine maintenance, have been substantially below requirements. An allocation of IDR 1 million per km is reported to be provided whereas an adequate level would be on the order of IDR25 million. In addition, the execution of routine maintenance works is generally well below good practice standards and this is the result of several systemic factors which are present with varying degrees of seriousness in most regions in Indonesia. These include:

- Maintenance generally has a low profile within the activities of the central and regional road agencies, this being related to the traditional low funding levels and an image of being a "low tech" activity
- A curative rather than a preventative approach to maintenance
- An ad-hoc approach as opposed to a systematic approach spread over the year and covering the whole network. For example, routine maintenance activities are generally included as part of periodic maintenance or betterment contracts on adjacent road sections. Under this approach, which certainly has merits, maintenance may not receive the highest attention of the contractor and supervision consultant and will cease when the main contract works are completed.

¹⁰ Estimate based on the 2008 proposals by local governments for APBD expenditures on roads

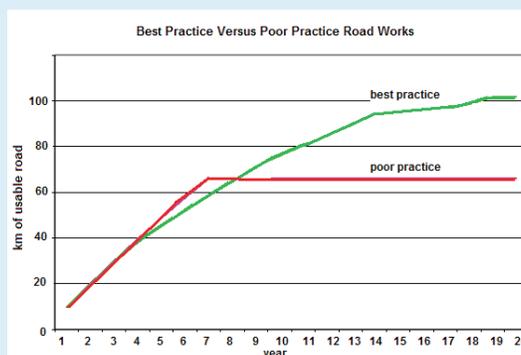
- Late release of budgetary funds which often results in funds lacking when the requirement is the greatest or the potential impact of timely intervention is the most significant.

The issues causing poor construction quality (section 1.2.3) combined with poor maintenance policies and practices produce poor value for money. This is illustrated in Box 1 by way of a simulation contrasting “best practice” and “poor practice” road works.

Road Traffic and Transport. Expenditures on such items as traffic lights in cities, signalization, road markings, bus terminals come under the Road Traffic and Transport agencies of MOT. The share of these expenditures under the APBD budget was estimated at 13 %.

Box 1: Comparison of “Best Practice” versus “Poor Practice” Road Works Policy

Given that different road building policies and practices have different outcomes, it is instructive to explore the differences through a simulation analysis. Consider the case of a kabupaten government that wishes to open up and develop a region by building a network of local access roads and is able to allocate a fixed annual amount for this purpose. The interesting question is: what will be the outcome in terms of total number of km of roads in use and their condition after a 20 year period under alternative policies. For illustrative purposes best practice policies are contrasted with “poor practice” approaches and it is assumed that the annual budget available for the development of the new network is IDR 10 billion. It is assumed further that the terrain, availability of materials and traffic volume (10 – 30 vehicles/day) warrant construction of a single lane gravel road at a cost of IDR 1 billion/km. Thus, it will be possible to build 10 km of road during the first year of the program under both scenarios.



Scenario 1. This scenario is based on the following: designs and alignment have been selected carefully taking into account the kind of terrain and soil conditions; construction quality is of best practice standard; and routine and periodic maintenance allocations are adequate and carried out professionally. Under this scenario the roads built every year receive periodic maintenance at 6-year intervals and have a 20-year life before there is a need for reconstruction. Given the budget constraint and the commitment to proper maintenance, under this scenario, starting in year 2 and during subsequent years, the number of km that can be built will decline gradually to only 1 km at the end of the 20 year period. By that time some 102 km will have been built which are kept in good condition (see graph).

Scenario 2. This scenario is characterized by poor designs and alignment selection and poor construction quality and maintenance practices. Maintenance takes the form of ad-hoc interventions to deal with emergencies such as landslides and mud slides that engulf sections of the road; bridge failures and pavement failures; and wash-outs that require spot rehabilitation to keep the road open. This set of policies and practices requires emergency interventions in years 4 to 7 and shortens the life of the road to 7 years with the result that in year 8 the road needs to be reconstructed at a cost of 85 % of the original construction cost. Based on the available budget, during the first three years it is possible to build 10 km every year. However, starting in year 4 emergency maintenance in the amount of IDR 40 million is eating into the annual construction budget and the number of km that can be built declines to 7.6 km in year 7. By that time the total km built amounts to 64 km and from this point onward every year practically the full budget is needed to reconstruct roads that reach the end of their life. The useable road network will stabilize at about 64 km in the subsequent period of 7 years but it will be in very poor condition most of the time with vehicle operating costs that are substantially higher than under scenario 1.

Table 10: Transport Sector Expenditures by MOT– Papua and West Papua (IDR Billion)

		2004	2005	2006	2007
Total MOT Expenditures	APBD	87	114	170	637
	Central Govt	352	268	495	644
	Total Transport (MOT)	439	382	665	1,281
Road Traffic & Transport	Share in APBD ¹¹	0.13	0.13	0.13	0.13
	APBD Road Traffic & Transport	11	15	22	83
	Central Govt Road Traffic & Transport	21	21	25	56
	Total	33	35	47	138
Waterborne	Share in APBD ¹²	0.44	0.44	0.44	0.44
	APBD Waterborne Transport	38	50	75	280
	Central Govt Ports	117	119	198	196
	Central Govt Ferry Transport				
	Central Govt River Transport				
	Central Govt Inland Waterways & Lake				
Total	156	169	273	476	
Aviation	Share in APBD	0.43	0.43	0.43	0.43
	APBD Aviation	38	49	73	274
	Central Govt Aviation	169	119	268	335
	Total	207	168	341	609

Source: based on MOF data

2.1.3 Waterborne Transport

For waterborne transport, it is estimated that central government was the major source of expenditures until 2007 when the level of APBD expenditures in transport increased dramatically (Table 2. above) and APBD became the main funding source. The above estimates do not include expenditures in the six ports which form part of Port Corporation IV. A high proportion (between 50 – 60%) of the central government expenditures is estimated to have been spent on staff compensation and goods with the remainder on what it is termed capital expenditure. The latter is understood to comprise expenditures on: dredging works to maintain or deepen navigation channels; navigation aids; breakwater maintenance or upgrading; minor port infrastructure and superstructure; and equipment as well as repair and maintenance works. In general, funding levels appear to have been inadequate to meet growing traffic flows and the requirements to keep existing infrastructure and facilities in good operating condition.

2.1.4 Air Transport

In aviation, both central and local governments have increased expenditures in recent years. Of the central government funding, about one third was spent on staff compensation and goods with the remainder being allocated for investment in new facilities and upgrading of existing facilities. Yet, available funding appears to have been insufficient to meet requirements for aviation safety investments and investments to meet growing demand

In general, as a response to a lack of adequate funding there has been a tendency to spread the limited funding over too large a number of projects which resulted in implementation periods that often times are stretched out far too long.

11 Estimate based on the 2008 proposals by local governments for APBD expenditures in transport

12 Estimate based on the 2008 proposals by local governments for APBD expenditures in transport

Noteworthy is that in recent years some Kabupaten governments embarked on imaginative ventures such as the acquisition of aircraft. This was no doubt in large part, motivated by the goal of improving communications and connections for the benefit of the local stakeholders (government, business, and community at large). The sudden and dramatic increase in revenues, experienced by local governments in Papua and West Papua in 2006 and 2007, would have posed a challenge for any local government in any country that is concerned with obtaining the best value for money possible from the available resources. This raises interesting practical and strategic questions (Box 2).

Box 2: Aircraft Acquisition by Local Governments

Aircraft acquisition by local governments raises issues of legal and operational arrangements. As the local government will not be in a position to obtain an aircraft operating license, it needs to associate with an airline to take care of the operation of the aircraft. The aircraft will be the contribution of the local government in a joint venture. The legal structure of this joint venture entity and the agreement between the parties on how costs and income will be shared will ultimately determine the outcome of the fundamental question whether the venture is worthwhile for the local government.

To answer this question, the local government needs to compare the benefits it receives from aircraft acquisition (net income from the joint venture plus the value of other tangible benefits for local stakeholders) with the benefits of investing the equivalent funds in the financial market (return on annuity of equivalent amount) minus the cost of buying the above tangible benefits (air transport services) in the aviation charter market.

If aircraft ownership gives a better return than the annuity, then the interesting question is why this would be the case¹³, and in particular why the airline company would rather operate the aircraft owned by the local government than an aircraft that it can lease in the market under streamlined contractual agreements. Several factors could contribute to the outcome. For example, it is possible that the joint venture entity has a more favorable tax status than the aircraft leasing company; that there is a higher insurance risk premium attached to operating a leased aircraft in Papua and West Papua; or that the cost of the aircraft was unusually low. In regard to the latter point, however, the local government should naturally be wary of situations marked by asymmetric information where its evaluation of the remaining life of the aircraft is different from that by the market. In that case, the ex-post return will of course be different from the ex-ante evaluation, but this will only be revealed when the aircraft reaches the end of its life sooner than anticipated.

The possibility that in the short term the initiative by the local government has had some positive impact should not necessarily be dismissed. For example, it may have unlocked potential demand that was not appreciated by the airline industry and therefore not entertained. In the process, the local government may have contributed to the development of a better supply of air transport services. It can be expected, however, that with the advent of a more developed air transport industry and associated better market coverage and with concomitant improvements in aviation safety, local government's role in improving the supply of aviation services will not be through aircraft acquisition, but rather through ensuring that infrastructure facilities are adequate and operated efficiently.

2.2 Recent Transport Policy Initiatives

In addition to the decentralization policy enacted in 1999 and 2001 and the dramatic increase in transfers that accompanied the new policy, recently enacted laws relating to waterborne and air transport embody transport policy initiatives of significance for the development of transport in Papua and West Papua.

2.2.1 Waterborne Transport

Shipping Law 17/2008 was enacted in April 2008; implementing regulations are under preparation with a target date for effectiveness of the main provisions by mid-2010. While from the perspective of Papua

¹³ Assuming that all key parameters, such as annual and periodic maintenance costs and remaining life of the aircraft, have been properly accounted for.

and West Papua, the new law does not open the prospect of fundamental change in the regulatory and policy framework for inter-island shipping, it has the potential of bringing about some improvement and opens opportunities in three areas. In ports, the law introduces the concept of Port Authorities to be established by the Minister of Transport and to be responsible for one or more ports in a particular area. The authorities are to be based on the landlord port model and this potentially provides opportunities for introducing better management practices through operation on commercial principles and/or greater involvement of private sector operators and for cost recovery as tariff setting would be on the basis of commercial negotiation. For people's shipping (encompassing traditional sailing vessels, auxiliary sailing vessels and motor vessels of less than 175 gross tons) and river transport, the delegation of authority to local government¹⁴ for licensing opens opportunities for a proactive policy promoting this neglected component of the Papua and West Papua transport system. Not only can Papua and West Papua governments be instrumental in improving the basic elements of the infrastructure such as small coastal and river ports, anchoring places and jetties as well as land access to such infrastructures but also by playing an active role in improving the human capital through targeted training programs for owners and operators of small water craft so that the licensing conditions can begin to take into account essential competency factors. For pioneer shipping services the potential is in terms of improved arrangements for contracting with private operators. Whether these opportunities will be realized will depend in large part on how the implementing regulations will be developed and how Papua and West Papua regional and local governments will seize the new opportunities that are provided to them.

With regard to devolution of responsibility for regional/local ports to the regions, the law appears to reflect a reversal in the decentralization drive initiated under the autonomy laws of 1999 and 2001 which had envisioned that operational responsibility for the DGST administered public ports would over time be transferred to regional governments. No progress had been made in the implementation of this policy in large part because the local ports had little prospect of becoming financially viable in the near term even if they were free to set their tariffs and tariffs were raised substantially.

The new law also requires the preparation of port master plans at the national level and at the level of the respective port authorities. Provided adequate funding is provided to carry out these planning exercises to high standards, this requirement should be beneficial for the development of the port sector of the provinces.

2.2.2 Air Transport

Aviation Law 1/2009 was enacted in December 2008 and implementing regulations are under preparation at an accelerated pace in view of the urgency in introducing a new aviation safety framework which is a main focus of the law. In particular, the thrust of the law is on: the establishment of an independent agency to undertake aircraft certification and oversight functions and of a single agency to provide air navigation services; development of an airport master plan at the level of the country and for all major airports and of a national aviation security plan.

In addition to the safety oriented measures of interest to Papua and West Papua which are so heavily dependent on efficient and safe air transport there are two other provisions in the law that are potentially beneficial. First, the law provides for the establishment by the Minister of Transport of Airport Authorities responsible for one or more airports in a particular geographic area. Details on the management and oversight arrangements and tariff policies under the new regime still need to be developed and specified in Government Regulations but the law provides the basis for potentially more commercial management

¹⁴ For inland waterways and ferry transport, however, an additional license – a route permit - is still required; and inland waterway transport and ferry operators must obtain a ship operating approval.

of airports. Second, as was the case with the Shipping Law the Aviation Law introduces the requirement for the preparation of a airport master plan at the national level and at the level of the individual airports. Again provided that adequate funding is provided for this work this requirement is a welcome measure for the two provinces.

In regard to the airport administration and management regime, the new law appears to reflect a reversal in the decentralization drive initiated under the autonomy laws of 1999 and 2001 which had envisioned that operational responsibility of the DGAT administered public airports would be transferred to regional governments (provinces and Kabupaten). No progress had been made in implementation of this policy in large part because most of the regional airports had little prospect of becoming financially viable even when free to set their tariffs.

Chapter 3

Review of Expenditure Plans

The year 2009 is the last year of the current 5-year plan (2004-2009) and a preview of the next 5-year plan (2010-2014) is not available. Consequently, at present there is no formal medium term expenditure program for the transport sub-sectors. This notwithstanding, investment plans and proposed projects lists with associated indicative implementation schedules are prepared periodically and such plans and prospective investments were outlined to the mission in discussions with provincial agencies. Because resources available for planning and project evaluation have been insufficient, both in terms of staffing and funding, few of the plans have benefited from proper in-depth analysis and evaluation. Such preparation work aimed at identifying the most worthwhile investments and developing well justified expenditure programs, including detailed cost estimates, and implementation and procurement schedules is indispensable if funds are to be used to good effect. Implementation planning is also hampered in general by uncertainty regarding the level of funding that will be available.

3.1 Roads

The new road links that are being put forward at national, provincial and kabupaten level can be considered under three main headings: (i) Trans-Papua links; (ii) roads to provide access to the highlands; and (iii) roads to provide local access.

3.1.1 Trans-Papua Links

These include: road links along the northern coastline, connecting Jayapura via Sarmi and Wamena to Nabire and from there on to Manokwari and Sorong; a southern loop from Sorong via Bintuni to Manokwari; road links to connect Jayapura via Nimbotong, Lereh to Wamena and from there on to Mulia, Enarotali and Nabire; a connection from Merauke to Tanah Merah, and then via Oksibil and Ubrub to Jayapura. Existing plans appear to indicate continuation of existing projects and start of new projects on an incremental basis without prior development of a long term master plan nor careful geotechnical surveys and investigations and design work.

These investments will have a major impact on the spatial development of the economy, mainly by locking in for the very long run the location of human settlements and economic activities and these locations can prove to be wisely or ill selected. The selection of the road corridors and of the route

location within these corridors needs to take into account many aspects, including: environmental, social, land use, geotechnical, engineering, and economic factors. Outcomes affecting future generations will be very different depending on whether the planning work is done carefully and professionally or superficially or barely at all.

The second critical question is one of timing, i.e. whether the individual links selected for implementation – even if properly prepared - should proceed now or at a later point in time. Costly interregional roads designed for long distance transport of goods and people are only economically viable if they are used for transport of goods and people and typically require traffic levels on the order of 200 – 300 vehicles/day to be economically justified. Such levels are currently only observed in the immediate vicinity of the major centers of economic activity and traffic rapidly declines the further the distance from the city center. The low levels of current and prospective interregional traffic can be accommodated in most cases by coastal shipping, aviation and even river transport in a few instances at much lower cost than by road. This is because in the comparison between road transport on the one hand and air or coastal shipping transport on the other, one need not only consider the trucking cost or the cost of the passenger vehicle but also the full road construction and maintenance cost over the life of the road.

For example, the cost of general cargo transport by coastal shipping between Jayapura and Manokwari is estimated at IDR 875,000/ton. This includes the cost for both the shipping and transshipment at the ports. It is a financial cost which does not include the full infrastructure cost as there is a measure of subsidy in the port costs. Hence, the full economic cost is somewhat higher but is estimated not to exceed IDR 950,000/ton. On the other hand, under more efficient coastal shipping operations this cost would probably come down significantly to some IDR 650,000/ton. If a road alternative were available, involving a distance of some 840 km, the trucking cost is estimated to be no less than IDR550,000./ton which is of the same order of magnitude as the all-inclusive shipping cost. These estimates indicate that road transport is only competitive with shipping when the cost of the road infrastructure is ignored. But because of the terrain conditions in the road corridor, and the many river crossings the construction cost of a sustainable road is estimated on the order of IDR 6 – 10 billion/km or some IDR 7 trillion. Clearly, at this point in time major investments in Trans-Papua links would provide negative returns for the economy and available funds can be used to much greater effect when applied to maintenance and rehabilitation of existing roads where traffic levels are already substantial and to improve the efficiency of coastal shipping and air transport. There is ample time to carry out the indispensable master planning and project evaluation and preparation work as the transport demand in the road corridors will remain negligible in the foreseeable future)

3.1.2 Road Links to Provide Access to the Highlands

Plans also provide for continuation of existing road projects and start of new projects to provide access to the highlands from several coastal centers, including: Jayapura – Nimbotong - Lereh – Wamena; Nabire – Enarotali; Merauke - Oksibil – Dekai – Wamena; Timika – Enarotali; Timika – Mulia. These projects also continue to be implemented on the basis of small sized incremental contracts seemingly without the benefit of a proper overall prioritization and transport cost minimization strategy under a master plan study and without sufficient geotechnical investigations and design work.

While the question of access to the Highlands is often presented as an issue of road access, it should be recognized that successful economic development and integration of the highlands in the Papua and West Papua economic space is not necessarily contingent on road access. This is illustrated by the examples of island nations and Alaska which do not have road connections between the different subregions and yet have been able to thrive well without an integrated region-wide road infrastructure. Several of the above links are a subset of a potential Trans-Papua interregional road network. However,

because such links entail a number of more complicated issues, a separate masterplan analysis focusing on Highland access would be justified. The special issues include:

- (i) several route alternatives are already being pursued and it is not economically justified nor financially feasible to implement several alternatives simultaneously;
- (ii) the very high cost of building a road through mountainous terrain and generally fragile soils estimated to be on the order of Rp. 8 – 10 billion/km depending on alignment and design standard;
- (iii) each of these alternatives causes significant and varying environmental and social impacts the mitigation of which compounds the high costs;
- (iv) each alternative has different implications for the associated road network requirements to serve the main communities in the highlands region proper;
- (v) the alternatives have different implications for the Trans-Papua links discussed above; and
- (vi) air and river transport will continue to play a role in providing access.

It follows that the question of access to the highlands needs to be framed in terms of identifying an economically and financially viable staging of strategic transport investments over the long term. Providing the answer will involve an engineering and economic analysis of the various route options and for each of these of the alignment alternatives. The analysis should take all the above mentioned factors into account and be guided by the criterion of providing a least cost access over the long term recognizing the role that can be played by other modes in particular in the short to medium term.

Again, also in this case there is ample time to carry out a proper study and in the meantime, the efficiency of air transport access to the highlands should continue to be developed and fostered. Air transport will remain a credible alternative for the foreseeable future given its potential to provide transport at a cost in a range of Rp. 10,000 – 25,000/ton/km depending on volume and route. At current traffic levels and given the high cost of a sustainable road, total costs for the economy with a single road connection would be higher than with air transport. It is estimated that the traffic volume using the road would need to be at least twice the current volumes of air cargo coming into Wamena to make the road connection economically competitive with air transport when the costs of building and maintaining the road are included in the comparison. It follows that a road connection could be justified in about 15 years on economic grounds, without taking into consideration other important factors. This also indicates that there is sufficient time available to carry out an in-depth and comprehensive study for a staged approach for improving access.

3.1.3 Road Works to Improve Access to Remote Communities

There is great pressure from remote communities to be provided with road access and Kabupaten governments are allocating the major share of their road expenditures on such works. Because of their nature, access roads, are seldom justified on grounds of purely traffic volumes or increased economic activity and associated economic benefits. But improved transport access for these communities has many less tangible benefits which are highly valued by society. These include in particular better access to basic services such as education, health, agricultural extension as well as to safe water and agricultural inputs. Also, evidence from around the world indicates that there is a link between transport improvement and poverty reduction. However, in the case of Papua and West Papua, improvement in access is not necessarily always a matter of road connections as many communities can be better served through improvements in air connections following the construction of airstrips and improvements in coastal shipping or river navigation.

To pursue this important goal, all modal alternatives and technological options should be considered. In many parts of Papua and West Papua air strips to accommodate light aircraft and jetties for waterborne transport are estimated to be at least ten times more cost effective than roads in providing or improving access for remote communities. And in some instances telecommunications might provide an initial lowest cost step towards improved accessibility. When land connections are the only option, the challenge is to identify the most cost effective design and construction alternative. For access to very small communities and relatively short distances, improved paths suitable for non-motorized and light motorized vehicles such as motorbikes will be an alternative to be considered. Such paths would represent the last element in the functional hierarchy of the road system and would be short in length. These have already been built under the KDP program in other parts of Indonesia. The focus of the works would be on river crossings, steep slopes, and improvements in otherwise difficult terrain conditions. For implementation priority should be given to community participation, learning from and building upon the experience in other regions with such works. The challenge is, therefore, to develop better tools to: (i) identify and seek out low cost solutions, (ii) evaluate alternatives which do not yield fully comparable outcomes; (iii) and to prioritize interventions by geographic location based on cost effectiveness in terms of number of people served..

Box 3: Road Network Development in Exchange for Logging Concession

Private sector parties have made proposals to build roads in exchange for wide ranging logging concessions. This is a bad public-private partnership model for several reasons and government should not entertain such proposals. First, roads built by industrial scale logging companies would be for their own needs, linking concession areas to saw mills and ports, and will seldom be congruent with the needs of the local or regional economy both in terms of standards and network configuration. If private logging companies need specific logging tracks that do not exist to make their concessions viable, then they should be built by the companies themselves, in compliance with government safeguard requirements. If they use public roads for their operations and cause severe deterioration, then the Government should be compensated.

Second, the core expertise of logging companies is not in building public roads. This is better contracted out to professional road building companies. Third, there is no sound basis for determining contractual obligations under such agreements between government and logging companies. On the one hand, the value of commitments by the companies cannot be accurately assessed by government. Private loggers have no way of knowing in advance how much their commitment will cost them. And given the volatility of world market prices, neither party can project with confidence how much revenue the concession will generate.

If there is value for the private sector in having a logging concession, then Government should mobilize that value in royalty payments through the bidding and not through promises to build roads. With the revenue generated by the concession government can employ specialized private sector road construction firms to build the infrastructure that will serve the needs of the wider economy.

3.1.4 Road maintenance

Road maintenance is not given prominent attention in the planned expenditures while rehabilitation works appear to attract an increasing share of total expenditures as a result of poor construction quality and poor maintenance in the past. In order to obtain a global indication of the maintenance and rehabilitation requirements of the Papua and West Papua road network, these have been estimated for all road classes and categories of works (Box 4). The main finding is that to stabilize the existing network to a maintainable condition, annual expenditures on the order of IDR 2,200 billion would be required during an initial 5-year period.

3.1.5 Sustainability of the Road Expenditure Program

Rapid expansion of the road network while existing road assets remain poorly maintained not only raises the issue of economic viability of each of the sections but also the question of the financial sustainability of the endeavor as a whole. Financial sustainability can be considered from different angles.

Value of road assets compared to regional GDP. Based on international experience, a ratio in the range of 0.2 - 0.4 is considered the right balance between the size of the economy and the demand for road assets. For Indonesia the ratio was 0.31 in 2004. For Papua and West Papua the road asset value is estimated at IDR 29 trillion¹⁵ which is high when compared to regional GDP at IDR 55.4 Trillion, or a ratio of 0.53. In the case of Papua and West Papua where mining has so far been an enclave activity which does not rely on the public road network for its activities it would be appropriate to exclude mining from the GDP value for this comparison. Thus, when mining is excluded, the regional GDP is IDR 17.5 Trillion and the ratio rises to 1.65.

Road Density. At 6.7 km per 1000 people road density is already very high in Papua and West Papua (compared to an average of 1.3 for Indonesia as a whole). In addition, the vehicle fleet amounting to some 60,000 units (excluding motorcycles) is small when compared to the size of the road network again suggesting that an emphasis on network expansion as part of Trans-Papua links as opposed to consolidation of existing road assets is premature. For example, the transport cost of cargo by road between Jayapura and Manokwari would be significantly higher than by sea if the full cost of both road infrastructure and trucking were to be charged.

Rehabilitation Costs. When these macro indicators are considered together with the fact that a legacy of poor construction quality and insufficient maintenance is placing an additional burden on the upkeep of the assets owing to the huge requirement for road rehabilitation (see Box 4) it is apparent that the size of the existing network will be seriously stretching the resources of Papua and West Papua and may not be sustainable.

¹⁵ Maximum asset value based on optimal road condition. Using current road condition the asset value is estimated at IDR 16 trillion

Box 4: Estimate of Road Maintenance Requirements for Papua and West Papua

The analysis - based on the World Bank Road Network Evaluation Tool (RONET) - is designed to develop an optimal mix of road works that will minimize costs for the economy over time (a 20-year period) and without any budget constraint. The costs to the economy are composed of the costs of the maintenance programs carried out by the road agencies on the one hand and the costs incurred by road users on the other. Inadequate funding for maintenance and poor maintenance policies and practices may involve lower costs for the road agency but will cause the vehicle operating costs of road users to be significantly higher. And these costs are of much greater magnitude than the road maintenance costs, under some conditions by a factor of more than 10.

Main Assumptions

<ul style="list-style-type: none"> • Length of Road Network (km): 20,000 <ul style="list-style-type: none"> ○ National 2,300 ○ Provincial 2,100 ○ Kabupaten 15,600 	<ul style="list-style-type: none"> • Road Pavement - % paved <ul style="list-style-type: none"> ○ National 75 ○ Provincial 65 ○ Kabupaten 8
<ul style="list-style-type: none"> • Road Condition - % in good and fair condition <ul style="list-style-type: none"> ○ National 36 ○ Provincial 35 ○ Kabupaten 30 	<ul style="list-style-type: none"> • Vehicle Fleet – Units <ul style="list-style-type: none"> ○ Cars 27,000 ○ Trucks 16,000 ○ Buses 17,000 ○ Motorcycles 255,000
<ul style="list-style-type: none"> • Road Utilization by Road Condition - % of vehicle km <ul style="list-style-type: none"> ○ Good condition 14 ○ Fair condition 43 ○ Poor condition 29 ○ Bad condition 14 	<ul style="list-style-type: none"> • Cost of Road Works - National and Provincial Paved Roads – IDR Million/km <ul style="list-style-type: none"> ○ Periodic resurfacing (overlay) 1,100 ○ Rehabilitation (strengthening) 2,100 ○ Reconstruction 4,000
<ul style="list-style-type: none"> • Cost of Road Works - Kabupaten Paved Roads – IDR Million/km <ul style="list-style-type: none"> ○ Periodic resurfacing (overlay) 800 ○ Rehabilitation (strengthening) 1,500 ○ Reconstruction 3,000 	<ul style="list-style-type: none"> • Cost of Road Works - National and Provincial Gravel Roads – IDR Million/km <ul style="list-style-type: none"> ○ Periodic regravelling 250 ○ Partial reconstruction 550 ○ Full reconstruction 800
<ul style="list-style-type: none"> • Cost of Road Works - National and Provincial Earth Roads – IDR Million/km <ul style="list-style-type: none"> ○ Heavy Grading 10 ○ Partial reconstruction 150 ○ Full reconstruction 400 	<ul style="list-style-type: none"> • Cost of Routine Maintenance Works – IDR Million/km <ul style="list-style-type: none"> ○ Asphalt pavement 10 – 30 ○ Gravel pavement 5 – 15 ○ Earth roads 1.5 – 6

Note: The above assumptions of costs of road works are network averages and mask significant variation between costs in different regions and terrain conditions.

Summary of Findings – Annual Costs of Optimal Maintenance Program (IDR billion/year)

Category of Road Works	Average Years 1 – 20	Years 1 – 5	Years 6 – 20
Rehabilitation	600	1,800	200
Periodic Maintenance	400	300	400
Routine Maintenance	100	100	100
Total	1,100	2,200	700

Source: Staff estimates

Optimal maintenance program. The optimal average annual expenditure level (averaged over 20 years) is estimated at IDR 1.1 trillion, comprising IDR 100 billion of recurrent maintenance, IDR 400 billion of periodic maintenance and IDR 600 billion of rehabilitation. Because more than 50% of the network is in poor or bad condition, the optimal maintenance policy mix is heavily focused on rehabilitation

Distribution of works. Works on Kabupaten roads, at IDR 430 billion represent 40% of the total. This is understandable considering that these roads make up more than 75% of the network. From the point of view of program preparation and implementation this will pose formidable challenges for many of the local governments.

Phasing of expenditures. In order to achieve the estimated benefits, expenditures under the optimal program would need to be about twice as high during the initial years to reduce the backlog of rehabilitation of roads in poor or bad condition. Total annual expenditures required during the first 5 years are estimated to be IDR 2,200 billion. This represents a dramatic increase compared to current maintenance programs. During years 6-20 required expenditures would reduce to IDR 700 billion.

3.1.6 Need for Greater Intergovernmental Collaboration on Roads

The above estimate of the average annual total funding requirements (over a 20 year period) for road maintenance and rehabilitation works of IDR 1,100 billion comprises IDR 430 billion for Kabupaten roads, or 40% of the total. This is understandable considering that these roads make up more than 75% of the network. From the point of view of program preparation and implementation this will pose formidable challenges for many of the local governments. Furthermore, the estimated requirement for the first five years is on the order of IDR 2,200 billion or twice the average over the 20 year period. Such a rapid ramping up of expenditures entails an extremely demanding program preparation and implementation task, in particular for the Kabupaten. This underlines the need for greater intergovernmental collaboration between the various levels of government, in the form of technical assistance from central and provincial government staff to Kabupaten staff and through the development of integrated road works programs covering all levels of government.

3.1.7 Development of Integrated Multi-Year Road Works Programs

The priority is to improve the composition of the expenditure program covering all road classes and categories of work with the aim of developing a better balance between road preservation expenditures and network expansion. This includes the following activities in particular:

- Refinement of the estimated allocation needed for routine road maintenance based on more accurate information on the road network and its condition and on implementation capabilities and readiness
- Development of a detailed rolling multi-year work program for preservation and improvement of the existing road assets (rehabilitation, periodic maintenance, betterment) based on more accurate information on the road network and its condition using existing well established GOI tools and estimation of funding requirements
- Formulation of network expansion and upgrading investments serving the productive sectors
 - to be coordinated with other modes and sectors of activity
 - prioritized in terms of economic benefits, (i.e. road works that will serve traffic and which will lead to reductions in vehicle operating costs)
 - and requiring a minimum rate of return of 8%
- Formulation of road network development investments to improve access
 - to be based on cost effectiveness and
 - a criterion of a maximum cost per person affected
- The development of the above rolling medium term expenditure program covering all highway

sector works and expenditures on the three administrative classes to be coordinated in a first round by the Dinas Bina Marga and in a second round under the provincial BAPPEDA

- On an ongoing basis, close coordination with the development and refinement of the spatial plan in an interactive way as spatial planning requires inputs from transport. Once spatial plans have been firmed up and approved, the planning of road infrastructure should align with the approved spatial plan

3.1.8 Road Traffic and Transport

Papua Province has plans for increasing the capacity of an existing bus terminal in Jayapura and for building new terminals in other locations, including two in the Jayapura metropolitan area and three in other cities within the next five year period. Such investments, when carefully planned can be effective in improving transport and mobility in the growing cities and make the cities more efficient. Planning should focus in particular on: location in terms of coordination with city spatial planning and road building, sizing of the facilities to meet forecast demand, and, arrangements for management of the facilities.

3.2 Waterborne Transport

Dinas Perhubungan of Papua Province prepared in 2008 an indicative list of investments covering various elements of waterborne transport. The mission did not obtain cost estimates for these proposals; nor details on equipment that may be required and on the state of readiness for implementation in terms of designs and specifications, bidding documents, etc.

3.2.1 Ports

The proposals provide for extensions of the quays in 7 ports, major upgrading in 2 ports, construction of one new port and studies for 4 new ports.

Considering that there is continued growth in traffic, expansion investments are in principle justified. However, there is a need for careful diagnosis and evaluation of port capacity requirements. Port congestion or capacity issues can be the result of many factors, ranging from: adequacy of infrastructure and facilities such as berth length, berth load bearing capacity and configuration, handling equipment, port layout and storage areas to operating practices in respect of cargo handling, cargo storage or other port activities. Sometimes, investments need to be undertaken not because of fundamental capacity constraints but to accommodate changes in vessel sizes and shipping technology. This underlines the point that a definitive assessment of the merits and priority of the above indicative expenditure proposals and indeed of any proposals which are not supported by detailed analyses and justifications will require additional information on traffic flows and forecasts, on conditions and operating practices in each of the ports and a thorough evaluation of alternatives to meet growth in demand. In the interim, when capacity issues are likely to arise, a first line of response must always be an examination of the scope for improvements in operations starting with the most essential, such as port working hours. To better anticipate future expansion requirements port operating monitoring systems may need to be upgraded and streamlined.

A number of proposed expansion investments are intended to meet demand in container transport. It is good practice to anticipate changes in ship sizes and technology rather than wait till serious capacity constraints are reached with attendant increases in costs for customers and the economy at large. Thus, investments to accommodate small container carrying vessels in response to the ongoing shift from general cargo and break bulk to containerized shipments will in principle often be justified. These will

most often need to be accompanied by other transformations in the port working areas, in particular the storage areas, including space and facilities for stuffing/stripping of containers as less than full container loads will likely continue to be the predominant form of shipment for the foreseeable future in small ports.

Proposed investments in quay extensions solely to accommodate the large Pelni passenger ships need to be considered more carefully and in the context of the broader question of the sustainability in the long term of operating these large vessels on the thin Papua and West Papua routes. This relates to the broader question of the appropriate ship size on different routes taking into account: (i) traffic demand by route for both passengers and cargo; (ii) service frequency; and (iii) trip length.

3.2.2 Pioneer Ports

For Pioneer ports the proposals provide for construction of small berths (35m x 7m) at 16 locations in the period to 2012 and at some other 25 locations thereafter.

The expansion program of Pioneer ports can in principle be supported. The important point is to ensure that these expenditures will indeed fill a gap in the supply of affordable transport services to communities that are poorly served or not served at all. In this regard two aspects are of critical importance. First, there is a need to establish that the service will indeed require subsidy and will not undermine or pre-empt the provision of these services on a commercial and cost recovering basis. Second, there is a need for careful selection of the port site from the point of view of access from the ocean and from the land side.

The fundamental issue is, however, that the delivery mechanism of the subsidy will need to be reformed for the program to be worthwhile. As indicated above, under the current subsidy regime funds are not being spent cost-effectively on Pioneer shipping. It will be crucial therefore that MOT/DGST, in concert with Papua and West Papua and with the other regional governments benefiting from the program, develop alternative more effective arrangements for subsidy delivery. Papua and West Papua should participate in the debate on the future arrangements for Pioneer shipping as it is a major beneficiary of the program. One approach to consider may be to allow for a differentiation in the arrangements between the different island groups depending on the local conditions.

3.2.3 River and Lake Navigation

For river navigation, the indicative program includes construction of 9 small wooden berths on the Mamberamo River to serve traditional wooden vessels up to a capacity of 150 tons. A concrete berth on the Yahukimo River is currently under construction. For lake navigation, there is an indicative program of construction of 9 small wooden jetties on Lake Sentani to serve water taxi operations.

River navigation has been a neglected mode in the past and investments to facilitate further development of the sector deserve support in principle. As is the case with ports serving coastal and inter-island shipping it is important to carefully analyze the nature of the facilities that are required and to ensure that the location of the investment is sound from the point of view of both riverside and landside access.

3.2.4 Ferry Transport

For ferry transport, there is an indicative program of construction of 6 movable access ramps of 500 gross ton capacity to serve ferry connections between the Papua and West Papua mainland and small islands off the coast.

3.2.5 Greenfield Port in Depapre

Concept plans have been prepared for a new greenfield port in Depapre some 50 km to the west of Jayapura. The investment would provide an alternative to future expansion of the port at its existing location which is constrained by the surrounding city and steep hills.

During the remaining master planning and feasibility study phases for development of a new greenfield port it will be important to learn from the worldwide lessons of experience of such investments. These lessons indicate long delays in getting to commissioning of the new facilities, major cost overruns, and numerous start-up difficulties. One of the major causes for the delays is the need for all the essential complementary investments in other infrastructure, such as land access, power, water and communications, to come on stream in a coordinated manner. This is not mainly or only a technical issue but often principally a financing issue, namely: who will finance the initial investment requirements in all these other sectors? If the greenfield expansion is driven purely by the requirements of strong growth in existing traffic, then the port business should in principle be able to bear the costs of all these other infrastructure requirements and obtain appropriate financing. If on the other hand the greenfield port forms part of a broader regional development scheme then the costs of bringing the other infrastructure on stream can be shared with the other stakeholders in the overall development scheme. But in either case the challenge of bringing all sectors on stream in a coordinated manner remains.

3.2.6 Port Maintenance and Rehabilitation

Port maintenance expenditures are not given prominent attention in the expenditure plans while rehabilitation projects are well represented. Anecdotal evidence suggests that maintenance of port assets is receiving little attention and inadequate funding. Maintenance is mainly carried out in a curative mode rather than as part of a preventative approach. There appears to be no up-to-date and accurate database of existing facilities and their condition, which is a basic requirement for effective programming and budgeting of maintenance activities.

3.2.7 Broader Policy Measures to Promote Waterborne Transport

A sound development of waterborne transport will require that it be given adequate attention under an integrated regional transport development master plan study. A number of broader policy aspects, which form part of a comprehensive approach extending beyond infrastructure development, merit to be highlighted.

3.2.7.1 *Ship Repair and Maintenance.* For coastal and riverine navigation to be viable and prosper it will be important that there is an effective local capacity for maintenance and repair of small to medium sized vessels and for building small craft based on efficient and economical designs. This is all the more important considering that two thirds of the Indonesian shipping fleet is over 25 years old and that the situation in this regard is unlikely to be better in Papua and West Papua.

With the aim of developing a best practice local capacity for building small craft and for repair and maintenance of small to medium sized vessels it may be worth considering the concession model as an effective approach in view, among other, of the limitations on foreign ownership in the sector. Under this approach, the government would invite foreign shipyards (possibly in association with a domestic yard) to bid for the right to modernize and operate an existing yard (or establish a new shipyard) for a period of say 20 years. The agreement would provide that at the end of the concession, the yard would be privatized or alternatively that the right to the concession would be rebid under new terms. There would be no subsidies for the operation of the scheme and no protection from competition. Initial start-up assistance could be justified, but once established, the business should be able to operate without government support. If any start-up assistance would be needed to make the investment by the foreign

yard viable, it would be reflected in the bids for the concession, for example: (i) in the bid price offered for the concession to operate the existing yard and to take over whatever valuable assets are available; or (ii) in the amount of initial support requested, for example, in terms of tax holiday or depreciation allowances to get the business up and running.

3.2.7.2 *Human Resource Development.* A sustainable waterborne transport industry can hardly be envisaged without the full participation of the local communities dependent or affected by waterborne transport. The communities that have traditionally engaged in fishing and in coastal and riverine shipping are ideally placed to participate in the operations and workforce of a modernizing industry. This underlines the need for an aggressive human resource development initiative initially focusing on two areas: (i) improvement of the managerial and business skills, in particular basic costing and financial aspects and targeted at existing small shipping companies/owner operators; and (ii) improvement of the technical skills of the seafarers in key relevant areas such as navigation, mechanical, communication, and basic maritime technology.

To effectively launch a human resource development initiative, it may be worth considering a partnering arrangement with a successful foreign vocational training institution in waterborne trades and a domestic training institution. The aim of the arrangement would be curriculum development and assistance in the start-up of training modules in basic concepts of business management, costing and cost control, and performance monitoring ratios as well as in the various technical aspects of the industry. The long term goal would be that following initial investment in curriculum development and in startup activities the operating costs of the training would gradually become self-financing based on the fees paid by the companies that are sending their staff for training.

3.2.7.3 *Pioneer Shipping.* National policies on Pioneer shipping have an impact on the long term future of the waterborne transport industry of Papua and West Papua. The provinces should take part in the debate on the appropriate policy framework for financially sustainable shipping in Eastern Indonesia and in particular on the respective roles of Pioneer shipping and People's shipping. In evaluating options, decision makers should be mindful of the fact that if Pioneer shipping is provided on routes where commercial People's shipping is viable in the context of a supportive policy framework, the subsidy under Pioneer shipping will be counterproductive in the long term.

3.2.8 Collaborative Approach

When waterborne transport is a technical option it is in most cases the lowest cost transport mode, in particular for bulk commodities, and should therefore receive high priority along the coastline and where there are navigable rivers. To fully exploit the advantages of waterborne transport requires not only that the infrastructure facilities are available and of high quality, but also and of equal importance, that sector policies affecting shipping and other essential operators and service providers in the industry promote entrepreneurship, competency and efficient operations.

Policies affecting waterborne transport are mainly a central government responsibility and notwithstanding many good intentions, central government policies have achieved limited success in fostering an efficient and low cost industry. Notwithstanding these constraints, decentralization and the new Shipping law provide new opportunities for targeted interventions. The waterborne infrastructure can be developed to higher standards and operations can be improved by following a two-pronged approach: (i) close collaboration between MOT/DGAT and Papua and West Papua in formulating and implementing improvement and expansion programs; and (ii) taking initiatives in those areas where the new legal framework makes this possible.

Enhanced collaboration between MOT/DGAT and Papua and West Papua would be based on the following principles and objectives:

- A commitment from MOT to provide technical input in program design and preparation while Papua and West Papua would commit to much greater cost sharing.
- The understanding on cost sharing would be predicated on Papua and West Papua continuing to receive the same share of central government budget allocations as in the past
- MOT to focus on bringing the Papua and West Papua infrastructure for coastal shipping and river navigation up to appropriate standards in terms of aids to navigation, dredging where required and basic port infrastructure using central government funds
- Papua and West Papua regional governments assuming increased cost sharing for maintenance, rehabilitation and upgrading of port superstructure, facilities and equipment
- Development with MOT of arrangements aimed at improving operational efficiency and greater involvement of the private sector in port operations
- Facilitation towards the establishment/development of related industries, such as ship maintenance and repair, building of small craft and other shipping and transport related services. This could include development of appropriate designs and standards for small craft, quays and jetty structures learning from experience in Papua and West Papua and elsewhere in Indonesia.
- Assistance in human resource development in respect of both government staff and the work force in the private sector

The last two points are of fundamental importance for the development of a healthy and sustainable waterborne transport industry in Papua and West Papua and the regional/local governments should be prepared to share in the costs and to take initiatives involving the participation of competent foreign entities in the area of human resource development and ship repair and maintenance along the lines outlined above.

3.3 Air Transport

Dinas Perhubungan of Papua Province prepared in 2008 an indicative list of investments covering various elements of air transport. The mission did not obtain cost estimates for these proposals; nor details on equipment that may be required and on the state of readiness for implementation in terms of designs and specifications, bidding documents, etc.

3.3.1 Airport Development Investments

The proposals provide for runway extensions at 5 existing airports, betterment/upgrading through extension and strengthening of runways at 4 existing airports, construction of 5 new airports and unspecified aviation sector facilities and equipment in general. In respect of Pioneer airports they provide for runway extension of one airport, betterment/ upgrading of 17 airports and construction of 1 new airport. The upgrading relates mostly to improvement from grass strip to asphalt. Concept plans have also been prepared for new terminal buildings at Jayapura and Manokwari and possibly other airports.

Such investments in airside facilities are in principle well justified on account of safety standards and/or traffic requirements. There is a need, however, to have these expenditures properly costed and prioritized, and then to proceed with preparing integrated implementation and acquisition programs on an airport by airport basis.

With continuing growth in traffic, terminal buildings at the 6 - 8 most important airports will need expansion and/or modernization and this should be addressed as soon as the above safety and airside requirements are being met. This will likely pose financing challenges as under the current airport administration regime financing is the responsibility of central government. But central government's finances will remain constrained for the foreseeable future and there is unlikely to be much enthusiasm for these projects as the aviation and airport system of Papua and West Papua as a whole is far from recovering its costs, in particular as a result of current charging and cost recovery policies for aviation and airport sector facilities and infrastructure. This underlines the need to formulate appropriate and streamlined cost sharing arrangements.

The 2004 master plan study of the air transportation sector¹⁶ reviewed requirements at 6 Papua and West Papua airports (Manokwari, Sorong, Nabire, Merauke, Wamena, and Jayapura) and made indicative recommendations for improvements related mainly to aviation safety, expansion of terminal facilities to meet traffic growth and extension of the runway of Wamena airport to 1,800 m. At the time of the study, the new airport at Sorong was to be financed with mainly GOI funds after the funding under an ADB project had been cancelled. Apart from the extension of the runway of Wamena airport and construction of a new airport at Sorong, not many of the recommendations of the master plan study have been implemented.

For terminal building expansion, cost effective concepts and approaches should be developed. These should in particular:

- provide for stage construction, incorporate local themes and building materials when competitive with materials sourced from outside Papua and West Papua and be geared towards the profile of the traveling public.
- seek as much private sector participation (e.g. management and maintenance of public areas) as is possible under current laws and regulations.
- give greater attention to facilitating multimodal transport by improving the facilities and arrangements for intermodal connections
- in the interim, minor upgrading and management of existing terminal building facilities should aim at maximizing the use of existing space and making passenger areas more client-friendly, inter alia, by seeking the collaboration of franchise holders

3.3.2 Maintenance and Asset Management

While key facilities in the aviation sector are generally better maintained than in other sectors because safety considerations require adherence to minimum standards and norms which are established under international agreements, indications are that there is scope for improvement in maintenance operations and practices. The 2004 Air Transportation Master plan Study found that maintenance expenditures represented only about 15% of operating expenses and that there was no reliable inventory of existing infrastructure and facilities. The situation is unlikely to have been different in Papua and West Papua. This points to the need to seriously consider establishing an asset management system.

3.3.3 Safety and Efficiency of Aviation

In view of the critical importance of aviation in Papua and West Papua's transport sector the underlying aim of expenditure program preparation should be to enhance aviation safety and to seek improvements in facilities (navigation, landing aids, runway conditions) that will contribute to improving the efficiency of the airline industry and hence to a lowering of costs. Investments that will allow the airline industry to achieve higher operating efficiency, e.g. fewer delays or flight cancellations because of weather

¹⁶ The Master Plan Study on the Strategic Policy of the Air Transport Sector of the Republic of Indonesia, July 2004

conditions, should receive high priority. Considering that transport volumes are still limited on most routes in Papua and West Papua, air transport will remain more economical than road transport if the cost of the road infrastructure is included in the comparison. The highlands in particular will continue to be dependent on air transport for the foreseeable future, even if plans are developed and implemented for providing road access. The objective should therefore be to establish and maintain an infrastructure and an air transport system of world class efficiency that will lead to a further lowering of air transport costs.

It is unlikely that with the advent of a safer and more efficient aviation and air transport sector and associated better market coverage by private airline operators, local government's role in improving the supply of aviation services would be through aircraft acquisition. The benefits of such investments by local government over cost sharing in airport and terminal building expenditures should be clearly demonstrated.

3.3.4 Collaborative Approach and Local Government Cost Sharing

Indications are that the aviation sector in Papua and West Papua has been underfunded in recent years. There are several reasons for this situation but important contributing factors are no doubt: (i) that the budget of DGAT which is the main funding source has been constrained; and (ii) that there is as yet no streamlined arrangement for cost sharing between local government and central government. The issue is compounded by the fact that expenditure program preparation requires a high level of technical expertise in a variety of fields and careful coordination of the various elements that make up the aviation system. In these circumstances a focused effort by an experienced team of government staff or by a consultant's team is needed.

That overall funding has been inadequate for the identified needs is all the more regrettable considering that local government revenues have dramatically increased in recent years and could have contributed to help fund critical aviation sector requirements. This is illustrated by the fact that some local governments have applied budget resources to big ticket acquisitions such as aircraft (Box 2), no doubt in recognition of the important role played by aviation in the life of their communities and with the aim of improving the level of aviation services for the benefit of local government administration, the local economy and the community at large.

The key to meeting the challenge of improving air transport safety and increasing capacity in response to growing demand is close collaboration between MOT/DGAT and Papua and West Papua in formulating and implementing improvement programs for the Papua and West Papua aviation sector. Such collaboration would be based on the following principles:

- A commitment from MOT/DGAT to provide technical input in program design and preparation while Papua and West Papua would commit to much greater cost sharing.
- The understanding on cost sharing would be predicated on Papua and West Papua continuing to receive the same share of central government allocations as in the past
- MOT/DGAT to focus on actions to bring the Papua and West Papua aviation system up to appropriate safety standards using primarily central government funds
- Papua and West Papua regional governments assuming cost sharing for maintenance, rehabilitation and extensions of runways and upgrading and improvement of terminal buildings and associated facilities
- Development of arrangements with MOT/DGAT for greater involvement of the private sector in the management of passenger areas of the terminal buildings, for example through an association of franchise holders operating in and around the terminal building.

3.4 Overall Assessment

Papua and West Papua transport planners and decision makers have not been well equipped in terms of planning procedures and institutional capacity in general to respond effectively to the transport challenges the provinces are facing. Many of the issues are interrelated and their impact is often compounded. From the perspective of a more effective approach to planning of transport investments and expenditures, the key issues relate to: (i) the approaches and practices under the planning process; (ii) coordination between the modes; (iii) asset preservation¹⁷.

3.4.1 The Approaches and Practices under the Planning Process

The Indonesia formal planning process and cycle is based on a 20-year plan divided into four successive 5-year plan tranches. The focus of these plans is on qualitative and quantitative targets. While they provide, in principle, a useful framework and direction for sector development, they do not enter in sufficient detail on costs and are not underpinned by evaluation of alternatives and economic/financial analysis. Furthermore, they do not map out the requirements and elapsed time associated with the project preparation, approval and procurement steps. As a result, expenditure planning remains heavily focused on the annual budget cycle which has tended to stretch out several months past the start of the budget year, inter alia, because of the approvals required by the respective parliaments. This is a serious shortcoming of the planning process as the majority of transport investments being considered require a long term view and considerable evaluation and preparation work and involve implementation periods covering several years. Its impact is exacerbated by the fact that resources available for project and program preparation are grossly inadequate. Thus, in instances where cost benefit studies are prepared for major investments, these tend to focus narrowly on demonstrating the economic justification of a given project rather than examining alternative project concepts, technological solutions and optimal timing.

3.4.1.1 Integrated Transport Master Planning, Project Evaluation and Project Preparation

The central government is aware of these issues and has recently (under leadership of MOF) initiated measures to remedy this situation by introducing budgeting under a Medium-Term Expenditure Framework which is currently being implemented at the national level. It is also placing greater emphasis on the need for master planning which is reflected in recent modal laws (section 2.2) while in the road sector a number of regional or island based master plans have been completed or are under preparation. Given these initiatives and looking to the future, the issue is now one of how best to implement an improved expenditure planning approach. This will need to be focused on giving substance to the long term plans through sound master plans which are based on much more extensive project evaluation and preparation work. Given the major projects and schemes that are under consideration, for Papua and West Papua, this is an opportunity to place themselves at the forefront of a much improved approach to expenditure planning.

The risks of misallocation of resources and of failure and associated negative consequences increase with growing complexity of projects and development schemes. The programs to develop Trans-Papua road links at accelerated pace and to improve access to the highlands discussed above illustrate what is at risk. Hydro-power development linked to industrial/mining and infrastructure schemes is another (Box 5). An approach whereby the structure of the road network to be achieved over the long term is mapped out has great merit. But the definition of this structure has to be underpinned by analysis and evaluation and implementation has to be based on need and economic and financial viability. For Papua

¹⁷ These and other issues have been documented and discussed in various reports. Here only those that are most relevant to transport in PWP are briefly reviewed.

and West Papua, the development of the transport master plans has to be anchored in the spatial plans and be driven by the concept of an integrated and multimodal transport system. If the main long term goal of the Trans-Papua road investments is to link major centers of activity, then it is critical that sea and air transport alternatives are carefully considered under the master plan work as such alternatives will in most cases provide a lower cost alternative for current cargo and passenger flows and flows to be expected in the foreseeable future. Thus, given the need for a multimodal approach in Papua and West Papua, road master planning should be part of integrated transport system development which encompasses all modes of transport and maps out the development of the various modes as transport demand increases.

The critical inputs are therefore: (i) the spatial or macro-zoning plan of the territory; (ii) the predicted development of the economy in terms of centers of economic activity and associated transport demand; (iii) the geographical constraints on account of areas that have been designated as protected; (iv) an assessment of the environmental factors both during construction and afterwards in terms of impact on forests, natural resources and the habitat; (v) an assessment of the social and cultural impacts of the transport infrastructure development; and (vi) geotechnical and soils conditions¹⁸.

The structure of the transport system should be planned taking these factors into account and with the aim of achieving maximum efficiency of the transport system in serving the needs of the economy and the population settlements. When carefully prepared along these lines the plan will provide a rational basis for reserving the right of way in the road corridors where roads will be built at some point in the future. This will be critical in the approaches to urban areas and needs to be coordinated with city planning. Once the road component of the master plan has been professionally designed, it will allow building individual sections on the basis of a stage construction approach by gradually filling in the priority sections as these become economically justified (oil spot approach) In the absence of such prior study work, it is inevitable that road sections will be built that will later prove not to be part of a rational network. If the main long term goal is to link major centers of activity, then it is imperative that sea and air transport alternatives are carefully considered as such alternatives will in most cases be able to provide transport at lower cost.

It is highly desirable to develop road master plans as part of island wide or provincial transport master plans. If for some reason this is not possible then it should at least be carried out in major logical regional components which can provide the basis for proceeding with construction of individual road sections. For example, one such practical approach would be to have the feasibility study stage of major road investment around the major cities be preceded by and combined with a regional network master plan component.

18 Particular caution should be exercised in areas featuring peat soils (covering about a fifth of the territory and a much higher proportion in certain regions), in mountainous terrain and in areas covered with fragile soils (also accounting for about a fifth of the territory)

Box 5: Power Development Linked to Mining/Industrial/Infrastructure Schemes

Papua has considerable potential for low cost hydro-power development at various locations and wishes to mobilize this asset for development of the province. However, as the scope for power generation is likely far in excess of the requirements of the general economy, investment in power development will only be feasible if combined with mining or industrial schemes. The challenge, therefore, is twofold: (i) to identify mining or industrial schemes - based on proven technologies and in collaboration with reliable partners - requiring large amounts of power and which will provide long term development benefits for Papua; and (ii) to structure a public/private partnership schemes involving power generation and off-take by the mining/industrial activity that is consistent with the Indonesian legal and regulatory framework for both power development and the industrial/mining activity while providing for an appropriate risk sharing between the public and private sectors.

The scheme being contemplated to the west of Jayapura is an example of investments requiring very careful master plan, feasibility and engineering studies. Such mega schemes not only require a thorough evaluation of the merits of the overall scheme and of the contribution/role of each of its components to the outcome but also require consideration of the risks attached to the scheme, the alternative modalities of Public/Private Partnership in terms of financing and implementation responsibilities and a thorough critical path analysis of the various implementation steps.

Worldwide experience shows that successful implementation, even of comparatively simple projects – such as for example development of a greenfield port – is a rare event when the scheme involves the participation of different government and private sector parties. Because, for a new port to become operational on target is not only a question of building the port infrastructure. A host of other actions and achievements have to come on stream at about the same time. An experienced port operator has to be selected and appointed, shipping lines have to be willing to make calls at the port, there has to be proper road access, and electricity, water, and telecom has to be provided. Such schemes require a strong and very experienced overall project management team which is fully empowered to coordinate the various essential components of the scheme.

The investments being considered west of Jayapura are of a complexity many times greater than just a greenfield port as new power, industrial and urban ventures are essential components of the scheme. Assuming that the urban development scheme is mainly driven by an industrial venture, the key challenge will be the staging of each of the components in a coordinated manner in concert with the industrial development, to avoid that major investments in infrastructure would proceed before the industrial development has been locked in. This is where a very careful design of the Public/Private Partnership and the associated allocation of risks will be essential. A poor design of the staging of the investments and of the respective roles and responsibilities of government and private parties could result in an unbearable financial burden, for example when road investments are made which are several times oversized in relation to prospective traffic¹⁹, and taxation revenues associated with the urban investments will not materialize until far into the future.

3.4.1.2 Transport Infrastructure for the Productive Sectors as Opposed to Network Development

By focusing on the transport needs of existing/growth centers it will be possible to support and stimulate economic activity much more effectively than by developing costly road connections between the existing centers. This is because in Papua and West Papua creation of road infrastructure cannot be assigned a spontaneous developmental role. Under conditions of low population density and a mostly subsistence economy, provision of transport infrastructure will not automatically lead to additional economic activities. Under Papua and West Papua conditions, if road infrastructure is to serve a developmental role, available funding is better used for targeted interventions where transport is an integral part of a regional development scheme which has been carefully prepared and evaluated.

These investments are to be focused on existing and emerging centers of activity in accordance with

¹⁹ The Mission was shown figures which suggest a cost of IDR 150 billion per km for the Jayapura ring road

what can be characterized as an “oil spot” approach in contrast to a “fishbone” approach. Under the fishbone approach the initial focus is on developing a road network linking all cities and covering the entire territory regardless of levels of activity and traffic. Under the oil spot approach, all the centers of activity will over time be linked but this will occur gradually as and when the hinterland of each of these centers develops and extends further into the interior while a potential for economic exchanges between centers of activity slowly arises and traffic levels reach minimum required levels. Under the “oil spot” approach, when identifying and selecting investments, the aim should clearly be to serve transport needs at the lowest long term economic cost. This requires among other that the needs of cargo and passengers are considered separately and that a transport system is fostered where modes are complementary and duplication is avoided. At this stage of Papua and West Papua’s economic development this means giving priority to (i) improving the road infrastructure and the intermodal connections in and around the existing centers of economic activity: and (ii) providing the port and airport capacity for efficient and low cost connections to other parts of Indonesia and the wider world. Indeed, because of its somewhat remote geographic location Papua and West Papua can only gain from better economic integration with the outside world.

3.4.1.3 Spatial Planning

Until recently, transport planners and decision makers have not had the benefit of carefully developed spatial plans when preparing investment and expenditure programs. This is now being remedied as the provincial governments are focusing on finalizing and formally issuing their respective spatial plans at the macro level. This will need to be followed by development of more detailed land use plans at the local level in particular at the level of major centers of activity. Those involved in transport planning at all levels should be systematically incorporating the parameters and guidelines developed under the spatial plans in their respective plans and programs and should also be interacting with the agency responsible for spatial planning when developing detailed transport infrastructure proposals..

3.4.1.4 Project Selection and Prioritization

A shortcoming of current planning, programming and budgeting practices is that prioritization of projects on the basis of needs and transport demand is not given sufficient attention. This is compounded at the implementation stage by a tradition of spreading out funding thinly over a large number of small incremental contracts which often form part of a larger scheme. While this approach may be perceived as “equitable” in that it is addressing the needs of a large number of communities, in reality over the longer term the benefits of the available funding to the community at large are seriously reduced. This can be illustrated by considering a simple example of 3 projects with a 3 year implementation period and with rates of return of respectively 10 %, 12%, and 14%. If annual available funding is sufficient to implement only one project at a time and if they are implemented sequentially starting with the project with the highest rate of return, the aggregate rate of return is 12.5%. If on the other hand all three projects are implemented in parallel now stretching out over a nine year period the aggregate rate of return is reduced to 8%. This less favorable outcome is mainly the result of having to wait 9 years before benefits start flowing whereas under the first scenario benefits start flowing after 3 years. In addition, it should be recognized that under an approach of small size contracts the construction costs will be higher than with more substantial contract sizes and hence that the return will be impacted negatively. For example, if it is assumed that in this example there would be a 15% increase in construction costs

because implementation is on the basis of 9 small contracts rather than 3 much larger contracts the rate of return would reduce further to less than 7%. Clearly, project selection and prioritization can be much improved under a 3-4 year rolling expenditure programming approach.

3.4.1.5 Social/cultural Impacts of Transport Development

Worldwide and Indonesian experience shows that certain forms of economic development which are heavily dependent upon or facilitated by transport infrastructure and particularly roads, often give rise to adverse social, cultural and livelihood impacts and to marginalization of the indigenous peoples. The sociological and other processes at work are not always fully clear and well understood, but in-migration appears to be a major factor. But adverse impacts are also noted in the absence of in-migration from other regions or groups, indicating that it is difficult to generalize. For purposes of avoiding and mitigating the impacts it can be assumed that it is not infrastructure per se that is the critical causal factor but that the pace of change as well as time and location specific factors play the major role in triggering undesirable impacts. Therefore, in order to prevent, mitigate and manage the adverse social, cultural and livelihood impacts of transport infrastructure development the following principles should underlie the approach:

- in general, the pace of economic development and associated infrastructure development in a region should be determined by the pace at which the affected population can be readied to fully participate at all levels in the government, industrial, commercial and professional spheres of society
- every major transport infrastructure scheme, whether in support of a particular extractive or industrial project or to serve economic development in general should be evaluated for its potential social, cultural and livelihood impacts; alternative project/program concepts should be evaluated in terms of their potential impacts; and, projects/programs should only proceed if the first general principle above can be satisfied at the level of the scheme/program under consideration

3.4.2 Modal Coordination and Multimodal Transport

Papua and West Papua are handicapped by high transport costs both externally and internally owing to geography and thin transport flows. To reduce transport costs as much as possible, with the aim of overcoming this handicap, Papua and West Papua need to rely for each transport flow on the mode, or combination of modes, that is able to deliver the lowest cost of transport for the economy. This means that where coastal shipping and river transport are available or are an option, these modes will usually be the lowest cost. For other transport needs in the interior where flows are thin, air transport will usually be the preferred mode. Given the high cost of sustainable roads, road transport will only be economical when traffic reaches certain thresholds, for paved roads on the order of 300 vehicles/day, for gravel roads 30 – 70 vehicles/day, and for earth roads 10 vehicles/day²⁰. Box 6 provides a current example of an attempt to develop a multimodal transport chain in Papua Province. It underlines the need to carefully evaluate the various aspects coming into play when assessing all-inclusive point-to-point transport costs.

A transport system can be viewed as comprising nodes (or transfer points) and links between these nodes where the links can be provided by air, water or road transport or a combination of several modes. An efficient, integrated transport system which is based on the most economical mode, or combination of modes for each link, requires a planning approach emphasizing multimodal transport. Thus, an efficient multimodal transport system requires: (i) well informed choices at the level of infrastructure development

²⁰ Some plan documents mention investment in railways. However, except possibly for dedicated lines serving high volume mineral extraction, railway transport is not a viable option in PWP. Railway lines, that are carrying much higher traffic volumes than can ever be expected in PWP, are being closed all over the world because governments can no longer afford the annual subsidy payments. Even in the case of Java, which given its level of urbanization, population density and spatial development, has among the best prospects for railway transport in the world, only passenger services are potentially economically and financially feasible while general freight services are loss making without much prospects for becoming viable in the foreseeable future under current transport sector policies.

for each link, i.e. selection of the most economical mode; and, (ii) efficient operations by operators and service providers. The infrastructure of a multimodal transport system comprises: (i) the infrastructure and facilities for the links; and (ii) the facilities at the transfer points.

Box 6: Air Connection to the Highlands via Dekai

Proposed investments towards establishment of an additional air connection to Wamena in the Highlands via Dekai are an example of a multimodal transport chain. This alternative is understood to involve river transport from Merauke to a port situated some 40 km from Dekai, from where goods would be transported by road to an upgraded airport at Dekai and thence by air to Wamena. The advantage of this alternative is reported to be based on the fact that river transport is low cost and that the air segment from Dekai to Wamena is much shorter than say from Jayapura to Wamena thereby saving on air transport costs.

Improvement of river transport to Dekai is certainly a worthwhile objective in its own right. The investment in aviation infrastructure for supplying the Highlands with general cargo is a question where total transport system costs of different alternative supply routes need to be compared. There are many different aspects to such an evaluation. For example: (i) the evaluation has to have a common point of origin and departure, e.g. the Surabaya or Makassar to Wamena; (ii) in evaluating this option it is important to factor in that air transport costs are not proportional to distance and this is particularly so in the case of the Dekai connection. Specifically, in terms of block hour costs, two important cost factors, fuel and maintenance costs, decrease as the average distance flown (the average stage length) increases. This is because these operating costs are lowest at cruising altitude and high during take-off and landing. In addition, in the case of the route Dekai to Wamena, since Dekai is located at the foothills of the mountains, the flying time to Wamena is likely to be impacted disproportionately by geography as the time spent by the aircraft at gaining altitude is unlikely to be in the direction of Wamena. In sum, the total flying time may not be that much shorter than from Jayapura; (iii) the cargo will be subject to two additional transshipments – adding to handling costs and to the incidence of damage to goods; and (iv) the reliability of river navigation during the course of the year. Clearly, such schemes require careful consideration of all factors having a bearing on costs and quality of service and should be part of a master plan study to improve access to the Highlands.

3.4.2.1 Selection of the Most Economical Mode or Combination of Modes

Traditionally expenditure planning both at the national and local level has been conducted mostly separately by planners within each of the modal agencies in a compartmentalized fashion. The lack of modal coordination in investments leads to duplication in provision of capacity and to ineffective intermodal connections. This can occur at the inter-regional level (for example the construction of costly road connections along the coastline where for the foreseeable future the focus should be on improvement of coastal shipping), at the regional level and even at the very local level where it should be easier to remedy. For example, there is evidence that communities that are already served by river transport are provided with new, costly road access while improved river transport would have been a much lower cost solution to meet their rising mobility expectations. More than this, building a road can undermine the viability of the river transport system by drawing traffic away from river transport, thereby reducing the usefulness of the river transport system for those communities that remain dependent on the river.

For many isolated communities which can be reached by waterborne or air transport, initial access or improved access can be provided at much lower cost through the construction of jetties or airstrips than through new road construction. Not only is the construction cost of such jetties or airstrips (in a range of IDR 100 – 500 million) often much less than that of a km of road, but in addition these facilities will in most cases provide access to many more people than the average km of road. In other words, the cost effectiveness of these facilities will easily be ten times greater than road construction.

Efforts at the national level to remedy this situation are frustrated by the fact that the country is too vast and conditions on the ground are too diverse for these efforts to have a chance to bear fruit. The issue is compounded by a lack of good coordination within each mode between the investments funded under the central budgets and those at the provincial and Kabupaten level and by insufficient appreciation of the importance of a modern multimodal transport system which is well integrated both nationally and internationally. For most situations, the development of a low cost and integrated transport system needs to be studied and approached at the regional/local level.

3.4.2.2 Efficient Intermodal Connections

Efficient connections at the modal transfer points – between sea and river ports and airports on the one hand and local distribution by road on the other – also play a critical role in reducing overall transport costs. Lowering costs will often involve careful spatial planning of the facilities at the local city level where the sea- and airports are located. The port of Manokwari which is receiving increasing numbers of containers provides an illustration of the kind of issues that may arise. For example, it has been suggested that part of the port area that is currently being used as a makeshift container freight station would be converted to a parking area. This raises the question of the optimal use of scarce waterfront land in the face of competing claims for space by a developing city on the one hand and a growing port located in the city center on the other. When the available land within the port area is adequate and as long as throughput of containers remains manageable within the port area it will be preferable from the point of view of transport efficiency to keep the container freight station within the port area so as avoid costly hauling of containers in and out of the port which in addition will contribute to traffic congestion and road damage in the inner city. Clearly, master planning at the level of the individual port and from the point of view of transport efficiency needs to be coordinated with city master planning to achieve optimal development of the transportation system within the city and optimal use of scarce waterfront land.

In practice a great deal can be achieved in the area of multimodal transport by focusing on the removal of physical bottlenecks and the streamlining of operations at intermodal connections. In particular:

- at main ports: improvements in transshipment between main line and coastal shipping, river transport and road transport
- at airports: improvements in navigation and airport landing facilities will help to ensure that fewer flights have to be cancelled last minute and thereby improve aircraft utilization and reduce operating costs in both the aviation sector and in connecting land transport
- at city level: increasing the connectivity at transfer stations between the various land transport vehicles: bus, car/taxi, motorbike, becak and walking. This is already being done in concept but requires careful analysis and great skill.

3.4.2.3 Efficient Operations by Transport Operators and Service Providers

The last aspect, efficient operations all along the transport chain, is not a matter of infrastructure and facilities but rather of management and regulatory policies. While these are issues that are largely under the authority of central government, as far as management of Papua and West Papua based facilities are concerned there is scope for having an impact on operations by ensuring that publicly owned operating entities are properly incentivized to operate efficiently.

3.4.3 Maintenance - Asset Preservation

National and regional decision makers are generally aware that maintenance expenditures produce the highest economic benefits and have the highest rates of return, but funding at all levels of government for routine and periodic maintenance and even for rehabilitation of deteriorated facilities continues to be inadequate, arrangements for implementation remain ineffective and commitment in general is weak.

The impacts of lack of maintenance are twofold. First, the life of the asset is reduced which creates higher costs for the agency responsible for the infrastructure; and second, the cost for the user of the infrastructure is much higher than it would be under proper maintenance. The road sector provides a good case to illustrate these adverse impacts of poor maintenance. Box 1 on “Best Practice and Poor Practice Policies” illustrates the impact of poor maintenance (and low quality initial construction) on the life of the road and in the process on the total kilometers of road that can be kept operational with a given budget. Box 4 providing a global estimate of the road maintenance and rehabilitation requirements of the network in the two provinces gave an estimate of an optimal works program that would minimize total costs of road works for society. This total cost can also be estimated under an alternative policy which minimizes expenditures to what is needed to keep the road network operational. To assess the impact of the two policies the costs to road users (vehicle operating costs of driving on well maintained roads as compared to poorly maintained roads) have also been estimated. The results shown in Table 11 indicate that while the average annual cost of road works decreases by IDR 360 billion the cost to road users increases by IDR 3,500 billion or almost ten times the decrease in road works costs. These results clearly underline that proper maintenance expenditures have a very high return and will play a critical role in reducing the cost of doing business in Papua and West Papua.

Table 11: Average Annual Costs under Optimal and Minimum Maintenance Policy (IDR billion/year)

Category of Costs	Optimal Policy	Minimum Policy	Difference
Rehabilitation	600	520	
Periodic Maintenance	400	190	
Routine Maintenance	100	30	
Total Road Works	1,100	740	-360
Road User Costs	15,500	19,000	+3,500
Total Economic Costs	16,600	19,740	+3,140

Lack of proper attention and adequate funding for road maintenance in the past has resulted in a huge backlog of periodic maintenance and rehabilitation. It is estimated that to stabilize the approximately 20,000 km of roads IDR 2,200 billion would be required annually over a period of 5 years. This total comprises IDR 1,800 billion of rehabilitation, IDR 300 billion of periodic maintenance and IDR 100 of routine maintenance.

3.4.4 A Collaborative and Comprehensive Approach

The review of the status and plans in the different modes has highlighted the need for greater collaboration between levels of government so as to maximize the outcome of the financial and institutional resources and capacities available to the provinces as a whole. This is of course also valid at the level of the transport system as a whole. The provincial BAPPEDA has to play a key role in this endeavor.

In addition, the performance of the transport sector is not only a matter of adequate physical infrastructure and facilities; it is affected as much by operational aspects. This covers operation of the facilities for which government entities and state corporations have responsibility, the activities of private sector operators and ancillary industries and of other service providers. Consequently, due regard must be given to the factors affecting the capability and performance of:

- the government entities in charge of transport infrastructure
- the road construction industry
- the users of the infrastructure: the truckers, shipping lines, airlines, small operators of river craft

- the related transport service industries such as various agents and freight forwarders.
- ancillary transport service industries such as ship repair

In respect of a number of issues, for example road maintenance, removal of impediments to and creation of incentives for better performance will be within the scope of responsibilities of Papua and West Papua regional government. Also, regional government can collaborate with central government and with trade associations and the private sector in the area of human resource development. And, before even conducting studies on operational performance, port and airport managers can seek out comments and suggestions from their clients who will most often be knowledgeable about major shortcomings.

3.4.5 Infrastructure for Extractive Industries and Logging

At the level of master planning for such requirements, there should of course be close coordination with the planning of all other infrastructures within the context of the spatial plan. But in regard to funding of the initial investment and subsequent upkeep of the infrastructure, it is crucial to have a clear understanding between the government and the private sector parties on the principles that should guide the respective responsibilities. In particular, to ensure that investment schemes by mining and logging companies will only proceed when they are viable for the investors without government subsidy, the investors should be required: (i) to bear the full financial responsibility for any new transport infrastructure that is needed for the scheme; and (ii) to cover their appropriate share of the cost of the use of any existing infrastructure. In the case of a new investment, this will incentivize the investors to adopt life-cycle and total system cost minimization in the design of the infrastructure. When the activity will use existing infrastructure, it may require the investors to assume the cost of strengthening the infrastructure and/or to compensate for the cost of additional heavy wear and tear. Finally, if the infrastructure is to revert to the host country at the end of the concession, appropriate safeguards – in the form for example of bank guarantees - should be included in the concession agreement.

Chapter 4

Recommendations

Regional autonomy is providing Papua and West Papua decision makers with new possibilities to address the most critical transport development challenges and issues. In particular, there are opportunities for taking decisive measures to improve: (i) the approach to transport investment and expenditure programming; and (ii) the composition of the short/medium term expenditure program.

4.1 Approach to Transport Infrastructure Development

4.1.1 Spatial Plans as the Starting Point

Spatial plans have to be the starting point for master planning of transport investments and for determining the location of investment. When spatial plans are not fully developed at the local level, transport planners should interact with the agency responsible for spatial planning as the development of spatial plans requires inputs from transport.

4.1.2 Transport Infrastructure Serving the General Economy

The preparation of these transport expenditures and projects has to be driven by the principle of least cost. This involves among other:

- integrated regional transport master plan studies that
 - seek out the least cost mode or combination of modes for each major link/transport flow of the transport system and thereby avoid duplication between modes
 - focus on the efficient and smooth functioning of multimodal transport
 - pay particular attention to the potential of waterborne transport
 - pay particular attention to reducing the cost of access to the highlands and remote communities
- a strong emphasis on the economic evaluation of alternatives
 - at level of expenditure categories (maintenance versus network or capacity expansion)

- at level of program goals (improving access to highlands and providing access to remote communities)
- at level of individual projects (technical, locational and timing options)

4.1.3 Transport Infrastructure Serving Major Extractive Industries and Logging

Financing of the transport requirements of major extractive industries as well as operation and maintenance should be the responsibility of the investors as this infrastructure forms an integral part of the industrial process. The same principle should apply to the operations of major logging concessions. When these industries use and cause wear and tear and damage to existing infrastructure, they should assume the cost of maintenance and strengthening of this infrastructure. Such a policy will ensure that the government will not subsidize unprofitable operations.

An approach to road network development, whereby a logging company promises to build a road network in exchange for logging rights is a bad public/private partnership model and government should not entertain such proposals.

4.1.4 Next Practical Steps

Initiatives can be taken immediately in respect of the following:

- for all modes, enhanced collaboration between central, provincial and Kabupaten level institutions in technical, planning and programming matters and in cost sharing
- by mode, the preparation of coordinated annual work programs across all levels of government as part of a medium-term rolling expenditure program to be coordinated by Dinas Bina Marga
- development plans and expenditure programs by mode to be coordinated across modes by BAPPEDA, inter alia, through the production of a single document which provides an overview of all transport investments under the 3-4 year rolling programs of all modes of transport and all levels of government
- increase funding for policy, master planning and feasibility and engineering studies (in particular for all types of waterborne transport) and seek assistance from donors for funding
- actively participate in sector policy discussions at the national level on matters that impact Papua and West Papua, such as for example the policy on Pioneer Shipping
- initiate asset management as a basis for development of maintenance programs

4.2 Composition of Short/Medium Term Expenditure Program

Implementation of the above approach, principles and measures should result in shifts in funding allocations to program categories within modes and to shifts in allocations between modes. The key points are the following.

4.2.1 For all modes

Funding for routine maintenance of assets should be increased. This should not be done on an across-the-board basis but progressively as and when work programs have been properly defined and activities and implementation arrangements have been firmed up.

4.2.2 Road Transport

- A program of rehabilitation, maintenance and improvement to consolidate and stabilize a basic network which is serving economic activities (global annual cost estimated at IDR 2,200 billion during an initial 5-year period – Box 4)
- An allocation for network expansion and upgrading investments serving the productive sectors made up of projects requiring a minimum rate of return (e.g. 8%). These investments are to be focused on existing and emerging centers of activity in accordance with what can be characterized as an “oil spot” approach in contrast to a “fishbone” approach.
- An allocation for network development investments to improve access based on cost effectiveness and a criterion of a maximum cost per person affected

4.2.3 Air Transport

An overall increase in funding for an integrated program of investments with a heavy focus on safety and selective expansion of airside and landside facilities developed following a collaborative approach and cost sharing between levels of government

4.2.4 Waterborne Transport

An overall increase in funding for an integrated program of investment in basic infrastructure once feasibility and design studies have been completed developed following a collaborative approach and cost sharing between levels of government.

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