

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

Inter-island Shipping: Issues and Strategies

**A Pilot Study on the Alleviation of
Poverty in Remote Island Communities
in Indonesia**



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New York, 1999

ST/ESCAP/2017

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1 Introduction

1.1 Background to the Study

Rapid economic growth has helped to reduce the level of absolute poverty in the ESCAP region, however, in many countries uneven income distribution has exacerbated regional disparities. In particular, it is still observed that a significant percentage of populations in remote rural areas live below the absolute poverty line. To alleviate this problem it is, therefore, increasingly important to reduce income inequalities between regions of a country and between urban and rural areas.

It is widely acknowledged that adequate transport is not only essential to a country's economic development but also contributes to improved living standards through easier access to employment opportunities, health, educational, cultural and other social services. Importantly transport linkages between rural and urban areas can encourage investment in industry and agriculture thereby promoting economic and social development which is crucial to poverty alleviation.

Noting the importance of transport in alleviating poverty, the ESCAP secretariat undertook a review of projects/programmes in the region in which the transport sector could contribute to alleviating poverty and improving the quality of life of people living in rural areas.¹ The study demonstrated that although poverty alleviation is a complex process, transport can play a central role in improving the standard of living of poor rural communities. This implies that transport interventions can be used as a policy instrument and an entry point for poverty alleviation.

While the focus of the study was placed mainly on road transport, a similar notion can be applied to water transport in many of the island and archipelagic countries in Asia and the Pacific. Provision of improved inter-island shipping services contributes to the alleviation of poverty in remote island communities by providing more income earning opportunities through improved access by cheaper transport.

Indonesia has been chosen for the pilot study for the following reasons.

- Indonesia is the fourth most populous country in the world. Rapid economic growth has been accompanied by a significant reduction in poverty, however, more than 10% of total population are still living in poverty and the differences in quality of life between provinces are substantial.
- Poverty alleviation has been a focal point of Indonesia's National Development Plans since 1969-1970.
- Indonesia is a country comprising more than 18,000 islands in a range of more than 3,000 miles from east to west, implying the importance of inter-island shipping.

¹ United Nations ESCAP, *Transport and Communication Interventions in the Alleviation of Poverty*, 1997.

- Indonesian inter-island shipping has a very complex structure. Subsidized services interact with commercial services. Service frequencies vary between less than 10 voyages to around 40 voyages per year. Many services involve a large number of port calls, sometimes up to as many as 40 ports on a single round trip.
- Due to the complexity of the inter-island transport services and their interaction, it was decided to apply the ESCAP maritime policy planning models (MPPM) to evaluate the level of efficiency and identify possible improvement.

1.2 Scope of the Brief

The purpose of this report is to document a pilot study on strategies to mitigate the effects of physical isolation on remote island communities. Indonesia was chosen as the location for the pilot study.

The study brief defined five specific tasks that were to be undertaken in the pilot study:

- Produce a preliminary assessment of the economic and social disadvantages suffered by remote island communities.
- Examine the potential for improvements to inter-island shipping services to ameliorate the disadvantages identified.
- Explore how the MPPM models may be used to assess the efficiency of current shipping operations, and to identify the matters and extent of possible improvements.
- Examine policies and strategies for the improvement of inter-island shipping services.
- Preparation of a project document for a full-scale study.

1.3 Study Activities

The specific focus of the pilot study was the less populated islands of Indonesia.

The research undertaken for the project comprised three phases:

- A desk review of past studies of disparities in social and economic development between the various provinces of Indonesia; the current policies with regard to the provision of shipping services to the communities of the remote islands; and the nature of the services that are currently provided to these islands.
- A site visit to the Directorate General of Sea Communications and the Research and Development Centre for Sea Transport within the Ministry of Communications of Indonesia. During this phase:

- Additional data on disparities in regional development in Indonesia were obtained;
 - Detailed information on inter-island cargo flows, and a time series of past imports and exports was assembled;
 - The nature of policies with regard to inter-island shipping was clarified;
 - Detailed information on Pelarayan Perintis ('pioneer shipping') services was obtained.
 - The nature of the MPPM modeling system and its previous and current application in the analysis of liner shipping systems were outlined, and possible applications to the Indonesian inter-island shipping system discussed.
- A sample of the data obtained during the first two activities was assembled in a form usable by the MPPM modeling suite, and an example application of the models undertaken.

2. Economic and Social Disadvantage of Remote Island Communities

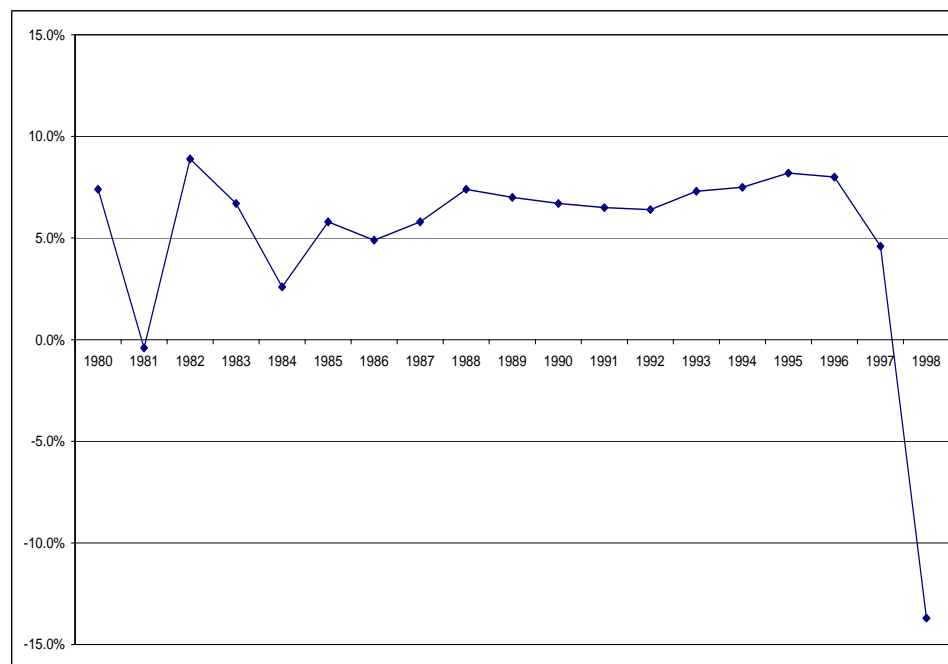
2.1 *The Indonesian Context*

2.1.1 Economic Growth

At the national level, the performance of the Indonesian economy over the last twenty years has been strong and consistent, apart from a short downturn in the early 1980's. However, the recent Asian economic crisis has impacted greatly on Indonesia.

As Figure 1 shows, Real GDP growth has remained at between 6% and 8% per annum throughout the last decade, and despite the current turbulence that is afflicting all developing ASEAN economies, most commentators believe that the longer term prospects for the Indonesian economy remain good.

Figure 1: Indonesia GDP Growth - 1980-



Source: ESCAP, Statistical Indicators for Asia and the Pacific, December 1998

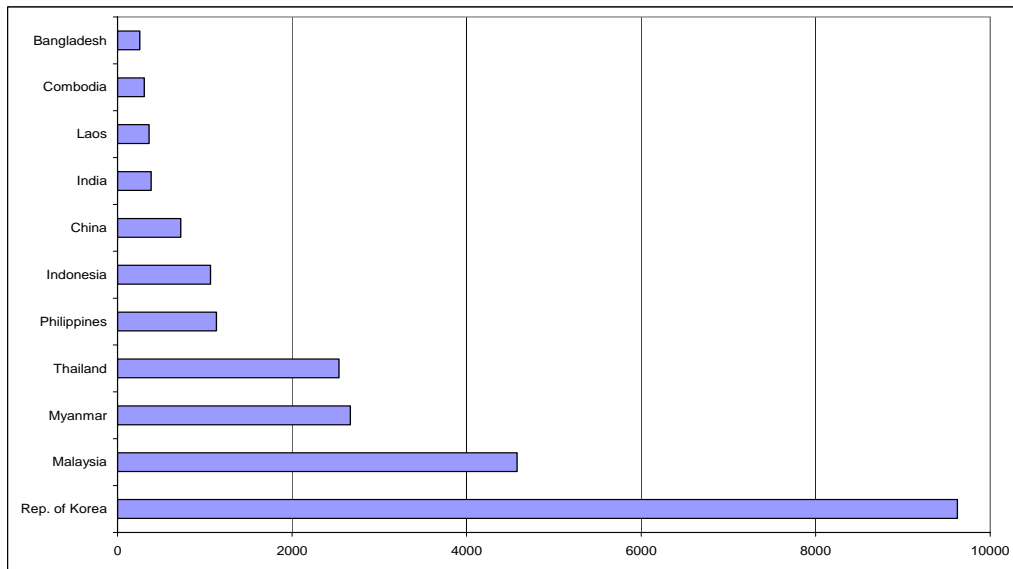
2.1.2. Income

The rapid economic growth detailed in the previous section has lifted the country out of the ranks of least developed nations. However, Indonesia is still towards the bottom of the table of middle income countries.

Figure 2 compares per capita GDP in Indonesia with that of other developing nations of East and South East Asia. In 1997, with GDP per capita of \$US 1,066, average income in Indonesia was almost three times that of India,

slightly lower than that of the Philippines, and approximately one-quarter that of Malaysia.

**Figure 2: Comparison of GDP/Capita 1997:
Indonesia and other selected Asian countries (\$US)**



Source: ESCAP, Statistical Indicators for Asia and the Pacific, December 1998

2.1.3 Poverty Alleviation

Rapid economic growth has been accompanied by a very significant reduction in poverty. Despite a large increase in total population, the absolute number of Indonesians officially defined as living in poverty² declined from 54.2 million in 1976 to 22.5 million in 1996. Expressed as a proportion of the total population, this represents a fall from 40.1% to 11.3% over this period.³

Table 1: Percentage of Population Living in Poverty: Indonesia, 1976-1996

Year	Urban	Rural	Total
1976	38.8%	40.4%	40.1%
1978	30.8%	33.4%	33.3%
1980	29.0%	28.4%	28.6%
1981	28.1%	26.5%	26.9%
1984	23.1%	21.2%	21.6%
1987	20.1%	16.1%	17.4%
1990	16.8%	14.3%	15.1%
1993	13.4%	13.8%	13.7%
1996	9.7%	12.3%	11.3%

Source: Central Board of Statistics, Indonesia, Statistical Yearbook of Indonesia, 1997

² Jumlah penduduk miskin

³ Dihitung dari hasil Survei Sosial Ekonomi Nasional (SUSENAS), modul Komsumsi dan Pendapatan Rumah tangga.

This achievement makes it possible for Somodiningrat to argue that:

The nature of poverty in Indonesia tends to be relative rather than absolute. The exact number of people living in absolute poverty is unknown, but is thought to be small in comparison with those living on, or near, the official poverty line. Whilst those in absolute poverty must be given immediate assistance, it is this latter group that requires the greatest amount of attention. These are the subsistence farmers and the people that scratch a meagre living from the informal sector of urban areas. It is this group that lives on the edge of economic disaster.⁴

However, globalisation and rapid economic development can tend to increase income disparities, and there is a clear need for pro-active government policies to ensure full participation in the potential gains:

The more developed (wealthy) economic groups will have the biggest opportunity in exploiting the globalness of the economy. Meanwhile, the less-developed (poor) groups will have to work harder in order to survive, and to increase their competitiveness. The adjustment process cannot be implemented by the poor themselves. Special attention is essential for empowering and levelling playing fields, in order to narrow the disparity gap and to make optimum use of the momentum of globalisation.⁵

Poverty alleviation has been a formal part of Indonesia's economic program since independence: the 1945 constitution enshrines a commitment to economic democracy – the development of the economy 'from the people, by the people, for the people'.⁶ The National Policy Guidelines, articulated in a series of National Development Plans (Repelita) since 1969-1970, are the principal means of articulating this vision.

Fundamental to poverty alleviation efforts has been the attempt 'to encourage the creation of more, and better, work opportunities, in particular for the poor and to improve the living and working standards.' The focus on an employment-led poverty alleviation has supported a development model which encouraged 'broad-based economic growth through a market-led strategy, strengthened by investments in physical infrastructures, basic facilities and institutions.' The development of human resources has been a priority since the mid 1960's, with the result that, while in 1970's approximately 30% of the workforce had received primary level education, the figure had by the mid-1990s reached around 60%.⁷

⁴ Gunawan Sumodiningrat, *Poverty Alleviation in Indonesia 1997: An Overview*. Paper presented to Regional Expert Group Meeting on Rural Poverty Alleviation under Changing Economic Conditions, Beijing, March 25-27, 1997, p3.

⁵ Sumodiningrat, p1.

⁶ Ginandjar Kartasamita, *Pembangunan untuk Rakyat, Memadukan Pertumbuhan dan Pemerataan*, Jakarta, 1996.

⁷ Sumodiningrat, p9.

2.1.4 Poverty Alleviation Strategies

The poverty alleviation strategies that are currently being pursued by the Indonesian Government can usefully be divided into two major groups:

- Sector or specific purpose grants, which provide assistance to government agencies to improve services to under-privileged groups. These funds may be used for personnel and operating costs as well as for other program-related expenditures. Sector and specific purpose grants constitute an attempt to integrate poverty alleviation objectives into the mainstream of the service delivery planning of Government agencies, so that poverty alleviation 'is considered a priority in each and every sector'.⁸
- *Inpres (Instruksi President)* grants, which are general-purpose grants made by the national government to lower levels of government. The three major grant programs are:
 - Inpres Dati I grants, made to provincial level governments;
 - Inpres Dati II grants, a per capita grant provided for district level infrastructure projects;
 - Inpres Desa grants, which provide funds for village development; and
 - Inpres Desa Tertinggal (IDT), which is specifically designed to assist villages 'left behind' in the development process.⁹

The IDT program, introduced in 1994, is the most recent aspect of this multi-faceted approach, and according to Sumodiningrat is 'the main thrust of the current poverty alleviation program' and 'acts as a focus for all poverty alleviation efforts in Indonesia'.¹⁰ The core of the IDT program consists of three main inputs:

- Capital injection of Rp. 20 to 60 million per village. These grants are used by groups of villagers which report on a monthly basis to the village council;
- The assignment of facilitators to assist the village groups. (These facilitators may be local professionals or specially assigned young graduates);
- Infrastructure developments linked to the IDT program because of the 'obvious connection between poor quality (or non-existent) basic infrastructure and poverty'.¹¹

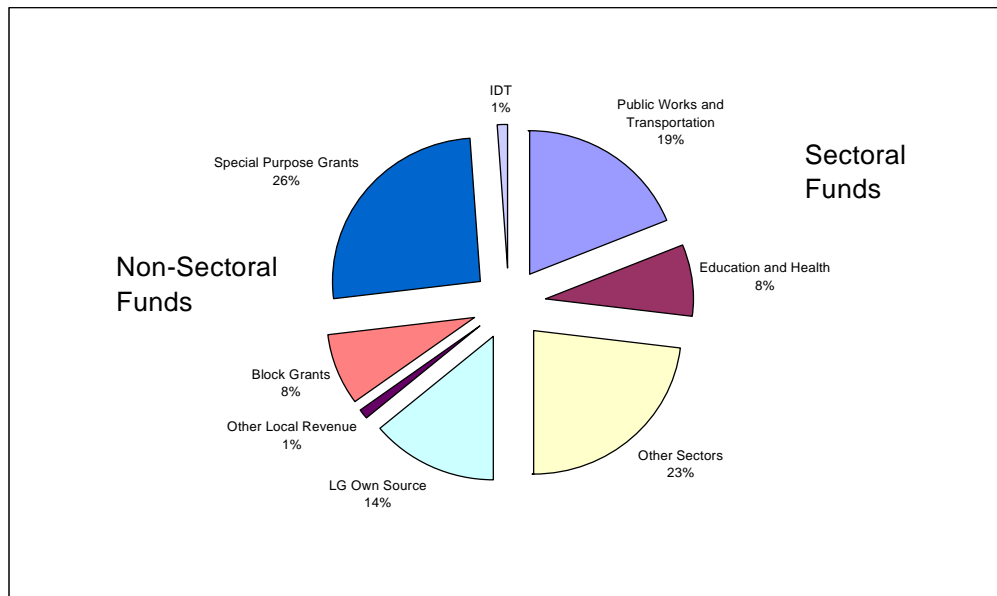
⁸ Sumodiningrat, p10.

⁹ Sumodiningrat notes that 'since its creation in 1994, the term Inpres Desa Tertinggal has been used to encompass not only these block grants but the entire village poverty alleviation effort.

¹⁰ *Ibid*, p5 and p12.

¹¹ *Ibid*, p13.

Figure 3: Source of Funds for Regional Development:



Source: Sumodiningrat (1997); Lawas (1996)

Figure 3 shows the shares of sectoral and non-sectoral funds in government spending in the regions in 1994. It is clear that IDT funding remained a small percentage of the total funds expended at a regional level. However, in recent times, the balance of funding has shifted from the provision of specific or sector funds to increased reliance on Inpres funds. This reflects a general trend towards devolution of decision-making:

The Inpres transfers have had a positive effect in the poorest areas and have encouraged the local governments to become more actively involved in planning, implementation and follow-up activities.¹²

Advancing the processes of decentralisation, devolution and empowerment are key features of Repelita VI, and most agree that they are essential to the development of successful poverty alleviation programs in the future. Nevertheless, there are still many technical, planning and administrative problems that need to be resolved before the benefits of integrating local skills, knowledge and insight with the resources of the national government can be fully realised. As Sumodiningrat cautions:

Decentralisation is not a universal cure for the problems of local governments, nor is it universally welcomed. Key elements are local institutional capacity and efficiency. Provision of resources is not the only factor. Gradually the level of authority over planning and implementation has been devolved but there will always be a hierarchy of problems and a need for a hierarchy of decision-makers.¹³

¹² *Ibid*, p11.

¹³ *Loc.cit.*

Lawas has attempted to address these issues at a conceptual level in a paper on integrated development planning for the Eastern Indonesia Development Project (EIDDP). He argues that the adoption and gradual implementation of the government programme on regional autonomy has placed a great deal of pressure on the limited capacities of local planning institutions. This skill shortage reinforces the need for a 'regional planning process in the district which moves toward comprehensively integrating policies, priorities and needs coming from the national and provincial levels and the needs and aspirations of people from the grassroot level'.¹⁴

Lawas further defines the three key 'guideposts' for regional government in Indonesia as:

Table 2: Three Basic Guideposts of Regional Administration

Decentralisation	The transfer of powers, responsibilities and resources for the administration of specific functions and/or services from the Central Government to lower level Regional Government Units (province and district). Decentralisation connotes a spatial approach in terms of development programmes, with sources coming from local budget and implementation carried out by the local governments.
De-concentration	The delegation of powers and authority to the delegation of responsibilities and authority by the Central Government/Agencies to their respective province, district or field offices, with the final authority still remaining as a Central Government responsibility. This involves a sectoral approach to development programmes. The source of funding is from the national budget of sector ministries, with implementation undertaken by the sectoral ministries/officers at the local level.
Co-administration	The implementation of function/services and/or programs of Central Government (or upper regional government) by the lower Regional Government, with responsibility remaining at the Central (or upper regional) level. This is a mixture of spatial and sectoral approaches, with funding coming from various sources at the central level.

Source: Lawas (1996)

The profound co-operation between levels of government that is required for success of these strategies – particularly de-concentration and co-administration – will be far easier to sustain if the various levels of government share the same information base and analytical frameworks:

¹⁴ Jose Mercado Lawas, *Integrated District Development Planning and Investment Programming in Support of Decentralization: Proposal for Local Government*, paper presented at the Seminar on Decentralization and Development Planning for Local Governments, Jayapura, Irian Jaya, November 1996, p1.

Most of the funds for project implementation at the local level emanate from the top. Well-articulated plans and investment proposals flowing vertically across administrative levels is a rational way to justify requests for and release of development funds.¹⁵

Well-articulated plans imply the use of appropriate planning and analysis tools to assess needs and test alternative strategies for service provision. We will return to this point in our specific discussion of the planning of inter-island shipping services.

2.2 The Importance of Location

2.2.1 Development

The evidence that location is an important determinant of economic and social development is extensive.

In South East Asia, metropolitan centres - and most particularly urban centres that are closely linked to the international trading system – have long been the focus of economic development and concentrations of wealth.

The concentricity of entrepot and polity was an almost universal phenomenon in maritime South East Asia...Central to the growth of such a polity was the entrepot which earned additional wealth and cultural contacts. The acquisition by local chiefs of prestige and luxury goods from trade and the redistribution of some these amongst clients provided the basis for the exercise of economic influence and political authority¹⁶

By contrast, communities that are remote from the main hubs of industrial, commercial and administrative activities develop at a slower rate than those more fortunately located, and characteristically rank lower on broader indicators of socio-economic development, such as health and education.

In more modern times, it is clear that Indonesian industrialisation has focussed very strongly on the key metropolitan centres and on specific-purpose facilities servicing resource-based industries (most notably oil, coal and metallic minerals).

¹⁵ Lawas, p22.

¹⁶ J. Kathirithamby-Wells, *Introduction: An Overview*, in J. Kathirithamby-Wells and J Villiers, *The Southeast Asian Port and Polity*, Singapore: Singapore University Press, 1990, p2.

Purwaka¹⁷ divides Indonesia's provinces into four categories:

Table 3: Development levels of Indonesian Provinces

Very High	Jakarta, West Java
High	Central Java, East Java, Yogyakarta, Lampung
Medium	North Sumatra, West Sumatra, South Sumatra, Bali, East Nusa Tenggara, West Kalimantan, South Kalimantan
Low	Aceh, Riau, Jambi, Bengkulu, East Kalimantan, Central Kalimantan, South Sulawesi, North Sulawesi, Central Sulawesi, Sulawesi Tenggara, East Nusa Tenggara, East Timor, Maluku and Irian Jaya.

The correlation between development level and distance from the key industrial development centre of Jakarta is striking. All but one of the provinces¹⁸ whose development level was rated as high or very high are located on the island of Java, while those in the 'medium level of development' class lie in close proximity to it. By contrast, the development level for all of the more remote provinces is classified as 'low.'

While Java is home to approximately 60% of the population, it has been estimated that in 1990 it had 76.2% of all large and medium manufacturing employment, and an even higher proportion (77.2%) of employment in small manufacturing enterprises. Moreover, it appears that the level of concentration is increasing rather than decreasing. A great deal of investment has been undertaken in the manufacturing sector since 1990, and much of this has been concentrated in Java. Between 1990 and 1993, employment in manufacturing increased by almost a third, with the rate of manufacturing employment growth in Java increasing more rapidly than elsewhere.

As the number of manufacturing enterprises located in Java increased by only 18.2%, compared to an increase of 38.7% on other islands, it seems that there is also a clear difference in the nature of this growth. The trend in Java is for an increase in the enterprise size – probably reflecting increased sophistication in the manufacturing sector. On the other islands, by contrast, there has actually been a decline in the average number of employees per establishment, possibly reflecting new startup enterprises stimulated by Government development programmes.¹⁹

It is likely that policies have increased the disparity between levels of development within Indonesia:

¹⁷ Tommy H Perwaka, *Policy on Marine and Coastal Resources Planning*, Centre for Archipelago, Law and Development Studies, Bandung, 1995.

¹⁸ The sole exception is Lampung, which lies at the extreme eastern end of Sumatra and is separated from Java only by a short ferry crossing.

¹⁹ Graeme Hugo, *Changing Patterns and Processes of Population Mobility*, in Gavin W. Jones and Terence H. Hull (eds), *Indonesia Assessment: Population and Human Resources*, ISEA: Singapore, 1997, p97.

...present development policies which stress the export of non-oil products are greatly influencing the process of urbanisation and urban development. The large cities, especially those in Java, are promoted by the policies, as the cities are better prepared with the supporting facilities and infrastructure. In the short run, it seems that the regulations tend to widen the disparities between small towns and intermediate cities, on the one hand, and large cities, especially those in Java, on the other hand; and the disparities between Java and the outer islands²⁰.

2.2.2 Income Levels

Provincial income levels in Indonesia are influenced by a number of factors. Provinces rich in natural resources such as Riau, East Kalimantan and Irian Jaya have comparatively high-income levels, while tourism plays a major part in supporting incomes in Bali. Industrialisation evidently also plays a substantial part as per capita income in Jakarta is second only to those in the resource-rich province of East Kalimantan.

Table 4: Per Capita Gross Regional Product by Province (1996)

Province	GRP/Capita Thousand Rupiah	Ranks	Living in poverty (%)
DI Aceh	3,702	5	10.79
North Sumatra	2,470	8	10.92
West Sumatra	2,142	15	8.76
Riau	5,882	3	7.94
Jambi	1,624	19	9.06
South Sumatra	2,285	10	10.72
Bengkulu	1,545	20	9.37
Lampung	1,356	23	10.65
Sumatra Island	2,586		10.15
Jakarta	8,809	2	2.48
West Java	2,185	13	9.88
Central Java	1,740	17	13.91
DI Yogyakarta	2,157	14	10.42
East Java	2,241	12	11.86
Bali	2,916	7	4.29
Java & Bali	2,620		10.75
West Kalimantan	2,246	11	21.98
Central Kalimantan	3,127	6	11.24
South Kalimantan	2,408	9	14.33
East Kalimantan	10,462	1	9.24
Kalimantan Island	4,262		15.35
North Sulawesi	1,777	16	10.60
Central Sulawesi	1,502	22	8.18
South Sulawesi	1,522	21	8.02
South-east Sulawesi	1,272	24	8.48
Sulawesi Island	1,539		8.59
West Nusa Tenggara	1,062	25	17.61
East Nusa Tenggara	902	27	20.57
Maluku	1,698	18	19.47
Irian Jaya	4,061	4	21.17
East Timor	988	26	31.15
Other Islands	1,607		20.33

²⁰ Tommy Firman, *Patterns and Trends of Urbanisation*, in Gavin W Jones and Terence H Hull (eds), *Indonesia Assessment: population and human resources*, Singapore: ISEAS, 1997, p116.

It is clear that location is also a significant factor in the determination of provincial income. The three provinces at the bottom of the income table all have small populations, are remote from the centres of industrial and administrative activity, and lack the principal offsetting advantage of extensive natural resources. The four provinces of Sulawesi – a larger island, but also remote and lacking in the mineral wealth of Kalimantan – are also among the ten poorest provinces. By contrast, none of Java's five provinces fall within this group.

It is also evident from Table 4 that the differences in income levels between provinces are very significant indeed: average per capita income in the poorest province, East Nusa Tenggara, is only fractionally over one-tenth that in Jakarta. It is important, of course, to acknowledge that the cost of living in East Nusa Tenggara is significantly lower than that of Jakarta. However, this difference nowhere near compensates for the difference in income. The official urban poverty line in Jakarta was set (in 1996) at 50,280 Rp per month per capita: for East Nusa Tenggara, the corresponding figure was 31,796 Rp month.

The data on the percentage of the population living in poverty also provides some additional interesting insights. A comparison of the proportion of the population living in poverty in Jakarta (2.5%) with the considerably higher proportions for the high-income resource rich provinces suggests that the income benefits of resource-based developments may be more concentrated than those of general industrial development. More difficult to explain is the (comparatively) low incidence of poverty on the low-income island of Sulawesi. What is not surprising, however, is the incidence of poverty on the smaller, more remote island provinces of West Nusa Tenggara, East Nusa Tenggara, East Timor, and Maluku. Poverty incidence in these islands is rivalled only by that of resource rich yet basically underdeveloped provinces of Irian Jaya and Kalimantan.

Sumodiningrat points out that these patterns create something of a dilemma for poverty alleviation priorities in Indonesia:

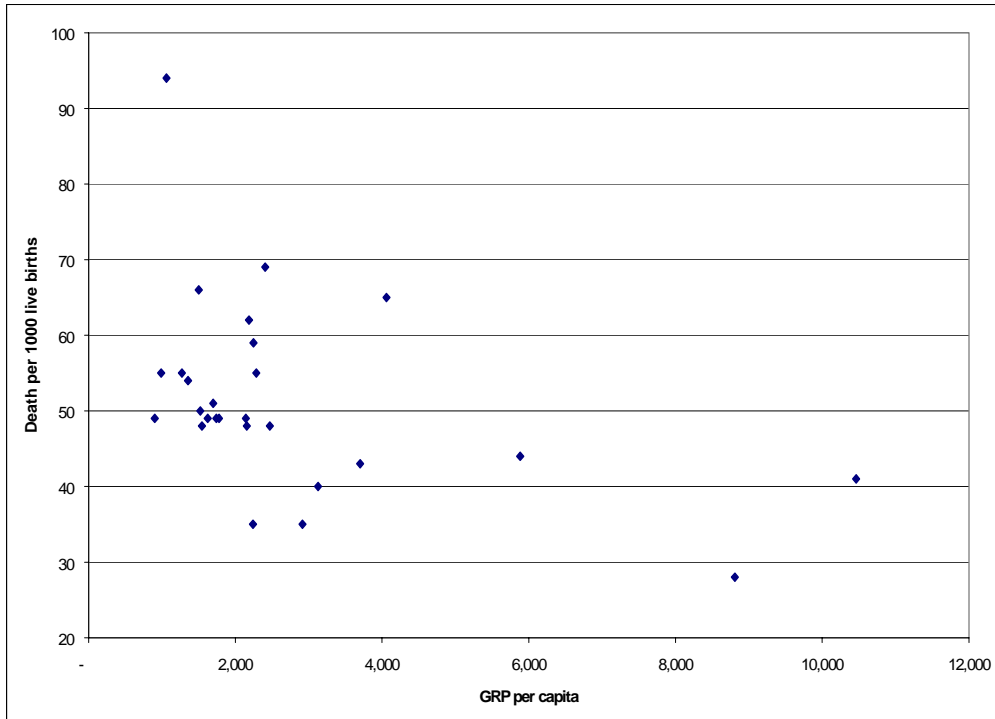
Whilst most of the poor live on Java and Sumatra, the degree of poverty in terms of the low general standard of these islands demands specific attention....in terms of quality of life, however, some of the areas outside of Java and Sumatra score so low on key indicators that they have been likened by some experts to Sub-Saharan African nations.²¹

2.2.3 Other Development Indicators

Given the well-established relationship between poverty and health – and particularly the health of young children – it is not surprising that the income levels discussed in the previous section are reflected in mortality statistics. Figure 4 shows the relationship between infant mortality rate and per capita gross regional product for each of the Indonesian provinces.

²¹ Sumodiningrat, p5.

Figure 4: Infant Mortality and Regional Income: Indonesia



Source: Central Board of Statistics, Indonesia, Statistical Yearbook of Indonesia, 1997; State Ministry for Population, Information Map: Population, Family Planning and Prosperous Family, 1997

Table 5 provides further details of infant mortality rates and life expectancy in each province. A notable feature of this table is that the provinces in Sumatra and Java and Bali islands have comparably lower infant mortality rates than the provinces in other islands. Seven provinces out of 27 have low infant mortality rates of less than 45, however, their per capita incomes show big difference from 2,241 thousand Rp. to 10,462 thousand Rp. A reasonable interpretation of these data is that accessibility to quality health care is a significant determinant of infant mortality rates, which acts independently of income level. The very high ranking of the province of Bali, and the comparatively poor showing of some of the provinces of Kalimantan, tend to support this hypothesis, as does the poor showing of Irian Jaya. Once again, the smaller remote island communities of Nusa Tenggara and Timor are placed near the bottom of the table.

Table 5: Indicators of the Quality of Life by Province (1997)

Province	Infant Mortality (Death/ 1000 live births)	Male Life Expectancy at Birth (year)
DI Aceh	43.00	64.23
North Sumatra	48.00	63.11
West Sumatra	49.00	62.87
Riau	44.00	64.07
Jambi	49.00	62.96
South Sumatra	55.00	61.54
Bengkulu	48.00	63.08
Lampung	54.00	61.81
Jakarta	28.00	68.20
West Java	62.00	59.94
Central Java	49.00	62.94
DI Yogyakarta	48.00	63.23
East Java	35.00	66.30
Bali	35.00	66.10
West Kalimantan	59.00	60.65
Central Kalimantan	40.00	65.07
South Kalimantan	69.00	58.48
East Kalimantan	41.00	64.90
North Sulawesi	49.00	62.99
Central Sulawesi	66.00	58.96
South Sulawesi	50.00	62.75
South-east Sulawesi	55.00	61.44
West Nusa Tenggara	94.00	53.38
East Nusa Tenggara	49.00	62.84
Maluku	51.00	62.46
Irian Jaya	65.00	59.22
East Timor	55.00	61.66
Total	52.00	62.29

Source: State Ministry for Population, Information Map: Population, Family Planning and Prosperous Family, 1997; Central Bureau of Statistics, Indonesia: Demographic and Health Survey, 1997.

2.2.4 Distribution of IDT Grants

A useful indicator of the development disadvantage of various areas of Indonesia can be gained from an analysis of the geographical distribution of the IDT grants. These grants, as we have indicated above, are a initiative under Repelita VI targeted specifically at villages left behind by the development process. Table 6 illustrates the distribution of these grants up to and including 1996.

Table 6: Villages in receipt of IDT grants by province

Province	IDT Villages			% of Total Villages
	Urban	Rural	Total	
DI Aceh	35	3,097	3,132	57
North Sumatra	64	1,816	1,880	37
West Sumatra	31	705	736	34
Riau	33	619	652	54
Jambi	17	444	461	42
South Sumatra	48	849	897	34
Bengkulu	7	476	483	44
Lampung	12	746	758	41
Sumatra Island	247	8,752	8,999	44
Jakarta	11	-	11	4
West Java	208	1,400	1,608	23
Central Java	205	2,319	2,524	30
DI Yogyakarta	22	105	127	29
East Java	235	1,813	2,048	24
Bali	19	92	111	17
Java & Bali	700	5,729	6,429	25
West Kalimantan	14	770	784	57
Central Kalimantan	8	977	985	84
South Kalimantan	25	855	880	41
East Kalimantan	10	905	915	82
Kalimantan Island	57	3,507	3,564	61
North Sulawesi	35	583	618	43
Central Sulawesi	14	883	897	67
South Sulawesi	56	878	934	41
South-east Sulawesi	13	450	463	55
Sulawesi Island	118	2,794	2,912	49
West Nusa Tenggara	32	298	330	57
East Nusa Tenggara	86	1,806	1,892	100
Maluku	75	1,442	1,517	100
Irian Jaya	52	2,228	2,280	100
East Timor	8	434	442	100
Other Islands	253	6,208	6,461	96

Source: Bappenas, 1996.

In four out of the five provinces of Eastern Indonesia, 100% of all villages have received IDT development assistance grants. In the fifth province of Eastern Indonesia, West Nusa Tenggara, 57% of all villages received grants. By contrast, approximately 26% of villages on Java have received grants. These figures should be compared to the national average of 44% of all villages.

2.2.5 Conclusion

On a priori grounds, one might expect that the outer islands of Indonesia – especially the long chain of islands with comparatively small populations that constitutes Eastern Indonesia – to be economically and socially disadvantaged by virtue of their location. This expectation is borne out by our examination of:

- Levels of industrial development;
- Per capita income;
- Infant mortality;
- Life expectancy; and
- The distribution of specific poverty alleviation activities of the Indonesian government.

Overcoming the disadvantages of location will require a mix of pro-active strategies. However, it is reasonable that, as accessibility lies at the heart of the disadvantages faced by these communities, improvements in transport will have an increasingly important role to play.

3 The Role of Transport

3.1 *Transport and Economic Development*

It is widely acknowledged that transport has a crucial role to play in economic development.²² More specifically, it has been recognised that the provision of a high quality transport system is a necessary precondition for the full participation of remote communities in the benefits of national development:

Adequate, reliable and economic transport is essential, although not in itself sufficient, for the social and economic development of rural areas in developing countries²³

The direct impact of transport on production at remote locations is derived from three effects:

- Lowering of production costs;
- Increased producer prices; and
- Encouragement of investment.

3.1.1 Lowering of Production Costs

The reduction in costs results from three main factors. Firstly and most obviously, improved transport lowers the delivered costs of inputs to the producer. This can be important for agricultural as well as industrial production: Ahmed and Hossain, in a study of two groups of villages in Bangladesh, found that agricultural output was 31 to 42 per cent higher in the group with better transport access, and attributed this difference principally to the lower delivered cost of fertiliser.²⁴

A second and related issue is the reliability of transport services. The importance of continuity of input supply increases rapidly as the degree of industrial sophistication increases. The absence of regular and reliable transport services operating with adequate frequency will effectively condemn remote communities to subsistence production in perpetuity. As shipping services generally use a larger unit of supply and operate at lower frequencies than land transport services serving markets of a similar scale, interruption to supply is generally a far more serious problem where the remote community is dependent on maritime transport.

Finally, improved transport can broaden the labour pool to which a production facility has access. While access to unskilled labour may not be a problem in most remote island communities, access to skilled labour frequently is. This applies to

²² See, for instance, Curt Carnemark, Regional Development Adviser, Transportation Department, World Bank, *Some Economic, Social and Technical Aspects of Rural Roads*, ESCAP workshop on rural roads, Dhaka 10-23 January 1979.

²³ S. Carapetis, H. Beenhakker, and J. Howe, *The Supply and Quality of Rural Transport Services in Developing Countries*, World Bank Staff Working Paper 654, August 1984.

²⁴ Ahmed, Raisuddin and Mahabub Hissain, *Development Impact of Rural Infrastructure in Bangladesh*, International Food Policy Research Institute, Research Report 83.

both labour that is required on a temporary basis – for example, to the services of specialist advisers – and to skilled workers required for permanent employment. In Indonesia, the latter is likely to become increasingly important with the change in strategy in transmigration efforts which have recently ‘focused not on moving people but on making locations more attractive and viable so that people want to move there themselves’.²⁵ An important component of making remote island locations more attractive to potential migrants – particularly skilled workers – will be a reduction in the sense of physical isolation associated with them.

The Palm Oil Industry

According to a World Bank survey, Indonesia is one of the world’s lowest-cost vegetable oil producers (after soybean oil from Argentina and Brazil). Direct costs of production are far lower than international palm oil prices, and land costs are low. However, investment – and especially foreign investment - in the oleochemical industry in Malaysia, where production costs are much higher, has far outstripped investment in Indonesia. A recent industry study suggests that this is because ‘some top managers from foreign companies which have palm oil business in both Malaysia and Indonesia evaluate that Indonesia’s advantages in labour and land are offset by overhead burdens so there is no difference in total costs between the two countries.’

The study authors identify the major disadvantages perceived by the industry side as possible bottlenecks inhibiting future development. The first two of these are:

- A shortage of port and storage facilities for palm oil products; and
- A shortage and poor maintenance of inland and offshore transport systems.

Source: Mari E Pangestu and Yuri Sato, *Waves of Change in Indonesia’s Manufacturing Industry* (Tokyo: Institute of Developing Economies, 1997)

3.1.2 Increased Producer Prices

For many agricultural commodities and low value added manufactures, the costs of transport represent a substantial proportion of total product costs. One study has indicated that, in developing countries, transport costs typically account for between 10% and 30% of final product price.²⁶

Frequency and reliability of transport also have a very significant impact. Irregular or infrequent transport services require purchasers to hold high levels of stock in order to ensure that they in turn can ensure continuous

²⁵ Sumodiningrat, p2.

²⁶ Henri L Beenhakker, *Issues in Agricultural Marketing Strategy and Pricing Policy*, The World Bank, Discussion Paper, Transportation Issues Series No TRP7.

supply to their customers. This results in an increase in inventory costs, which in turn depresses the prices offered to producers in remote locations.

Added to this is the risk of spoilage of perishable products. This may seriously inhibit the diversification of primary activity into higher value lines such as horticultural production. Alternatively, it will significantly erode the benefits to producers of diversification into higher value but more perishable commodities.

3.1.3 Increased Investment

The quality of infrastructure and support services has been identified as a significant determinant in investment decisions. Creightley reports that 'for countries in the early phases of development, good quality infrastructure was preferable to tax incentives for attracting foreign investments'.²⁷

Creightley also reports evidence that 'transport improves access to institutional credit, contributes in shifting the allocation of credit from nonproductive to productive activities, and leads to increased demands for credit'.²⁸

3.1.4 Virtuous Circle Effects

Transport sector improvements can serve as a catalyst that promotes a virtuous circle of economic development. The reduction in input costs and improved producer prices lead to improved profitability of agricultural and industrial production, creating an incentive to increase output. At the same time, greater access to investment funds permits the expansion of capacity required to enable producers to expand production in accordance with this incentive, and also facilitates upgrading of the technology of production.

Economies of scale combine with improved productivity from capital deepening to further improve margins, and provide additional impetus for investments.

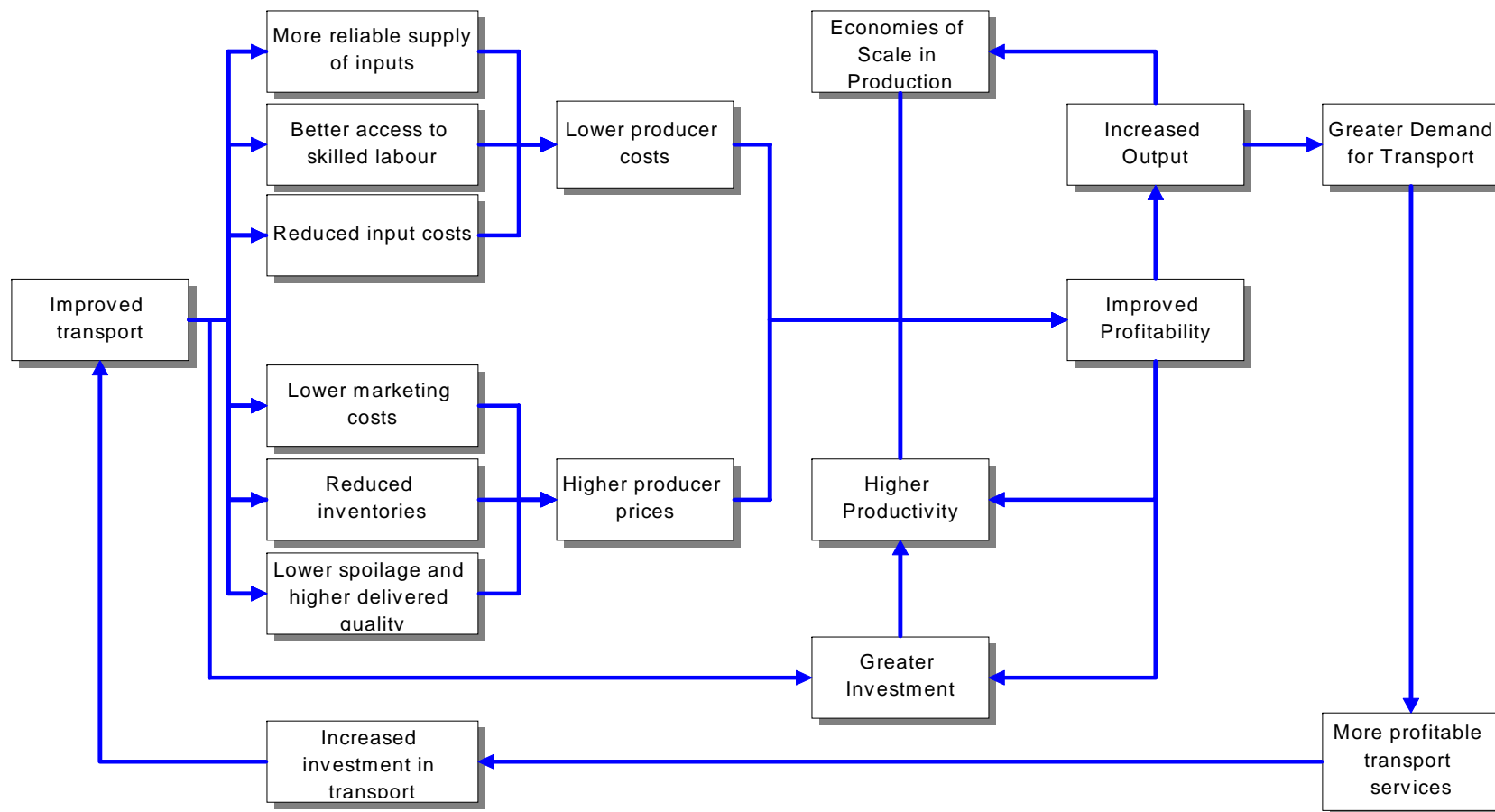
Increases in levels of production bring with them increased demand for transport services, improving profitability and encouraging further investment in transport itself. This in turn leads to improved service frequency and larger scale units of production (ships in the case of maritime transport), providing a basis for the next cycle of improvements in the agricultural and manufacturing production of the regions served.

A schematic representation of these processes is provided in Figure 5.

²⁷ Cavelle D. Creightley, *Transport and Economic Performance: A Survey of Economic Performance*, World Bank, Washington: 1993, p8.

²⁸ *Ibid*, p10.

Figure 5: Schematic Representation of Relationship between Transport and Economic Development



3.1 **Transport and Personal Welfare**

The contribution of transport performance to regional economic development has obvious implications for poverty alleviation and personal welfare. In addition, however, transport system performance can have a direct and significant impact on a range of other dimensions of development.

3.2.1 Health

In Indonesia, considerable effort has been devoted – and continues to be devoted – to the provision of basic health services at the village level. However, in a previous section, we reviewed the impact of accessibility on health, and found large discrepancies in outcomes on even the most basic health outcome indicators (infant mortality and life expectancy).

The urban bias is simple to understand but often results in a widening gap between the poorer rural areas and the wealthier urban ones. Health is a sector where this bias is clear. Indonesia has made a very real effort to provide primary health centres to villages, and trained many thousands of doctors, nurses, primary health care workers, midwives and paramedics. Nevertheless, access to quality health care (even non-specialist) staff, pharmaceuticals and facilities is still very much an urban privilege.²⁹

However, the health budget is finite, and it is not realistic to expect that a comprehensive range of services can be universally available at the local level. Greater concentration of population and economic activity create an inbuilt bias in service provision towards metropolitan locations. The task, therefore, as Sumodiningrat says, is

'not to provide a hospital to every village ... but to make it possible for rural communities to gain easier access to urban-based facilities. This requires not only better physical infrastructures and transport systems but a rural health awareness campaign and means of paying for the required services'.

In other words, better transport is a necessary, though not a sufficient condition, of providing adequate access to health care for village communities. In the case of the remote, under-developed islands of Eastern Indonesia, where incomes for most remain well below the level that make air travel a realistic alternative, better transport means improved passenger shipping services.

3.2.2 Education

Analogous arguments can and have been advanced with respect to education services. While a key component in improving life prospects for the inhabitants of remote communities is the provision of sound basic education at the local level, it is unrealistic to expect the full range of educational

²⁹ Sumodiningrat, p5.

opportunities and options to be available outside of major urban centres. Once again, therefore, reliable, efficient and affordable shipping services will play a key role in ensuring equitable access to educational opportunities for remote island residents.

3.2.3 Employment

Indonesia's strategy of diversifying its economic base to reduce its dependence on oil revenues has led to major changes in its economic structure, with a rapid rise in the importance of manufactured exports. Labour-intensive manufacturing increased particularly strongly during the latter half of the 1980's and early 1990's, creating a wide range of new employment opportunities.³⁰

As we have seen, these new opportunities are heavily concentrated in the main urban centres. One of consequences of this change has been a change in inter-provincial migration patterns. Indonesia has long had a transmigration programme to transfer people from the Inner (Java, Bali and Madura) to Outer Indonesia. Originally conceived as a programme to 'even out' population densities, the goals are now more commonly articulated in terms of development in the outer islands. Partly as a result of this programme, Java's population has been growing significantly more slowly than that of Indonesia as a whole. However, Hugo notes that:

The shift in Government policy in the late 1980s to facilitate international and domestic private investment and industrialisation is tending to favour growth in Java. Between 1985 and 1990 the number of people moving into Java (773,789) was almost as great as the number moving in the opposite direction.³¹

Hugo further suggests that recently more people moved from the Outer Islands to Java than moved in the opposite direction'. As most inter-provincial migrants to Java settled in urban areas, the most probable explanation of this trend reversal is that migrants are 'attracted by the rapidly expanding urban-based job opportunities'.

Official statistical data captures only permanent relocation. Perhaps even more important is the employment-induced temporary relocation of workers. It is widely accepted that the scale of non-permanent movements has increased dramatically in recent years, and is many times larger than permanent migration.³² Non-permanent migration increasingly provides an important source of supplementary income, and diversity of employment opportunities, to rural households. According to one study, 'twenty-five years ago many of the landless labourers on Java had very few sources of

³⁰ Natsuki Fujita and William E James, *Employment Creation and Manufactured Exports in Indonesia, 1980-1990*, Bulletin of Indonesian Economic Studies, Vol 33 No 1, April 1997, pp103-115.

³¹ Graeme Hugo, *Changing Patterns and Processes of Population Mobility*, in Jones and Hull (1997), p77..

³² Indirect supporting evidence can be gleaned for travel statistics: ferry movements increased from 6.8 million in 1968 to 46.6 million in 1992, while domestic air travel increased from 0.4 million to 3.8 million over the same period.

income...Now most of the landless rural families on Java have at least one person who is working outside the village, and in a factory or service job³³.

Hugo cites a long list of reasons why temporary rather than permanent migration may be a preferred strategy for tapping the larger employment markets of the large

cities. Some of these are causative, and some permissive. Amongst the most important are:

Causative:

- Participation in work in both the urban and rural sectors spreads the risk by diversifying families' portfolio of income-earning opportunities;
- The cost of living in urban areas is considerably higher, so that keeping the family in the village while earning in the city allows earnings to go further;
- Job options in the village, especially during seasonal increases in demand, are able to be kept open;
- In many cases, there is a preference for living and bringing up children in the village where there are seen to be fewer negative influences.

Permissive

- Flexible time commitments in the urban informal sector allow time to circulate to the home village;
- The growing body of family and friends with urban experience makes the transition less intimidating for the rural worker, and often provides an urban base for him or her;
- Many urban employers provide barrack-style accommodation for workers;
- Recruiters and middlemen play a significantly increasing role in rural labour recruitment;
- Java's transport system is cheap and diverse, and allows workers to get to their home village from time to time.

All but the last of these considerations apply also to Outer Island residents.

Migration to pursue employment opportunities is one of the most important mechanisms by which the 'trickle down' effect of industrial wealth generation is realised. The main focus of industrialisation in Indonesia will, for some time to come, be the major conurbation of Java, and it appears that temporary migration will be the preferred means of participation. For Outer Island

³³ Collier et al., quoted in Hugo, p91.

residents and those in less well developed areas, the ability to take full advantage of these opportunities will require access to reliable and affordable transport services. Income levels suggest, and patronage statistics confirm, that these will be primarily maritime.

3.3 Previous Study on the Role of Transport for Poverty Alleviation

3.3.1 Transport and Communications Interventions in the Alleviation of Poverty

To examine the role of transport interventions in poverty alleviation, the United Nations ESCAP undertook a review of projects/programmes in which transport could be a central element in alleviating poverty and improving the quality of life of people living in remote areas. The review comprised the following five case studies:

- the Rural Roads and Markets Improvement and Maintenance Project in Bangladesh;
- the Least-developed Village Development Grant Scheme in Indonesia;
- the Dhading Development Project and Gorkha Development Project in Nepal;
- the Aga Khan Rural Support Programme in Pakistan; and
- the Medium-term Development Plan in Philippines.

The case studies have demonstrated that poverty alleviation is a complex process, therefore, success or failure can rarely be attributed to one particular element within a programme. Nevertheless, transport interventions appear to have played a central role in the process of alleviating poverty or in improving the standard of living of the communities targeted in the respective projects mentioned above.

The followings summarize the major conclusions drawn from the case studies with respect to the role of transport interventions in poverty alleviation.

- Transport interventions can be used as a policy instrument and an entry point for poverty alleviation.
- Transport interventions may have a direct impact on poverty reduction when the provision of improved transport is directly targeted towards the needs of the low-income groups and provides them with income earning opportunities. Direct impacts on the poor were observed in the cases of Indonesia and Philippines.
- Transport interventions also have an indirect social and welfare impact when improved transport provides cheaper and easier access to health, education and other services. Transport interventions in the cases of Bangladesh and Pakistan were found to have these indirect impacts on poverty alleviation.
- Transport interventions in Nepal had a combined impact generating employment opportunities as well as increasing social mobility.

3.3.2 Implication for Inter-island Shipping

One of the main purposes of the ESCAP study was to assess the impact of improved rural infrastructure, mainly roads, markets, bridges and culverts, on agricultural output, rural development and the well-being of residents in rural areas. However, project evaluations, particularly cost-benefit analyses, cannot provide a full understanding of the impact of transport on alleviation of poverty of the rural poor.

Evaluation of effectiveness of inter-island shipping in alleviating poverty of remote island communities is even more difficult because of the complexity of shipping networks. Consequently, the evaluation tends to be based on subjective judgements.

It is necessary to find ways to assess the effectiveness of inter-island shipping, one of which can be application of the MPPM models.

4 Indonesian Inter-island Shipping

4.1 *Status Quo of Inter-island Shipping in Indonesia*

Indonesia is one of the largest archipelago nations, comprising 18,000 islands and islets and bordered by Singapore and Malaysia to the north, Papua New Guinea to the east and the Indian Ocean to the west and south. It has 27 provinces, 310 municipalities and 63,000 villages in scattered islands including Sumatra, Java, Bali, Kalimantan, Sulawesi and Timor.

Because of the geographic features of the Indonesian archipelago covering a large area of 3,000 miles from east to west, shipping plays a crucial role in providing international and domestic links.

Regular and frequent international shipping services are available at major Indonesian ports. Tanjung Priok near Jakarta in western Java is the largest port in Indonesia and ranked 24th on world container port league with the container throughput of 1.5 million TEU in 1997. Other principal ports are Tanjung Perak near Surabaya in eastern Java, Belawan port near Medan in northern Sumatra and Ujung Pandang in Sulawesi.

Inter-island shipping is the prevailing means for distributing goods through more than 300 ports in Indonesia. The cargo volume carried within Indonesia by inter-island shipping services reaches over 300 million tons, far exceeding international trade volume. Thus, inter-island shipping accounts for 60% of total seaborne cargo movement in Indonesia. Especially, for remote islands like Sulawesi and others, the percentages of cargoes carried by inter-island shipping are even higher.

Table 7: International and Inter-island Seaborne Cargo Volumes by Island (1996, in thousand ton)

Islands	Inter-island	(% of Total)	International	Total
Sumatra Islands	134,996	63.3%	78,387	213,383
Java & Bali	71,258	52.6%	64,125	135,383
Kalimantan Islands	78,921	56.0%	62,075	140,996
Sulawesi Islands	14,569	75.2%	4,804	19,374
Other Islands	12,975	88.4%	1,694	14,669
Total	312,719	59.7%	211,086	523,805

For passenger shipping, around 14 million passengers a year are travelling by inter-island shipping services. The remote islands again show higher percentages in the number of passengers travelling by inter-island shipping compared to their proportion of total population.

**Table 7: Number of Passengers of Inter-island Shipping
(1995, in thousand passengers)**

Islands	Passengers	(%)	Population	(%)
Sumatra Islands	3,023	21.6%	40,830	21.0%
Java & Bali	3,170	22.7%	117,630	60.4%
Kalimantan Islands	2,634	18.8%	10,470	5.4%
Sulawesi Islands	2,303	16.5%	13,732	7.1%
Other Islands	2,844	20.4%	12,093	6.2%
Total	13,974	100.0%	194,755	100.0%

4.2 Promotion of Inter-island Shipping

4.2.1 Deregulation

Until relatively recently, shipping in Indonesia was highly regulated, with an extensive route licensing system that defined a variety of different vessel classes. The course of deregulation, however, which commenced in 1985 (under Inpres 4/1985) and was effectively completed in 1988 (by the Paknov/88 reforms and their supporting regulations), has left Indonesia with an inter-island shipping system that is very largely deregulated.

In the following sections we will focus on maritime cargo services. However, the preceding discussion will have made it clear that inter-island passenger services are also a vital part of the development infrastructure for Indonesia's remote island communities³⁴.

The majority of domestic maritime freight tasks are distributed between two forms of shipping:

- Ferries; and
- Inter-island shipping services.

Although the responsibility for both sectors lies within the Ministry of Communications, each is administered by a different Directorate: ferries are the responsibility of the Director General Land Transport, while inter-island shipping services are administered by the Director General Sea Transport. The rationale for this division of responsibility is not entirely clear, but it appears to be that ferries are regarded as extensions of the highway system rather than shipping services.

Despite this division of administrative responsibility, there seem to be several key dimensions to the distinction between the two types of service:

³⁴ Although the MPPM model suite has previously been applied solely to freight transport, it is worth recalling that many of the techniques employed and the mathematical algorithms on which the models are based have their origins in an urban transport planning setting. There are no technical reasons why the MPPM suite could not be used to analyse and refine the inter-island passenger shipping system.

- Nature of route: ferry services are generally point to point services, whereas shipping services are offered on more complex routes;
- Length of route: ferry services are generally offered over a relatively short distance, typically between adjacent islands;
- Nature of craft: ferry services typically use ro-ro vessels, while shipping services commonly use lift-on lift-off vessels; and
- Nature of cargo: ferry services typically carry a mix of passengers, cars and trucks, while shipping services are usually dedicated cargo services.

Inter-island shipping services are subject to minimal regulation, in that service providers are required:

- to file every three months a *Rencana Pola Trayek*, defining the deployment of each vessel over the next three month period;
- to provide at least one month's notice of any change to this plan

However, as there are 1,156 registered shipping companies and approximately 10,000 vessels, the task of monitoring, analysing and compiling the information contained in the *Rencana Pola Trayek* is beyond the resources of the Ministry of Communications. The majority of inter-island services are therefore undertaken by commercial operators in an environment in which they are to all intents and purposes free to pursue their commercial interests without regulatory intervention.

As one component of the battery of measures designed to foster regional development, the Ministry of Communications is responsible for the support of 'pioneer' services designed to ensure regular transport services to remote communities. These include:

- Pioneer land transport (bus) services;
- Pioneer ferry services;
- Pioneer shipping services;
- Pioneer air services.

There are also programs in place supporting the construction of small ships capable of serving remote communities, and for port development at remote locations. (There are now approximately 110 ports operated as multi-user ports by the government, as well as several hundred single user ports operated by private or government enterprises to service individual trades).

4.2.2 Pioneer Shipping Services (Pelayaran Perintis)

Pioneer Shipping Services are established under Presidential Decree No 16 (1994).

The initiative for the establishment of a Pelayaran Perintis service usually comes from a regional governor, who will propose the establishment of a pioneer route. The proposal will be evaluated by the Ministry of Communications, which will take into account other alternatives available for serving the traffic and the size of the communities involved in making its recommendations.

Once it has been decided that a Pelayaran Perintis service should be established, tenders are called from service providers willing to operate the route.

All shipping companies are free to tender for the service. There is no limit on the number of services that can be provided by an individual operator, and in practice, four or five companies tend to win most of the contracts.

Contracts are let annually (called in February but let in April), but subsidy payments are made on the completion of each round trip. The tender documents will specify:

- The route to be served;
- The frequency of service;
- The size of vessel to be used;
- The level of charges that will be permitted.

Tenderers are asked to bid on the level of subsidy that would be required. Performance is monitored by a Bagian Proyek (project officer) located in each home port from which pioneer services are operated. Calls at individual ports on the route are certified by local port officials. Lateness is subject to a financial penalty under the terms of the contract.

4.3 Possible Direction for Policy Improvement

4.3.1 Policy Successes

The Indonesian inter-island shipping system has come a long way from the tightly regulated, bureaucratically dominated regime that prevailed until the mid 1980's. Regulation is now very light-handed, and a diverse and flourishing domestic shipping sector is now evident.

However, while Indonesia relies in the main on market forces to shape domestic maritime cargo transport, the administrative system continues to acknowledge that providing acceptable levels of service will not always be commercially viable, particular in the case of services to more distant and less

populous islands. The system of 'Pioneer' services provides a mechanism for the introduction of both ferry

and inter-island shipping services that would not be sustainable without Government support.

Moreover, the manner in which support is provided to inter-island cargo shipping services has many attractive features:

- Services are provided by private sector operators, rather than by a Government department or agency;
- The allocation of a subsidised route to operators is done via a competitive tendering process;
- The period for which a subsidy is allocated is short (one year), allowing the competitiveness of an incumbent operator to be frequently verified;
- Performance expectations, at least with respect to frequency of service and adherence to schedule, are clearly specified and sanctions are imposed in the event of unsatisfactory performance;
- The receipt of a subsidy does not bring with it an exclusive right to operate a route. Other shipping lines can at any time establish a service, which competes in whole or in part with the subsidised operation.

The basic direction of policy with regard to inter-island cargo shipping in Indonesia is one that is likely to contribute to poverty alleviation through improving accessibility without imposing an excessive burden on public finances.

4.3.2 Integration

At the present time, inter-island passenger operations, inter-island cargo shipping operations and ferry services are subject to different administrative arrangements. The discussion of the previous sections makes it clear that all three of these components have a role to play in improving the accessibility of the remote island communities of Indonesia. The overall effectiveness of the contribution of maritime transport to poverty alleviation could be enhanced by an improved understanding of the interaction between these three elements, and tighter integration of their administration.

4.3.3 Service Assessment

The introduction of the new services through the *Pelarayan Perintis* program is initiated at the local level. The recommendation for a new service is then scrutinised by central Government officials and a judgement made on whether the new service is justified.

The empowerment of local communities that is implicit in this approach is in keeping both with the general thrust of poverty alleviation initiatives under *Repelita VI* and most contemporary thinking on poverty alleviation.

However, Lawas³⁵ has identified the need to reconcile decentralised decision-making with a coherent, integrated planning regime as one of the key challenges of the devolution initiatives that are embraced by *Repelita VI*. Failure to address this challenge adequately will lead to a poor alignment of individual projects with national priorities and an inequitable distribution of poverty alleviation effort.

Amongst the principal strategies for achieving this reconciliation are the establishment and promulgation of clear guidelines for service definition and an appropriate, consistent and coherent analytical approach.

This is made particularly difficult in the case of inter-island shipping because the nature of shipping networks make it impossible to consider a single service in isolation. *Pelarayan Perintis* services interact both with other *Pelarayan Perintis* services and with unsubsidised commercial services. Although the Research and Development Agency does attempt to assess the extent to which existing shipping services meet the demands of the communities to whom it is proposed to service, no formal tools are at present available for assessing the impact of a new service on existing pioneer services, or on commercial operations which partially overlap the route. Consequently, the assessment must rely very largely on subjective judgements about what can be rather intricate interactions within a complex system.

It is in this area that adaptations of the MPPM models may be of use, and this issue is the subject of the next section.

³⁵ Lawas, 1996.

5. The Use of MPPM Models

5.1 MPPM Suite

One of the purposes of this study is to investigate the ways in which the MPPM models can be used to assist in improving the efficiency of domestic shipping services in Indonesia, and by doing so contribute to the alleviation of poverty in outer island communities.

The MPPM suite has been developed and maintained by the Transport, Communications, Tourism and Infrastructure Development Division of ESCAP. The MPPM suite was deliberately and consciously developed with an open architecture that encourages user intervention at all stages of the modelling process. In developing the models, ESCAP adopted the philosophy that the international trade and shipping system was far too complex institutionally and operationally to be reduced to a set of deterministic mathematical relationships. The fundamental strategy is to allow the modeller to input as much information as he or she believes can be reliably obtained from exogenous sources, and to present these to the models in the form of a hypothesis. Using these conditions as constraints, the mathematical relationships embodied in the models are used to fill in the gaps, to ensure internal consistency and to provide feedback on the credibility of the modeller's initial hypothesis and suggest directions in which it should be revised.³⁶ This approach to modelling inevitably means that producing forecasts is time-consuming, and demands a high level of both modelling expertise and industry knowledge on the part of the modeller. But it also allows the introduction of a host of considerations that defy mathematical formulation, and hence can produce forecasts that are genuinely realizable future states rather than Utopian abstractions.

The MPPM suite comprises of the following three modules:

- the Trade module, used to produce forecasts of containerized cargo on a region to region basis, and to partition these trade flows into port-to-port cargo movements;
- the Liner Shipping Network module, used to heuristically design a shipping network capable of accommodating those cargo flows, to assign the cargo to the network, and to estimate the total costs of different shipping system configurations; and

³⁶ For a detailed explanation of how this works in practice for the various model components, the reader is referred to the MPPM User Manuals available from Transport, Communications, Tourism and Infrastructure Development Division, ESCAP.

- the Port Strategic Planning module, used to assess the port facilities required to service the defined shipping network, and to compute the consequent investment requirements.

5.2 MPPM Models and Domestic Shipping in Indonesia

The pilot project called for an investigation of the ways in which the MPPM model could be used to assist in improving the efficiency of domestic shipping services in Indonesia, and by doing so contribute to the alleviation of poverty in outer island communities.

There are essentially two ways in which the MPPM models suite can be useful to planners:

- a) As a forecasting tool;

It is in this mode that the models have been used in the major container shipping studies that have so far been undertaken. The models are used to assist planners in anticipating the way in which the shipping system, driven by economic and institutional forces that are beyond the control of the planner, is likely to develop.

The MPPM model suite could be used in this way to forecast the likely future developments within the Indonesian domestic shipping system.

- b) As a design tool

The MPPM models can also be used to assist in the design of components of the shipping system that are in whole or in part under the control of maritime planners. For example, the MPPM suite can be used to assist in the assessment of alternative means of meeting the needs of remote communities through the provision of *Pelayaran Perintis* services, or on the development of alternative route patterns for meeting the needs of inter-island passenger traffic.

In this pilot project we have focused solely on the application of the MPPM models to the *Pelayaran Perintis* system. However, it should be borne in mind that the conceptual and mathematical foundations of the MPPM models were largely borrowed from urban transport planning methods, which are primarily designed for the analysis of personal movement, by either private or public transport. The modelling approach is therefore equally applicable to the analysis of inter-island passenger services.

5.3 MPPM and the *Pelayaran Perintis* System

In this section, we assess the scope for applying the MPPM models to a full-scale analysis of the *Pelayaran Perintis* routes, and the adaptations that would need to be made to the models if this were to be undertaken successfully.

5.3.1 Coverage

The majority of the *Pelarayan Perintis* routes serve eastern Indonesia. There are however a few routes that are dedicated to the islands adjacent to Sumatra³⁷. The interaction between these services and the majority of the pioneer services is minimal. Discussions with Ministry of Communications officials suggest that the most interesting application is likely to be one that focuses on the principal problem area of Eastern Indonesia.

5.3.2 Ports

As the reason for existence of Pioneer services is to provide access to remote communities, it is not surprising that the number of ports covered by the system is very high. Examination of current *Pelarayan Perintis* routes indicates that over two hundred ports are currently covered.

Assessment

The number of ports in current shipping system studies is limited to 101. Keeping the dimensions of a problem within these limits is achieved by omitting minor ports and representing ports beyond the focus of immediate interest by 'composite' ports.

In the case of the analysis of Eastern Indonesian service, it would be desirable to represent at least all direct ports of call of Pelarayan Perintis services explicitly and individually. This would require the models to cater for twice to three times the number of ports used in previous applications. However, as there are no longer any fixed limits on the scope of the trade/port assignment module, there should be no difficulty in accommodating the increased number of ports. Some modification to the liner shipping network model would however be required. However, investigations undertaken during the pilot study indicate that these are mostly restricted to input and reporting routines, and would not require a very large resource commitment.

5.3.3 Routes

At present, there are a total of 37 Pelarayan Perintis routes operated out of 17 base ports.

Assessment

The MPPM model suite is capable of handling up to 400 shipping routes. Even allowing for the inclusion of a number of non-subsidised routes that compete for some elements of the cargo carried by Pelarayan Perintis services, the number of routes will lie well within the limits of the models in their current configuration.

5.3.4 Vessels

Five classes of vessel are used to operate these routes: 200 dwt; 350 dwt; 500 dwt; 750 dwt; and 950 dwt.

³⁷ The details in this section are taken from Departemen Perhubungan, Direktorat Jenderal Perhubungan Laut, Peta Trayek Angkutan Laut Perintis Anggaran 1997/1998.

Assessment

This is well within the capacity of the MPPM models. Representation of these vessels would require only that estimates be made of operating costs.

5.3.5 Vessel Deployment

A single vessel is deployed on each of the subsidised services, with service frequencies varying with the length and complexity of the route between 9 and 39 voyages per year.

Assessment

The MPPM models allow for an indefinitely large number of vessels to be assigned to each route. They also allow the user to explicitly define the service frequency.

However, the MPPM models do not readily accommodate the part-time deployment of a vessel. Several of the Pelarayan Perintis routes are split into two components, operated alternately (e.g. R-15A and R-15B). It would be possible to accommodate this without modification to the model by combining these components into a single complex route. The resulting route would involve a large number of port calls, which would in several cases exceed the current limitation of the model. However, as indicated in the next section, this is already a problem with some routes, and it would in any case be necessary to make some modifications to the models deal with this.

5.3.6 Route Complexity

Many services involve a large number of port calls, with some vessels calling at as many as 40 ports on a single round trip.

Assessment

The MPPM models do not at present permit more than 20 ports of call to be included on any one route. This restriction derives from the need to comply with prescribed memory limits. If the maximum number of routes that are defined in a problem is reduced, then it is possible to increase the number of ports that can be included on each. However, as a number of the user interfaces have been designed with the 20-port limitation in mind, some redesign to the model's editing and reporting interfaces would be necessary.

5.3.7 Subsidies

The *Pelarayan Perintis* services are all provided with a subsidy, but as a result of the competitive bidding process the level of subsidy varies from route to route.

Assessment

The MPPM models uses service costs as a proxy for price, and price is one of the determinants of user choice (along with frequency, transit time and the need for transshipment). As subsidised services imply lower prices to users than would be indicated by the costs of service provision alone, it would be necessary to modify the route descriptions in the model to take explicit account of subsidy payments. (If this is not done, the allocation of cargoes between subsidised and non-subsidised routes, and between routes receiving different levels of subsidy, will be distorted).

5.4 Trial Application of MPPM Models

A trial application of the MPPM model to a subset of the routes served by Pelarayan Perintis services was undertaken as part of the pilot project. The purpose of the trial application was to verify that the MPPM models could be applied to the Indonesian inter-island shipping system. Attention was therefore focussed on the structure of the problem, rather than the quantities concerned, and no attempt was made to draw any conclusions about the appropriateness or efficiency of the present system.

While the route data used in the trial is entirely real, the cargo flow data is not. Detailed data on inter-port cargo flows in Indonesia is available in *Angukutan Laut 1995*. However, this data was not available in computerised form, and recording the cargo flow data from the printed format was beyond the resources of the pilot study. Moreover, not all of the ports of call included in the 1997/8 Pelarayan Perintis network are recorded in the 1995 *Angukutan Laut* (the latest available). The cargo data matrix used in the trial was therefore created by:

- Using port import (landed) and export (shipped) totals from *Angukutan Laut* where these were available;
- Using 'dummy' values of a realistic magnitude where these were not;
- Applying the RAS techniques using a seed matrix of unit values to produce a port to port matrix;
- Adjusting individual port-to-port flows within the Liner Shipping Network Model where these were clearly anomalous.

6. Conclusion

The principal conclusions of this pilot study are:

- Statistical evidence and the policy stance of the Indonesian government both support the view that there is a substantial gap in levels of economic and social development between metropolitan centres and remote island communities;
- The great majority of the disadvantaged island communities lie in Eastern Indonesia;
- Improvement in transport services – and in the case of Eastern Indonesia this means primarily maritime transport – have an important role to play in poverty alleviation;
- The government strategy of general deregulation of cargo shipping coupled with selective fiscal support for services to isolated communities is an appropriate and effective approach to securing improvements in shipping services;
- This approach could be further refined by the full integration of planning for the three main forms of maritime transport which are subject to government guidance – subsidised ferries, passenger services and *Pelarayan Perintis* services;
- Improved tools for modelling the *Pelarayan Perintis* services – and especially the interaction between individual subsidised services, and between these services as a whole and unsubsidised operations – could lead to a more efficient allocation of resources in this area; and
- With minor modifications, the MPPM model suite would provide a suitable tool for this purpose.