Appendix 1

TECHNICAL PAPER
DEVELOPMENT POTENTIALITY OF BIO-DIESEL FUEL PRODUCTION IN SULAWESI

(1) INTRODUCTION

1) Current Situation of Bio-diesel in the World:

The total annual bio-diesel production and consumption volume of the world has reached at around 4.1 million tons (or 11,000 tons per day) in 2006. The composition of bio-diesel consumption by county is as shown in Table A.1-1.

Table A.1-1 Bio-diesel Production in the World

(unit: ton)

Year / Country	2006	2000
Austria	75,000	18,000
Czech Republic	120,000	60,000
Denmark	70,000	0
France	550,000	320,000
Germany	1,900,000	265,000
Italy	200,000	80,000
Poland	100,000	0
Spain	150,000	0
Sweden	30,000	800
UK	100,000	0
Other Europe	80,000	10,000
Europe Sub-total	3,375,000	753,800
USA	450,000	6,000
Brazil	97,000	0
Australia	80,000	0
Others	100,000	8,000
World Total	**4,102,000**	**767,800**

Source: Bio-fuel Thailand 2006

The production / consumption of bio-diesel have been drastically increasing at an average annual growth rate of more than 30 % since 2000 and it is going to increase further in pursuant to the EU directive to achieve the target of bio-diesel composition in the total annual diesel consumption in the transport sector at 5.75 %. However, as shown in Table A.1-1 no Asian country has participated to this league of countries that producing and consuming bio-diesel.

In Asia, even including Japan, has just started to set a stage of bio-diesel development from experimental level to a commercial level such as in Thailand, Malaysia, India and in the Philippines1. Indonesia has started the distribution of bio-diesel through the gas stations in 2006, however, the volume of distribution has been still limited.

2) Bio-diesel: Renewable Alternative Fuel Made from Vegetable Oil

Bio-diesel is a renewable, bio-gradable and clean burning diesel fuel made from vegetable oil or triglyceride oils such as palm oil, coconut oil, soybean oil, corn oil and other vegetable oil instead

[1] PTT (Thai Petroleum) of Thailand will start a commercial production of bio-diesel made of palm oil at a rate of 300 tons per day from the beginning of 2007. Chemrez Inc. of the Philippines has commissioned Coconut Methyl Ester Production Plant (CME) having capacity of 300 ton per day in February 2006.

of petroleum and produced by converting the triglyceride oils to methyl esters with a process known as trans-esterification. Or in other word, bio-diesel is a vegetable oil of which glycerin is removed by trans-esterification process using methanol and catalysis. Bio-diesel is considered as a fuel enhancer as well because it increases engine combustion performance and improves engine lubrication. Bio-diesel reduces air pollution by reducing particulate matter (PM) level and sulfur content of diesel exhaust gas emission as well. As no engine conversions are required at all, the production or consumption of bio-diesel has expanded rapidly in the past 10 years especially in EU countries.

3) Energy Plants for Bio-diesel Production

Bio-fuel is a renewable alternative energy which can alternate petroleum fuel. As bio-fuel ensures a reduction of carbon dioxide emission volume; level of sulfur content as well as particulate matter (PM) in exhaust gas emission, when it is used as a fuel to run internal combustion engine. A use of bio-fuel has been enhanced not only by member countries of EU but also by the government of developing countries facing with economic difficulties attributed by high price of imported petroleum fuel, but where appropriate raw material for the production of bio-fuel is available locally.

The property of vegetable oil showing its appropriateness as raw material for production of bio-diesel are summarized by kind of plant or its oil as shown in Table A.1-2.

Table A.1-2 Property of Energy Plant Oil

Vegetable Oil	Iodine Value	Cetane Value
Coconut Oil	8 - 10	70
Palm Oil	44 - 58	65
Jatropha Oil	95 - 110	51
Rape Seed Oil	97 - 105	55
Corn Oil	115 - 124	53
Sunflower Oil	125 - 135	53
Soya bean oil	125 - 140	53

Source: Bio-diesel Handbook 2005, others

Cetane value is an important indicator expresses an easiness of ignition of engine. As cetane value of all listed vegetable oil is more than 45 which is the standard value of petroleum diesel fuel, all vegetable oils listed are considered appropriate for the production of bio-diesel. Iodine value is an indicator to expresses an easiness to produce bio-diesel as well. If the value of iodine is less than 25, production of bio-diesel becomes easier. Therefore, coconut oil is considered as the best material for production of bio-diesel.

4) Productivity of Energy Plant for Bio-diesel Production

Table A.1-3 shows the productivity of each energy plant and major producing countries, respectively.

Table A.1-3 Yield of Oil Production and Major Producing Country

Vegetable Oil	Oil Yield (ton/ha/year)	Annual Output (million tons)	Major Producing Country
Palm Oil	5,000	25.0	Malaysia, Indonesia, Thailand
Coconut Oil	2,260	4.0	Indonesia, Philippines, PNG
Jatropha Oil	1,400	0	Ecuador, Mexico
Rapeseed Oil	1,000	37.0	EU, Canada, China
Sunflower Oil	800	21.0	CIS, Argentine, France
Soya bean Oil	375	172.0	USA, Brazil, Canada, China
Corn Oil	125	300.0	USA, Canada

Source: FAO, Agriculture Statistics of the World, Jatropha Fact Handbook, etc.

The major raw materials used for the production of bio-diesel in Europe are rape seed and sunflower those requires a relatively flat and wide area for cultivation. But in the case of Asia the raw materials considered as appropriate for the production of bio-diesel are palm and coconut oils because the total volume of production of these oils by Asian countries such as Malaysia, Indonesia, Philippine, and Thailand accounts almost 85% of the total volume of the same in the world. In Asian countries under tropical climate are lack of appropriate land area to cultivate rapeseed and sunflower. India determined to use Jatropha as a raw material for production of bio-diesel as India endows vast area of unused land where precipitation is limited and not suitable for other crops.

5) Required Area of Energy Plant for Production of 100 tons of Bio-diesel per Day by Kind

The minimum production capacity of bio-diesel production plant at commercial scale operation is thought to be 100 tons per day as this size is quite common in Europe. At present, the biggest production capacity of bio-diesel plant is 500 tons per day which uses corn oil as its feedstock and located in the USA.

The potential and appropriate raw materials which can be used for the production of bio-diesel in Indonesia and the needed cultivation area in hectare to produce bio-diesel at 100 tons per operating day are tabulated in Table A.1-4.

Although the required area of coconut for production of coconut bio-diesel is larger than the other two energy plants, the spacing between coconut trees is quite wide by grid of 10m x 10m, thus Jatropha can be cultivated in between coconut trees as an intercrop for coconut farming by grid of 2.5m x 2.5 m. This combination of planting is thought to be best adopted in Sulawesi and other islands located in the eastern part of Indonesia in general.

Table A.1-4 Required Area for Bio-diesel Production (100 TPD)

	Nos. of Tree per hectare	Weight of Nut (kg) per tree per harvesting	Nos. of Harvesting per year	Oil Extraction Ratio (%)	Needed Hectarage for 100 tpd BDF Plant
Palm Oil	50	15.0	24	20.0	11,000
Coconut Oil	100	9.6	8	27.5	50,000
Jatropha Oil	2,500	2.0	2	35.0	21,000

Source: JICA Study Team

Note: TPD means ton per operating day. The number of operating days per year is assumed at 330 days.

6) Balancing of Energy Security and Food Security

A rapid expansion of land for energy plant or cash crop cultivation may lead to a negative impact to the food security issue because the land will be designated not for food production purpose.

In view of balancing between energy plant cultivation and food crop cultivation or to avoid shrinking of land area for food crop cultivation an inter-cropping is recommended to be exercised. This exercise can be done only in the case of coconut cultivation for enhancement of bio-diesel production. The coconut tree is commonly planted in grid of 10m x 10m. Therefore, a food crop, such as corn, cassava and other vegetables, can be planted in-between coconut trees. This way of coconut cultivation would ensure a food security and an energy security simultaneously. This is to be noted that in the case of oil palm, such an inter-cropping is not possible to apply.

(2) Assessment of Potentiality of Bio-diesel Production in Indonesia

1) Potential Market Size of Bio-diesel in Indonesia

The total annual fuel consumption of Indonesia was around 47.5 million KL in 20052. The total diesel fuel consumption of the same accounts for around 45% and its volume was 21.5 million KL as shown in Table A.1-5.

Table A.1-5 Fuel Consumption in Indonesia (2005)

(Unit: Million KL)

Fuel Type	Transport	Industry	Household	Power	Total
Gasoline	13.36				13.36
Diesel (HSD)	**9.50**	**6.57**		**5.38**	**21.46**
Kerosene		0.06	8.74		8.80
Diesel (LSD)	0.06	0.62		0.02	0.70
Fuel	0.23	1.53		1.63	3.39
Total	23.15	8.79		7.03	**47.51**

Source: PERTAMINA

If the diesel consumption will continuously increase at the annual growth rate of 7% which Indonesia has been experiencing in the past 5-years; the eastern part of Indonesia's share of the total fuel consumption of Indonesia would be around 30%; and the blending ratio of bio-diesel will be set at 10%, the estimated volume of consumption of diesel fuel and biodiesel fuel both in Indonesia in total and in the eastern part of Indonesia can be projected as shown in Table A.1-6.

[2] Annual report, PERTAMINA 2006

Table A.1-6 Estimation of Required Number of BDF Plants (100 tpd)

		2010		2020	
	Unit	Indonesia Total	Eastern Indonesia	Indonesia Total	Eastern Indonesia
Diesel Consumption	Million KL/yr	30.00	9.00	60.0	18.00
BDF Requirement	Million KL/yr	3.00	0.90	6.0	1.80
BDF Requirement r	Million Tons	2.60	0.77	4.8	1.56
BDF Requirement	KL/day	8,200	2,700	16,400	5,500
BDF Requirement	Ton/day	**7,100**	2,400	**14,200**	**4,700**
BDF Plant 100 tpd	Units	71	**24**	142	**47**

Source: JICA Study Team
Note:
Specific gravity of BDF is assumed at 0.865.
Number of BDF plant operating days is assumed at 330 days per year.

Assuming that 3.0 million KL of bio-diesel will be produced and consumed locally, a provable market size of bio-diesel in Indonesia in 2010 in total can be calculated as Rp. 15.9 trillion or US$ 1.7 billion[3] per year based on a current diesel fuel price of 2006 in terms of value. Accordingly the required number of BDF production plant having capacity of 100 tons per day can be estimated at 71 units throughout Indonesia.

As shown in this table, the market size of bio-diesel in 2020 would reach to approximately 14,200 tons per day in total in Indonesia and around 4,700 tons per day can be produced in the eastern part of Indonesia using the coconut and Jatropha as the feedstock.

2) Bio-diesel Development Plan of Indonesia

In year 2004, Indonesia became a net energy import country although Indonesia produces a massive volume of crude oil and natural gas and a member country of OPEC. Therefore, the current high crude oil price adversely affects the national economy in general and transport business in particular. A sudden rise of diesel fuel price forced to reduce the consumption of diesel fuel in the later half of 2006.

Under such circumstance, the government of Indonesia embarks a plan to go into bio-diesel production at a massive scale by 2010. However, the energy plant cultivation area expansion plan has not been finalized yet.

At present, the plan concentrates on the expansion of oil palm cultivation area exclusively dedicated for the production of bio-diesel in North Sumatra and Kalimantan. The cultivation area for oil palm is planned to be expanded around 3 million hectare on top of present 5 million hectare.

However, the expansion of oil palm cultivation area in the eastern part of Indonesia seems difficult because it requires provision of a flat and suitable land for oil palm cultivation newly. Such a development of new land in the islands already dense with crops and natural vegetation is difficult in view of environment preservation. In addition to this, a tendency of international market price of palm oil which is likely to go up chiefly due to an increasing demand of palm oil in China and India

[3] High speed diesel fuel at Singapore is Rp. 5,300 (US 58.5 cent) per liter at exchange rate Rp.9,066/Rp.

as edible oil mostly for cooking use and processing into vegetable oil based food products.

On the contrary the international market price of coconut oil has been in downward trend because the edible oil market has been shifting from coconut oil to palm oil. Thus it needs a new and stable market for coconut oil or it requires to developing oleo chemical industry further, which requires a massive investment at private sector.

3) Candidate Energy Plant for Bio-diesel Development in Indonesia

Oil Palm: Indonesia is the world's second largest palm oil producer and exporting country following Malaysia. Indonesia government plans to produce the bio-diesel made from palm oil and other vegetable oils to lessen a dependence on imported energy or fossil fuel especially for transport use as much as possible. In line with this policy, the Ministry of Agriculture has prepared a plan to develop 3 million hectare of palm oil plantation in the next five years to expand its current oil palm cultivation area to 8 million hectare that could meet increasing demand for bio-diesel as an alternative source of energy as well as for consumption as an edible oil. Most of the oil palm cultivation is done in the form of plantation or by form of large scale estate. However, the price of palm oil is likely to rise continuously due to a strong and increasing demand of palm oil in China, India, South Korea, Turkey, etc. Therefore, this price hike tendency does not ensure the financial viability of bio-diesel production business in the future. Unless the pump price of diesel will increase further otherwise the bio-diesel production business will not likely be a sound and sustainable business for private sector.

Oil Palm Estate	Fresh Fruit Bunch
	

Photo: Koike in Thailand 2004

Coconut: Indonesia is the largest coconut producing country in the world. The total cultivated area for coconut is estimated at around 3.1 million hectare in Indonesia at present. The Philippines follows Indonesia, but in terms of trade volume of coconut oil the Philippines is the largest country in the world and Indonesia follows the Philippines. Almost 80% of the coconut oil produced in the Philippines is exported. On the contrary to this, around 80% of coconut oil produced in Indonesia is for local consumption. Most of the coconut cultivation is done in a form of group of small-scale farmers. The government of Indonesia has not drawn its attention to the development or use of coconut as a raw material for bio-diesel production yet.

Coconut Tree	Coconut Shell
	

Jatropha: Jatropha is a perennial tree and propagated from the Central America to the world since 17th century by Portuguese, Dutch and Spaniard. As the leaves of Jatropha is toxic thus normally used as a hedge to protect crops against intrusion of animals to inside of the farming area. Recently Jatropha oil is found to be a suitable raw material for production of bio-diesel. It is suitable as a raw material for production of bio-diesel in view of economy because its price can be fixed without influence of international commodity market unlike other vegetable oils such as palm oil and coconut oil.

Ministry of Agriculture has provided subsidy to private seed research institution to find out the most suitable Jatropha spices for bio-diesel production. The same ministry declared to develop Jatropha cultivation area at 350,000 hectares per year from 2007 to reach 1.5 million hectares by 2010 in Sunbawa and Lonbok Island (West Nusatengara) aiming at poverty alleviation in these islands.

4) Suitable Energy Crops for the Eastern Indonesia

Oil palm: Oil palm has been grown in a massive scale in Sumatra and some part in Kalimantan but not in Java, Sulawesi and rest of other islands in Indonesia because the islands located in the Eastern Indonesia is not suitable for oil palm cultivation which requires a certain level of annual precipitation, wide and flat land, seasonal labor force, etc.

Jatropha Tree (3 months)	Jatropha Seed
	

Photo: Koike in Tanzania in 2005

Coconut: Coconut has been grown traditionally in the Eastern Indonesia including a part of Java but especially in Sulawesi. As most of coconut growers and farmers engaging with coconut farming in Indonesia are small-scale farmer and most of them belong to a poverty segment. In view of alleviation of poverty, coconut can be considered as the most suitable cash crops to ensure a constant and increased income of growers and promotion of rural industrialization in sustainable manner if the coconut is used for the production of bio-diesel at commercial level. Those growers engage with cultivation will become possible to obtain income constantly at fixed price. Because the final market of the product being produced newly from coconut is the same market of petroleum diesel fuel.

Jatropha: Jatropha is draught resistant perennial tree but it has not been regarded as a cash crop tree until it is found that oil extracted from Jatropha seed is suitable for production of bio-diesel until recent past. Jatropha requires merely 600 mm annual precipitation to grow and its life is around 50 years. Some of the islands located in the eastern part of Indonesia where the annual precipitation is limited or irrigation facility may be needed to grow other crops, may be suitable for cultivation of Jatropha once the market for bio-diesel made from Jatropha oil is ensured to the growers.

The ordinary grid of coconut trees is around 10m x 10m. Therefore, it is possible to grow vegetables in-between coconut trees as an inter-cropping practice. Jatropha can be grown as an inter-cropping plant so as to ensure better and more guaranteed supply of raw materials for bio-diesel production as well as to ensure maximum income from one hectare of land area.

5) Assumed Area for Expansion of Energy Plant Cultivation in Indonesia

As discussed in preceding section, the bio-diesel development in the developing countries has been considered as an effective tool for poverty alleviation in rural area through the promotion of rural development. Since no definite development plan has been prepared by the government of Indonesia, the distribution of expansion plan for cultivation area by kind of energy crop is assumed solely independently taking into consideration of various reports and published information related to bio-diesel development in Indonesia. If the total annual bio-diesel requirement is assumed at 14,200,000 tons as shown in Table A.1-6, the probable development framework of bio-diesel development in Indonesia could be as shown in Table A.1-7.

Table A.1-7 Provable Bio-diesel Production Plan of Indonesia by 2020

Kind of Energy Plant	Cultivation Area Expansion Plan Exclusively for Energy Plant (Ha.)	Needed Area for Operation of 100 tpd BDF Plant (hectare/Plant)	BDF Production Capacity per Hectare (tons/year)	Estimated Available Production of Bio-diesel (tons/year)
Oil Palm	3.0 million	11,000	33,000	9,900,000
Jatropha	1.5 million	21,000	33,000	2,475,000
Coconut	3.0 million	50,000	33,000	1,980,000
Total	4.5 million			14,355,000

Source: JICA Study Team

If two (2) small-scale farmers will engage with the cultivation of coconut exclusively for the use of its nuts for the production of raw material for bio-diesel, the number of such farmers can be estimated at around 6 - 9 million or more. In addition to the farmers who would engage directly

(3) Business Potentiality Assessment on Bio-diesel Production in Indonesia

1) Supply Chain of Bio-diesel Product

The bio-diesel production especially based on coconut and Jatropha or mixture of both energy plants should be based on a long-term off-take contract among growers – crude oil millers – bio-diesel producers – distributors. Figure A.1-1 illustrates a typical supply chain diagram of bio-diesel production system.

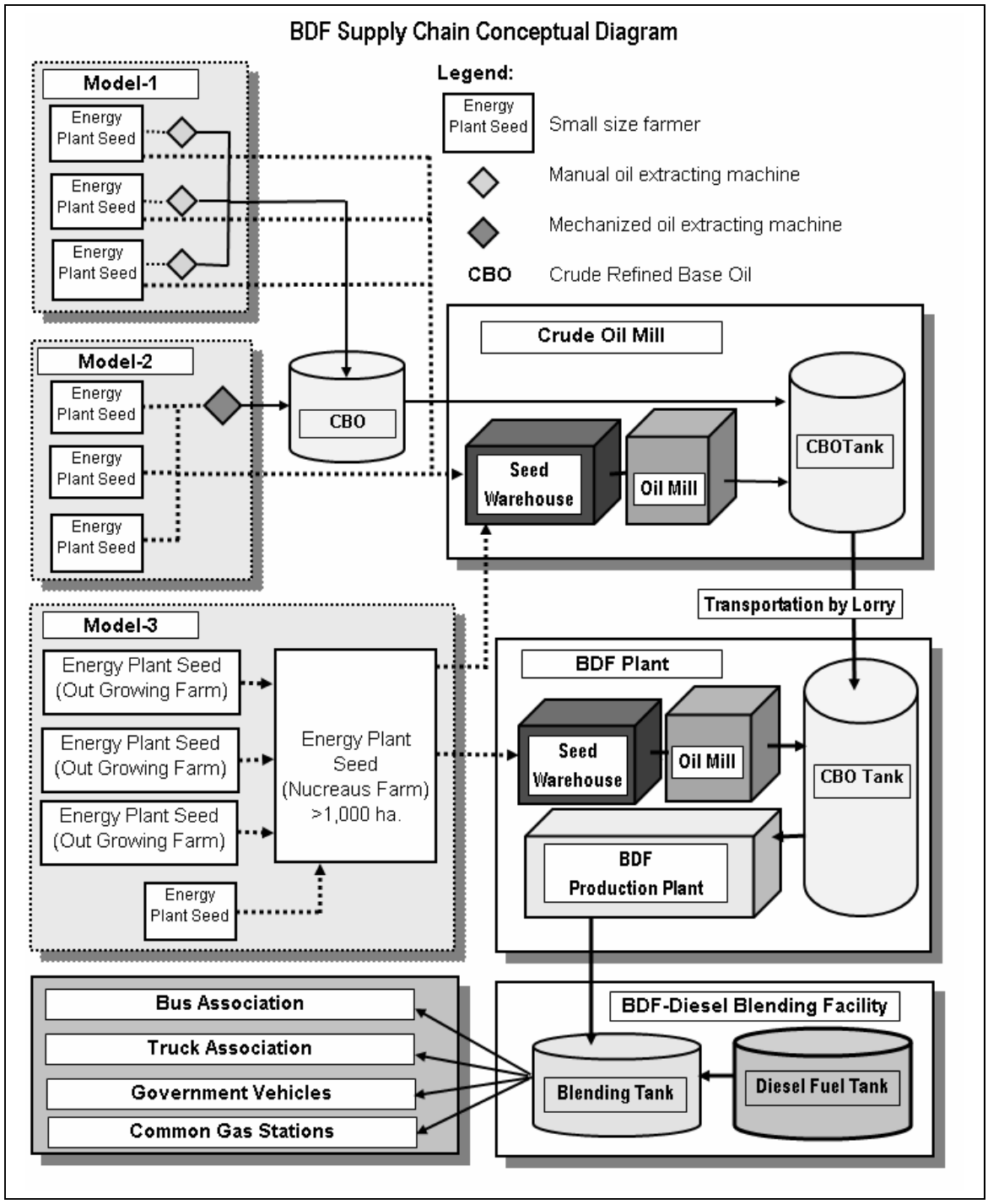
As illustrated therein, there are three different models for organizing the growers of energy crops as follows:

Model 1: Small scale farmers who grow energy plant organize themselves to collect harvested nuts or copra or seeds to crush by small machinery for extraction of oil. Then, such oil is collected by oil miller. Or copra and seed are collected and simply delivered to the millers but in organized manner.

Model 2: Small scale farmers who grow energy plant organize themselves to collect harvested nuts or copra or seeds to crush by oil expeller of industrial scale. Then, such oil is collected by oil miller. Or copra and seed are collected and simply delivered to the millers but in organized manner.

Model 3: Fairly large scale farm is developed as an estate that covers say more than 1,000 hectare of land and function as a nucleus farm belong to BDF producer. Then, this farm is supported by out-growers located and operated in and around such nucleus farm.

The model of farming or combination of these models is totally depends on locality where the bio-diesel development is taking place in the future.



Source: Koike 2006

Figure A.1-1 BDF Supply Chain Conceptual Diagram

2) Financial Viability of Bio-diesel Production Business in Indonesia

The market of bio-diesel is very same of the market of petroleum diesel. The market price of petroleum does not fluctuate frequently in short period that occurs in the case of market of vegetable oil. The market price (pump price) of bio-diesel is needed to be the same or lower than that of petroleum diesel. Therefore, the trade among raw material producers, bio-diesel producers and users should be rigid and constant. Unless this condition is realized the bio-diesel will not be

used by the automobile users widely and commonly as petroleum fuel is currently consumed everyday. The question is whether the growers of energy plant that would engage with the production of raw material for bio-diesel will be able to accept or willingly sell their product to the bio-diesel producers; and the bio-diesel producer will keep running the production under marginal profit.

Indonesia should be well-situated for the production of bio-diesel. In Malaysia, it controls nearly 85 percent of the production of crude palm oil (CPO). But nearly 10 million tons out of 15 million tons production of CPO in total in Indonesia is exported and its international market demand has been rising continuously.

However, the low market price of diesel fuel currently sold in Indonesia may hinder private investment on bio-diesel production because raising trend of CPO price is a substantial risk for the investor and will not make sure of lucrative profits to the bio-diesel producers. Billions of dollars in government subsidies offset the high price of fuel imported from overseas. This is to be noted that the current market price of diesel in Indonesia is one of the cheapest in the world – around 50 cents per liter – and heavily subsidized.

In order to produce bio-diesel at competitive price against petroleum diesel, the raw material purchasing price by the crude oil producer or bio-diesel producer should be set at appropriate level but the current CPO price is more than such a level. Therefore, the government of Indonesia has been encouraging the cultivation of Jatropha which ensure an acceptable level of selling price to the bio-diesel producer because Jatropha is neither recognized as an international commodity nor commercial product except for production of bio-diesel at present.

Beside the production of CPO, Indonesia is the largest coconut producer in the World. However, coconut has not been considered for the raw material to produce bio-diesel yet, because coconut is produced by numerous small-scale farmers that have not been well organized. The economic value of coconut has not been fully utilized in Indonesia. Only endocarp of coconut, which is around 20% of total weight of one nut, or copra (dried meat) that is a raw material to extract coconut oil has been utilized fully.

If the other part of coconut which has been abandoned for further industrial processing will be processed into value products, the total value of nut can be increased from current value even the copra price is lowered to meet with the required price level set by the bio-diesel producer. Such a industrial development would ensure an increased as well as constant income of coconut growers based on a constant purchase of copra by the bio-diesel producers.

3) By-products of Bio-diesel Production

The by-product produced through the production process of bio-fuel from the oil extracted from energy plant varies widely as shown in Figure A.1-2 and Figure A.1-3 for coconut and Jatropha based BDF respectively. This is to be noted that the market value of some by-products are much

higher than that of material directly used for the production of bio-diesel. The rural industrialization based on these by-products can only be available when the raw material for production of bio-diesel is purchased / sold constantly at a fixed but adjustable price based on a long-term purchase / supply contract or in other word, off-take contract.

The price of raw material directly used for the production of bio-diesel can be fixed or adjusted based on the possible production and sale of valued by-products.

Products Tree of Coconut

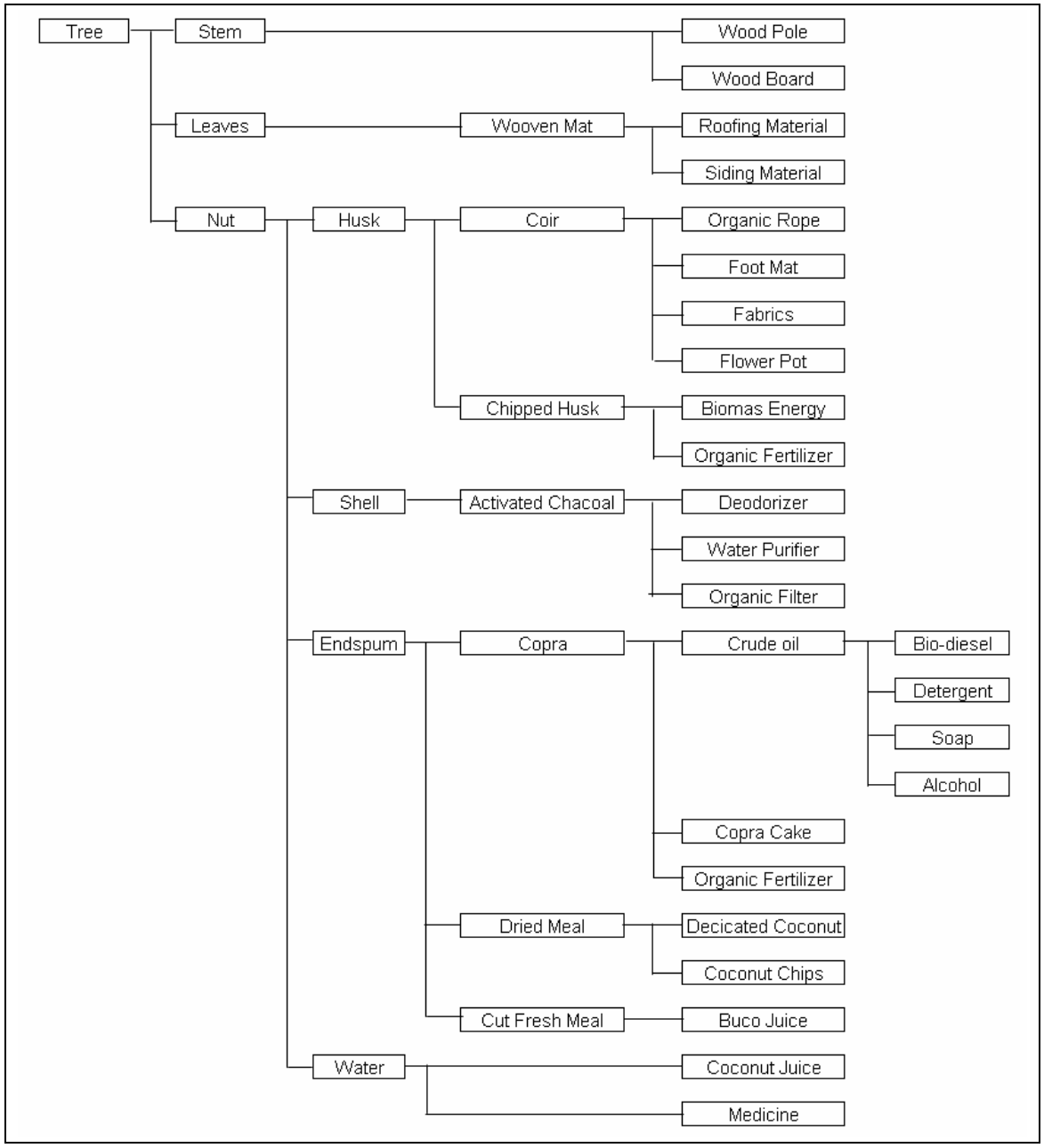


Figure A.1-2 Variety of By-products from Coconut BDF Production

Products Tree of Jatropha

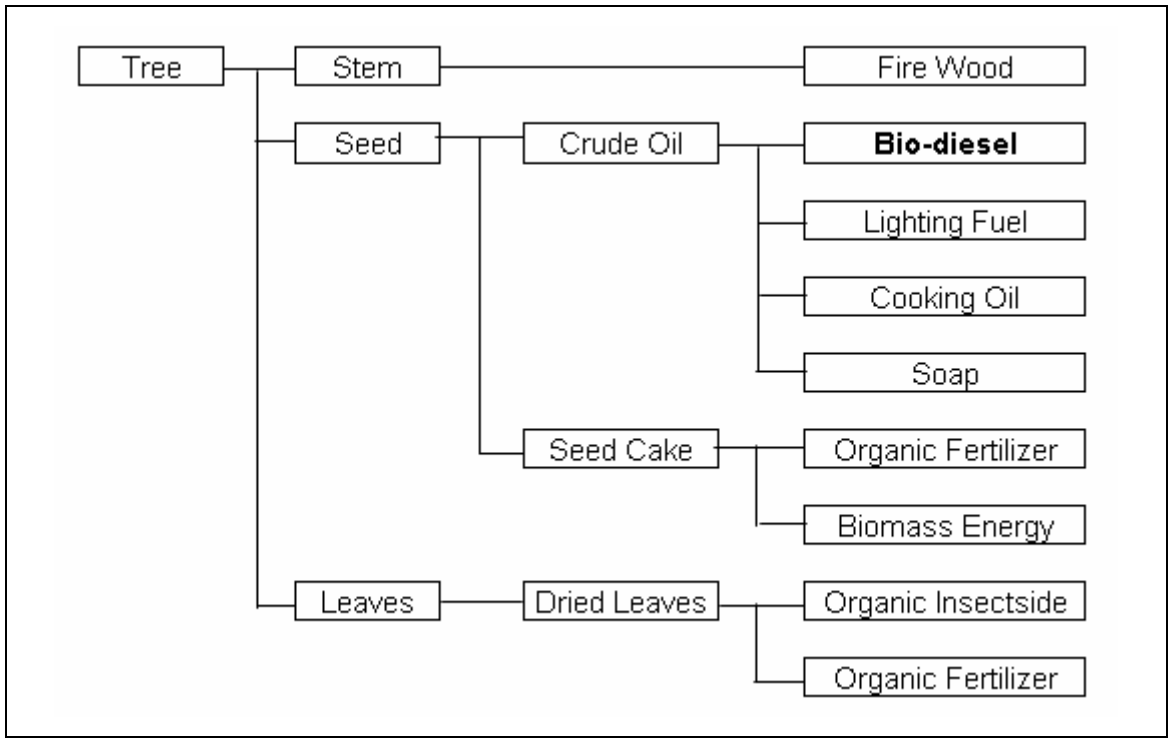


Figure A.1-3 Variety of By-products from Jatropha BDF Production

4) Conceptual Diagram of Rural Industrialization based on Bio-diesel Production

The bio-diesel production cannot be realized without collaboration among crude oil producer and energy plant growers unless a bio-diesel producer owns and operates crude oil production facility and estate to grow needed raw materials. All elements which constitute bio-diesel supply chain should collaborate under long-term off-take contracts, otherwise, the production of bio-diesel cannot be sustainable or vulnerable against price fluctuation of fuel market price as well as international commodity market price.

Figure A.1-4 illustrates an organizational set-up for production of coconut bio-diesel in integrated manner, which will promote the rural industrialization at raw material production area and ensure the stable as well as equitable income distribution among concerned parties forming such product supply chain.

The higher the value gained through processing and production of by-products, more stable and lower the price of direct raw material for production of bio-diesel. In order to realize higher value of by-products from this system, an integrated coconut processing plant (ICPP) is planned to be incorporated into the production system.

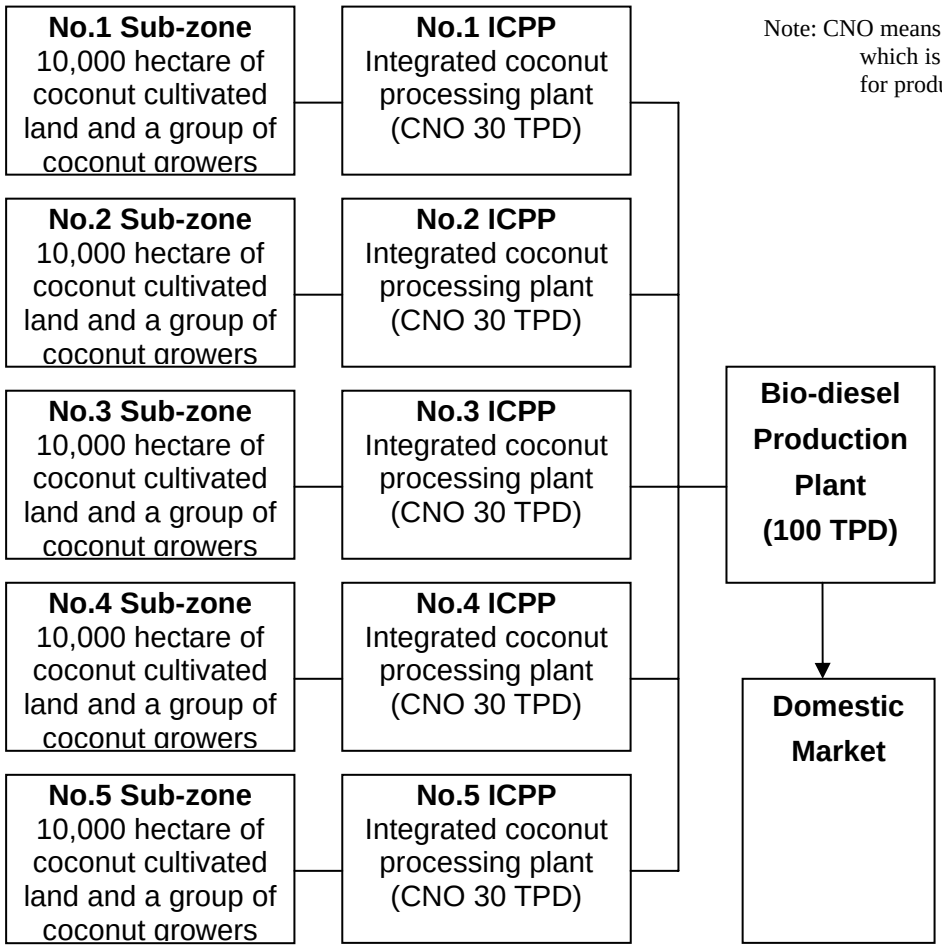


Figure A.1-4 Conceptual Organization Set-up for Production of Coconut Bio-diesel

(4) Regional Bio-diesel Development Program in Eastern Indonesia

1) Introduction

The eastern Indonesia composing of the islands of Sulawesi, Halmahera, Maluku, Bari, Lombok, Sumbawa, Flores, Seram and Papua endows a substantial potentiality to go into the bio-diesel production on commercial scale based on the use of coconut in combination with Jatropha as discussed in the preceding section of this paper.

2) Potentiality of Sulawesi Island as a Center of Bio-diesel Production and Distribution in Eastern Indonesia

As preceding section suggests the number of required BDF plant having capacity of 100 tons per day could be around 29 or 30 units (Or 10 units of 300 tpd BDF plant) in the eastern part of Indonesia in 2010 or 58 or 60 units (Or 20 units of 300 tpd BDF plant) in 2020. As one BDF plant, having production capacity of 100 tons per day, would require around 50,000 hectare of coconut cultivated land area which is exclusively devoted for the production of feedstock to run such BDF plant, the total required area for coconut cultivation in the eastern part of Indonesia could be around

1.5 million hectare in 2010 and 3.0 million hectare in 2020 as shown in Table A.1-7.

The total coconut cultivation area in Sulawesi is around 710,000 hectare at present. Table A.1-8 shows the distribution of coconut cultivated land area in Sulawesi.

Table A.1-8 Distribution of Coconut Cultivated Area in Sulawesi Island

	North	Central	South	South East	Gorontalo	West	Total
Area	250,923	172,581	119,498	50,375	53,967	67,013	**714,357**
Share	35%	24%	17%	7%	8%	9%	100%

It is hard to imagine that the total area presently cultivating coconut in Sulawesi will be shifted exclusively to provide the feedstock for bio-diesel production. Thus, development of new land for coconut cultivation in Sulawesi will become necessary to meet with the requirement of feedstock for BDF plants.

However, even the coconut cultivation area of Sulawesi will be doubled in the future it would not be able to meet still with the requirement for BDF production in 2020. This implies that all islands situated in the eastern part of Indonesia need to be consolidated into one group of islands which provide feedstock to meet with the requirement to run BDF production plan.

In view of geographical setup, preparedness of infrastructure, readiness of ports, volume of existing coconut cultivation area, human resources, etc. the Sulawesi is regarded as a center of the consolidated area of these islands participating into the production of feedstock for BDF production in the eastern part of Indonesia. The major islands that would supply feedstock by kind of oil are as shown in Table A.1-9.

The BDF production plant will be located at the locations where existing coconut crude oil mills are under operation such as Manado in Sulawesi Utara, Makassar in Sulawesi Selatan, Luwuk in Sulawesi Tengah. The copra and seed of Jatropha will be cultivated and collected at those island and areas shown in Table A.1-9 and these will be transported mostly by sea transport to the locations where BDF production will take place. BDF produced will be distributed to the major diesel consumption area such as Jakarta, Surabaya and other areas throughout Indonesia by sea transport.

Table A.1-9 Demarcation of Area for Production of BDF Feedstock in Eastern Indonesia

Copra production area		Jatropha Seed/ Copra Production Area	
Regency	**Name of Island**	**Regency**	**Name of Island**
Maluku Utara	Halmahera	Nusatenggara Barrat	Bari
	Seram		Lombok
	Sula	Sumbawa	Sumbawa
	Obi	Nusatengara Timur	Lomblen
	Mangole		Alor
Maluku	Seram		Pantar
	Buru		
Irian Jaya Barat			
Papua			

Figure A.1-5 illustrates the image of linkage among islands for production of biodiesel in the eastern part of Indonesia and distribution of bio-diesel products to the major consumption area.

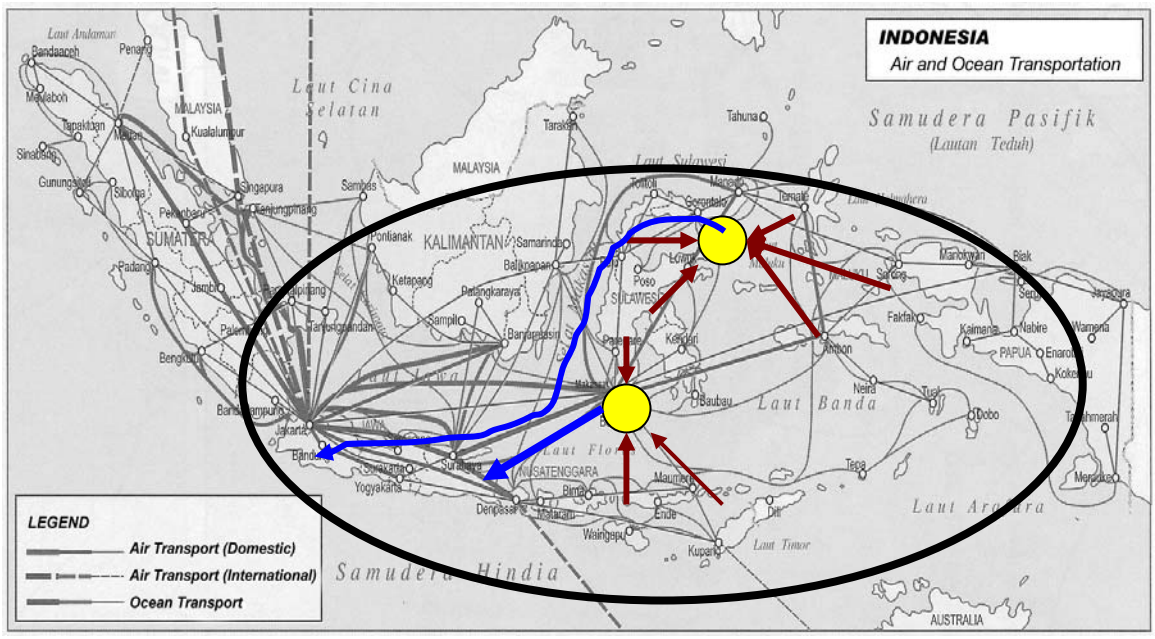


Figure A.1-5 Feedstock Supply and BDF Product Distribution Linkage

4) Provisional Development Schedule throughout Eastern Indonesia

The bio-diesel production program using coconut and Jatropha in the eastern Indonesia may be developed by phases according to an availability of feedstock that would ensure a constant production operation of BDF can be summarized in the matrix table as shown in Table A.1-10**.**

Table A.1-10 Phased Development Plan of BDF Production in Eastern Indonesia

Phase-1 2007-10	Phase-2 2012-15	Phase-3 2016-2020
Preparation for the development program for **coconut** based BDF production and distribution In **Sulawesi** and in the eastern Indonesia as the development master plan. (New development of coconut cultivation area 400,000 hectare in Sulawesi)	**Preparation** for the development program of **Jatropha** based BDF production and distribution in the **eastern region of Indonesia** as the master plan. Experimental Jatropha cultivation in the Eastern region of Indonesia (Expansion of coconut cultivation area)	**Preparation** for the development program of mixture of **coconut and Jatropha** based BDF production and distribution.
Preparation for the establishment of bio-diesel production plants (300 tpd x 2) + (100 tpd x 2) = 800 tpd in Sulawesi	**Establishment** of BDF plants. **Preparation** of establishment of bio-diesel production plants (300 tpd x 4) = 1,200 tpd	**Establishment** of BDF plant in Sulawesi and Eastern Indonesia Production capacity: (300 tpd x 9) = 2,700 tpd
Organizing the first group of growers for coconut cultivation in **Sulawesi** and prepare the development guidelines on BDF production program based on coconut.	Organizing coconut and Jatropha growers in **Sulawesi and other islands** and prepare development guidelines on BDF production program based on Jatropha.	Expansion of organized coconut and Jatropha growers **throughout Indonesia**

Phase-1 2007-10	Phase-2 2012-15	Phase-3 2016-2020
Experimental production and distribution of biodiesel made of coconut oil in **Sulawesi** (100 tpd x 1)	Experimental production and distribution of biodiesel made of Jatropha oil in **Nusatengarra**	Experimental production of biodiesel made of coconut and Jatropha in mix in **Sulawesi Selatan**.
Use of BDF products **within Sulawesi Island**	Use of BDF product **throughout Indonesia**	Use of BDF product **throughout Indonesia**
Experimental production of a variety of **by-products from coconut**	Experimental production of a variety **of by-products from Jatropha.**	Production of a variety of by-products from coconut and Jatropha at **full scale.**
No biodiesel for export except by-products became available for exports.	**No biodiesel for export** except by-products became available for exports.	**Biodiesel will be exported** together with by-products.

(5) Biodiesel Development Program in Sulawesi

1) Geographical Location of Bio-diesel Development Zone

Figure A.1-6 illustrates a concept of geographical deployment plan of coconut and Jatropha based bio-diesel development zone.

Figure A.1-7 illustrates the image of bio-diesel production plant having a production capacity of bio-diesel at 300 tons per day.

2) Probable Initial Capital Investment Cost Required

The probable investment cost for the establishment of needed production facilities for the bio-diesel development in Sulawesi is estimated at US$300 million for the Phase-I of the development program as shown in Table A.1-11. The components of the Phase-1 of the project is planned on the basis of very roughly but on the proportion of current available area and area where an expansion of coconut cultivation may be available in the future in Sulawesi Island.

Table A.1-11 Rough Estimates on Initial Investment Cost

Bio-diesel Development Zone	Type of Facility	Required Nos.	Probable Unit Cost (US$ Million)	Subtotal (US$ Million)
North	BDF Plant (300 tpd)	1	40	40
	ICPP	25	2	50
West	BDF Plant (100 tpd)	1	20	20
	ICPP	5	2	10
East/Central	BDF Plant (100 tpd)	3	20	60
	ICPP	20	2	40
South	BDF Plant (300 tpd)	1	40	40
	ICPP	20	2	40
Total	Production 1,000 tpd			300
Coconut Area	400,000 hectare			

3) Estimated Total Income due to Development of Bio-diesel Zone

Assuming the total cultivated area of coconut is 400,000 hectares, the output of bio-diesel is planned to be 300,000 KL/year. Therefore, the probable revenue of planned BDF plants at full scale

will be US$ 165 million. The value of by-products became available through the production of bio-diesel is estimated very roughly at US$ 200 million per year. A major part of this output can be shared by around 0.8 million growers, thus, output per grower could be around US$ 300 - 450, which is approximately 1.5 – 2.0 times of current average income per farming household in respective provinces.

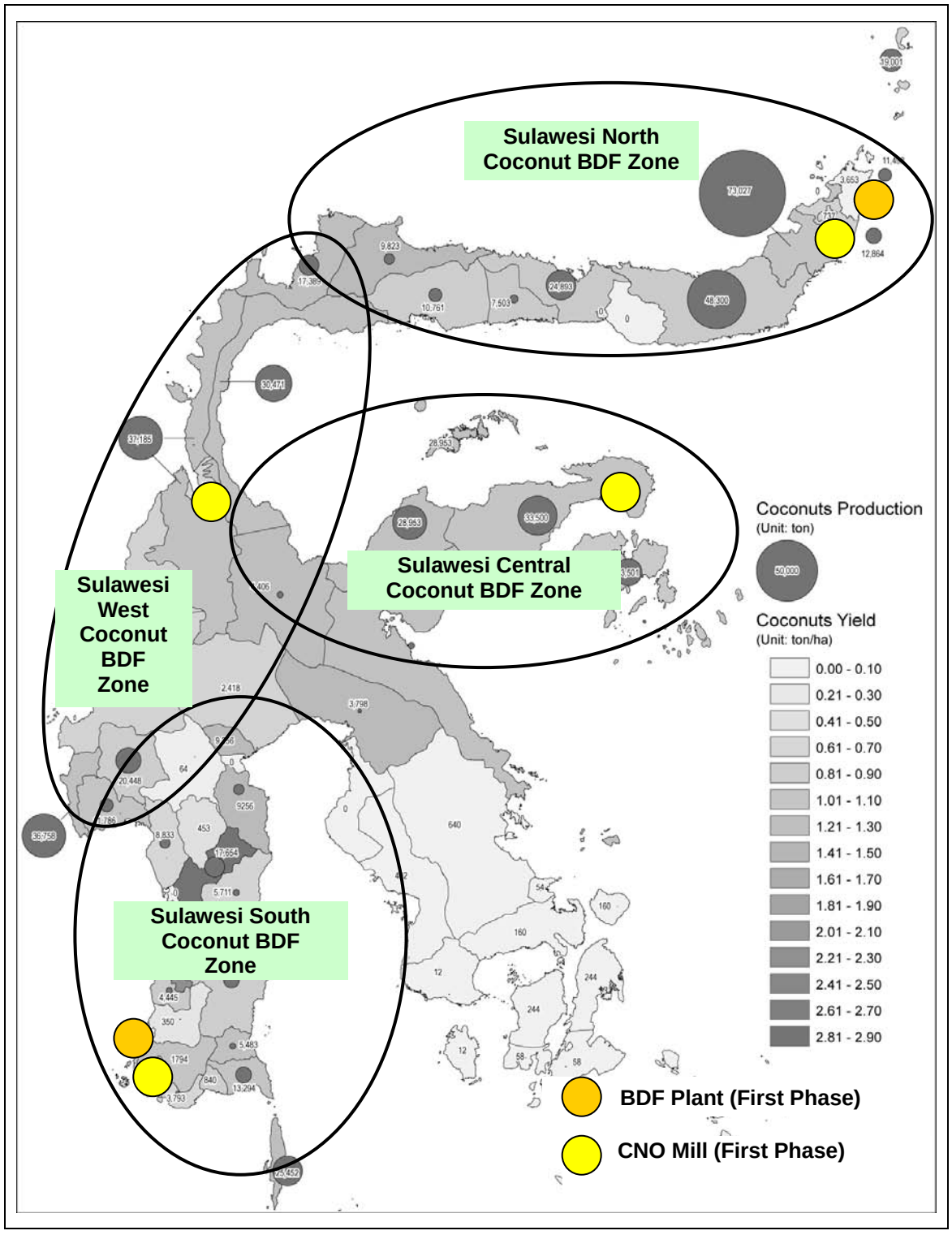


Figure A.1-6 Conceptual Geographical Deployment Plan of Bio-diesel Development Zone

Figure A.1-7 Image of Bio-diesel Production Plant (300 TPD)

Table A.1-12 shows the volume of goods produced assuming 400,000 ha. of land is dedicated to the production of bio-diesel exclusively.

Table A.1-12 Volume of Product Generated by 400,000 Hectare per Year

Part	Unit Ton/ha./year	Annual Volume	Transport Needs	5 ton Trucks Per Day
Whole Nut	7.68	2,197,000	In farm	
Husk	2.11	602,000	Farm→ICPP	120
Copra	1.50	428,000	Farm→ICPP	90
CNO	0.81	231,000	ICPP→BDF Plant	45
BDF	0.75	214,000	BDF Plant→Market	45
Total				300

Note:
Number of coconut trees per hectare: 100 trees (10m x 10m)
Number of nuts per tree: 6 nuts
Weight of nut: 1,600 gram
Number of harvesting time: 8 times per year (each 45 days)
Loading capacity of lorry for BDF is assumed at 10 tons.
ICPP means an Integrated Coconut Processing Plant
Coconut husk can be used as a bio-mass energy source for heating or for power generation.

This implies that around 300 units of 5-ton trucks will run every day in and around the area where BDF plant will be located.

(6) Experimental Bio-diesel Development Plan in Sulawesi

As discussed in preceding section, Sulawesi would function as a center of bio-diesel production and

distribution in the eastern part of Indonesia. However, as an inception phase to make sure of successful expansion of bio-diesel production and regional development based on such an activity, an experimental project should take place in Sulawesi at first.

In Sulawesi, the raw material or so called feed stock for the bio-diesel production using coconut oil is quite sufficient to operate BDF plant having a production capacity of 100 tons per day.

Figure A.1-8 is an image of BDF plant having a production capacity of 100 tons per day.

Figure A.1-8 View of BDF Plant (100 tpd)

The total diesel consumption in Sulawesi at present is estimated at around 150,000 tons per year. Therefore, if the target blending ratio were set at 20%, one (1) BDF plant having a production capacity of 100 tons per day would be able to serve the need of whole Sulawesi.

The experimental operation of the first BDF plant having capacity of 100 tons per day is not just for experimentation of the bio-diesel production in Sulawesi but for the establishment of proper and operative development guidelines composing exercise of long-term purchase / sale contract among project participants, organizational scheme of growers and producers, value added mechanism by utilization of by-products, financial mechanism, etc. in integrated approach. Table A.1-13 shows the justification of production capacity of BDF production plant as an experimental operation in Sulawesi.

Table A.1-13 Material Balance of Experimental BDF Plant (100 tpd)

Element	Volume	Unit
Present CNO production	300,000	ton/year
Present coconut cultivation area	700,000	hectare
Average out put of CNO	0.43	ton/year
Annual Diesel Consumption of Sulawesi	150,000	ton/year
Target BDF blending ratio	20	%
BDF Requirement	30,000	ton/year
BDF Requirement	**91**	ton/day
Needed coconut cultivation area	50,000	hectare
Minimum coconut cultivation area provided	27,000	hectare

Source: JICA Study Team

The initial capital investment cost of BDF plant having a production capacity of 100 tons per day is estimated at around US$ 15 million.

(7) Best Mixture of Coconut and Jatropha Cultivation

The space between coconut trees is recommended to be 10 m so as to make an inter-cropping practice easier. In-between coconut trees the Jatropha can be planted at each 2.5 m interval as illustrated in Figure A.1-9. Therefore one hectare of land is composed 100 trees of coconut oil and 1,500 trees of Jatropha. In such a way, around 2,000 liter of bio-diesel can be produced from one hectare of coconut/Jatropha mixed cultivated land. This means that a required land area to operate one (1) unit of BDF plant having a capacity of 100 tons per day will be around 29,000 – 30,000 hectares.

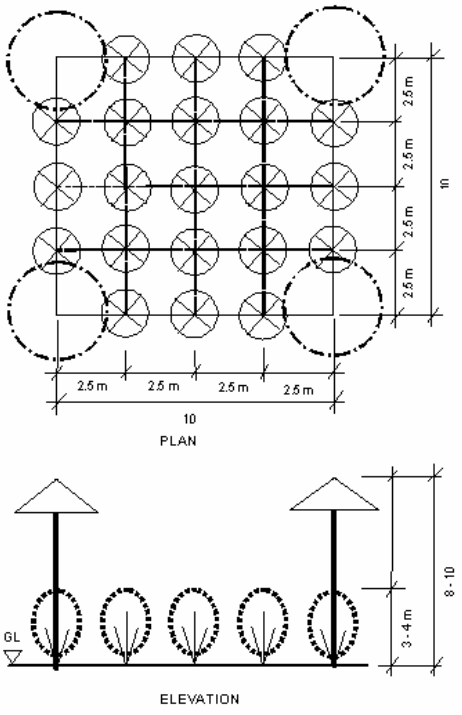


Figure A.1-9 Coconut / Jatropha Multiple Planting Plan

(8) Clean Development Mechanism (CDM)

The amount of fossil fuel being used can be lowered if biomass absorbed CO_2 by photosynthesis is utilized as an alternative energy. The biomass resources, having its roots in the solar energy, are renewable energy. Since under carbon circulation {CO_2 – organic matter – CO_2 –}, carbon dioxide (CO_2) does not increase in the environment. This condition is referred to as "Carbon Neutral". Bio-diesel is renewable biomass energy. Therefore, when one liter of bio-diesel is combusted, carbon dioxide is emitted but this is not counted as net emission of CO_2 to the atmosphere. On the contrary, the volume of CO_2 supposedly emitted by diesel fuel (fossil fuel) which is replaced by use of bio-diesel can be considered as not emitted at all.

The volume of carbon dioxide emitted when one liter of diesel fuel is combusted is known at around 3,000 grams. If 462,000 tons or 533,000 KL[4] of bio-diesel is produced in Sulawesi Island as discussed in preceding section and used in Indonesia in a year, the net emission volume of carbon dioxide saved can be estimated at around 1.2 million t-CO_2 per year taking into account that the leakage of CO_2 emission at a rate of 25% of gross saved emission volume.

Assuming that the bio-diesel production project were approved as a CDM project[5] and permitted to enter into the emission trade at US$10 per t-$CO_2$, the total amount of emission trade probably available throughout the Sulawesi Island in total could be estimated at around US$ 12 million per year and it would continue for 10 years.

The husk of coconut can be used as a biomass energy source as well. A massive volume of husk available through the bio-diesel production can be utilized for generation of energy which can be in a form of electric power or heat resource to produce bio-diesel or crud oil. If such project can be applied to CDM under the same theory or "Carbon Neutral", then there will be a possibility to add more additional revenue through CDM based on efficient use of coconut husk as an alternative energy.

[4] Specific gravity of coconut bio-diesel is assumed at 0.865.
[5] Methodology for calculation and application of the bio-diesel production project as CDM project has not been approved yet but under consideration at present by UNFCCC CDM methodology panel as well as Executive Board. Refer to NM0142-rev.

Appendix 2

PORT AND AIRPORT IN SULAWESI

Table A.2-1 List of Port Facilities of Major Ports in Sulawesi

	Makassar Port	Bitung Port	Kendari Port	Parepare Port	Gorontalo Port	Pantloan Port
Ship Service Facilities (1) Berth/Wharf	- Soekrno : 1,360 m; -9.00 m LWS - Hatta Quay : 850 m, -12.0 m LWS - Hasanussin Quay : 210 m,-5.0 m LWS - Small ship : 510 m, -3 m	- 1,447 m (Berth I – IX)	- 272 m (Berth I – VII) - Beach Landing : 60 m	- Nusantara : 280 m (Berth I & II) - Cappa Ujung : 100 m (Berth I) - Wooden berth 34 m (Berth I – IV) - Lontange : 35 m (Berth I & II)	- 180.5 m (Berth IA – II D)	- Berth I : 150 m - Berth II : 100 m
(2) Access Channel	- Length : 2 sea miles - Minimum width : 150 m - Depth : -13.0 m LWS	- Length : 9 sea miles - Minimum width : 600 m - Depth : -16.0 m LWS	-	-	- Length : 1.02 sea miles	-
(3) Pilotage/Towage	- Towing boats : 3 units - Pilot boats : 3 units	Towing & Pilot boats : 5 units	Towing Boats : 1 unit	Speed boat : 1 unit	None	Towing boat : 1 unit Speed boat : 1 unit
Cargo Service Facilities (1) Shed	- Shed 101 : 3,800 m2 - Shed 102 : 3,800 m2 for flour - Shed 103 : 4,000 m2 for general cargo (rice, coffee, cashew nuts, plywood) - Shed 104 : 3,800 m2 for general cargo and cacao shed - Shed 105 : 3,800 m2 for cacao shed CFS Shed : 4,000 m2 for plywood, nickel, cacao seed, coffee, etc	- Shed A : 4,320 m2 - Shed C : 4,320 m2 - Shed D : 4,320 m2 - Shed Butler : 432 m2	- Shed : 1000 m2	Shed : 456 m2	- Shed 01 : 560 m2 - Shed 02 : 1,000 m2	- Shed 101 : 1,000 m2 - Shed 102 : 1,000 m2
(2) Cargo Stacking Yard	Yard 100 : 26,538 m2 Yard 101 : 1,213 m2 Yard 102 : 1,930 m2 Yard 103 : 3,374 m2 Yard 104 : 1,017 m2 Yard 105 : 1,216 m2 Yard 106 : 925 m2	- Yard A : 7,319 m2 - Yard B : 1,687 m2 - Yard C : 3,153 m2 - Yard D : 6,625 m2, 240 m2 - Yard E : 2,998 m2 - Yard F : 30,280 m2	- Yard : 2,594 m2 - Yard for beach landing : 3,000 m2	- Yard (Nusan tara) : 2,746 m2 - Yard (Cappa Ujung) : 1,973 m2 - yard (Longta ngnge) : 7,008 m2	- Yard : 1,000 m2	- Yard : 11,600 m2
(3) Container Yard	Hatta Container Yard : 114,416 m2 (350,000 TEU/year)	27,311 m2	- CY1 : 2,790 m2 - CY2 : 2,380 m2	None	None	- 13,900 m2
(4) Loading/Unloading Equipment	Container Gantry Crane: 4 units (25T x 1 unit, 40T x 3 units) Reach Stacker: 2 units x 42 ton Top loader: 2 units x 30 ton Mobile crane: 2 units x 40/25 ton Forklift: 2 units x 5&3 ton Forklift: 10 units x 2 ton Bottom Lift: 1 unit x 15 ton Head Truck: 14 units x 45 ton Chassis: 32 units x 20'&40' Transtainer: 5 units	Container Gantry Crane: 1 unit x 40 T Transtainer: 2 units x 40 T Mobile crane: 1 unit x 25 T Forklift: 1 unit x 2 ton Forklift: 1 unit x 3 ton Forklift: 2 units x 5 ton Reach Stacker: 2 units x 42 ton Trailer: 2 units x 20 ft Head Truck: 3 units Chassis: 3 units	Forklift: 1 unit x 2 ton Forklift: 1 unit x 3 ton	Forklift: 1 unit x 3 ton	None	Forklift: 4 unit x 3 ton
(5) Reefer Plug	36 units	-	None	None	None	No information
(6) Inland Container Depot	Inner port area 1) TEMAS 2) Dyzkarto 3) PT Tanto Outer port area 1) METRATUS 2) JAYA KUSUMA 3) TEMAS	Outer port area 1) TEMAS	None	None	Outer port area 1) TANTO (1.5 ha) : Non pavement	

Table A.2-2 List of Performance of Major Ports in Sulawesi (2006)

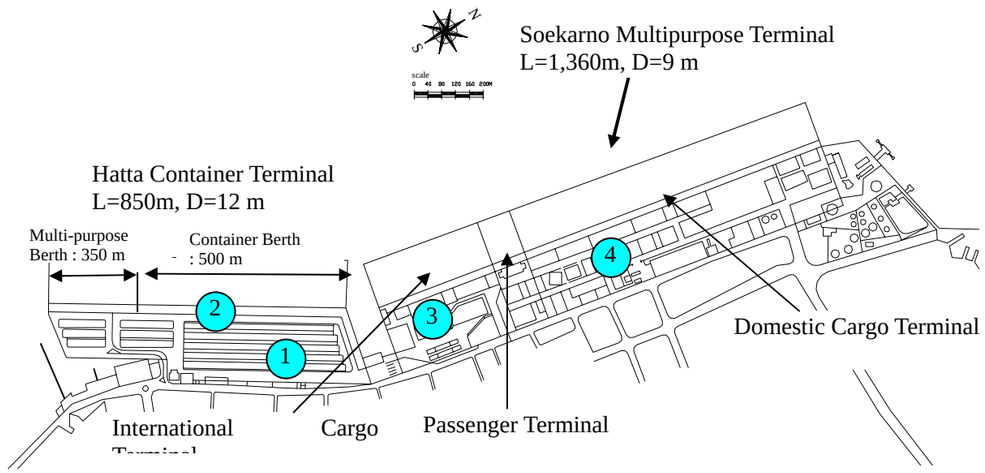
	Makassar Port			Bitung Port			Kendari Port			Parepare Port			Gorontalo Port			Pantloan Port		
Ship Call (Vessels)	Ship call	GT	Ave. GT	Ship call	GT	Ave. GT	Ship call	GT	Ave. GT	Ship call	GT	Ave. GT	Ship call	GT	Ave. GT	Ship call	GT	Ave. GT
(1) International	298	2,205,392	7,400	286	1,244,220	4,350	5	4,597	919	6	62,300	10,383	15	15,294	1,019	77	244,389	3,174
(2) Domestic	4,687	18,440,551	3,934	5,192	5,831,404	1,123	2,958	1,143,921	387	1,080	4,188,134	3,878	358	754,732	2,108	2,271	5,135,907	2,261
Cargo Throughput (ton)																		
(1) International	1,917,209			469,371			0			1,945			26,832			138,552		
Unloading	1,110,486			57,180			0			1,900			0			3,152		
Loading	806,723			412,191			0			45			26,832			135,402		
(2) Domestic	7,819,862			2,310,395			600,843			833,577			400,270			2,18,765		
Unloading	4,648,548			803,014			470,303			511,038			324,391			845,984		
Loading	3,171,314			3,113,409			130,540			322,539			75,879			1,336,781		
Container Traffic (TEU)	Full Container		Empty Container	Full Container		Empty Container	Full Container		Empty Container	Full & Empty Container			Full Container		Empty Container	Full Container		Empty Container
(1) International	13,545 (100%)		0	0		0	0		0	0			0		0	0		0
Unloading	1,262 (100%)		0	0		0	0		0	0			0		0	0		0
Loading	12,283 (100%)		0	0		0	0		0	0			0		0	0		0
(2) Domestic	187,892 (77.5%)		54,634 (22.5%)	63,414 (62.8%)		37,519 (37.2%)	11,468 (74.4%)		3,948 (25.6%)	0			10,601 (71.0%)		4,338 (29.0%)	28,139 (85.9%)		9,619 (14.1%)
Unloading	124,437 (97.8%)		2,829 (2.2%)	48,650 (96.8%)		1,629 (3.2%)	7,085 (94.3%)		431(5.7%)	0			5,444 (80.6%)		1,312 (19.4%)	18,179 (96.8%)		593 (3.2%)
Loading	63,455 (55.1%)		51,805 (44.9%)	14,764 (29.1%)		35,890 (70.9%)	4,383 (55.5%)		3,517 (44.5%)	0			5,157 (63.0%)		3,026 (37.0%)	9,960 (52.5%)		9,026 (47.5%)
Major Commodity of Cargo																		
(1) International																		
Export	Clinker, Cacao, Flour			Fresh Fish, Coconuts Oil			-			General Cargo			Corn , Sugar cane			Cacao beans (Malaysia, Brazil and Singapore)		
Import	Wheat, Sugar, Fertilizer			Mixed Goods			-			General Cargo, Asphalt			-			-		
(2) Domestic																		
Loading	Cement, Car & S. parts, Rice			Coconuts Oil, Fresh Fish, Coconuts wood, Rattan			Rattan, Wood, Fish, Nuts			Onion, Rice, General Cargo			Corn, Sugar Cane, Rattan, Wood			Cacao beans, Coconuts wood, Stone (Gravel)		
Unloading	Car & S/ parts, Fertilizer, Coal			General Cargo, Mixed Goods, Rice, Wheat Flour			General Cargo, Oil, Sugar, Asphalt, Cement, Fertilizer			Oil, Fertilizer, General Cargo, Asphalt, Wood, Fruits			Oil, General Cargo, Fertilizer, Cement, Wood			General cargo		
Cargo Handling Productivity	International		Domestic	International		Domestic	International		Domestic	International		Domestic	International		Domestic	International		Domestic
(1) General Cargo (T/G/h)	16.99		18.06	22.00		22.00	-		18.00	-		-	-		-	31.88		16.00
(2) Bagged Cargo (T/G/h)	37.80		18.86	23.00		23.00	-		19.00	-		26.69	31.00		18.00	31.88		23.00
(3) Dry Bulk Cargo (T/G/h)	113.27		118.64	40.00		40.00	-		-	-		-	-		-	-		-
(4) Liquid Cargo (T/G/h)	5.32		15.76	60.00		60.00	-		-	-		-	15.00		47.00	-		-
(5) Container Cargo (TEU/h)	-		24.00	-		9.00	-		8.00	-		-	-		10.00	-		8.00
Ship Service Performance (hour)	International		Domestic	International		Domestic	International		Domestic	International		Domestic	International		Domestic	International		Domestic
(1) Waiting time	4.01		8.98	1.50		0.45	-		4.00	102.28		5.30	13.00		19.00	17.43		2.37
(2) Berthing time	65.87		24.22	53.00		64.00	-		137.00	28.92		82.14	62.00		125.00	60.25		28.93
(3) Turn Round Time	69.88		33.20	54.50		64.45	-		141.00	131.20		87.44	75.00		144.00	77.68		31.30
Port Facility Performance (%)	Hatta (Container)		Soekarno (Multi)															
(1) Berth Occupancy Ration			45.93	58.25			79.01			54.00			89.14			59.36		
(2) Shed Occupancy Ration			24.03	11.82			31.17			-			1.97			26.03		
(3) Yard Occupancy Ration	50.70		8.77	36.60			100.00			-			26.25			15.46		

Table A.2-3 Present Condition and Future Development Plan of Makassar Port

1) Outline

Makassar port is located at Sulawesi's southeast corner and faces the Makassar Strait which is an international shipping lane (ALKI). It is one of the main ports in Indonesia beside Port of Tanjung Priok, Tanjung Perak and Belawan. The port is highly supported by its hinterland, namely all provinces in Sulawesi, Papua, Maluku and other islands, all of which are rich in mining, agriculture as well as farming products. Makassar port consists of container terminal (Hatta), international cargo and passenger terminal (Soekarno) and domestic cargo terminal (Paotere) managed by PELINDO Makkasar Brunch and private company berth managed by PT Berdikari producing flour.
Hatta Container Terminal and Soekarno Multi-Purpose Terminal are located side by side. The passenger terminal is located in the Soekarno Multi-purpose Terminal.

2) Present Port Layout

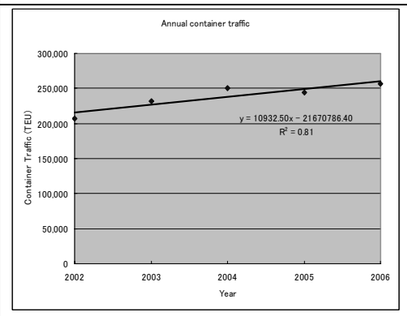


4) Future Development Plan

4) Port Operation Issues

- Hatta Container Terminal consists of 2 berths such as a container berth with a length of 500 m and a multi-purpose berth with a length of 350 m.
- The greater part of concrete at rail for gantry crane has damaged due to lack of strength of concrete.
- Some parts of container yard have been occurred settlement.
- There are 5 Rubbed Tired Gantry Crane (RTG) and 14 trailers in Hatta Container Termanl where consists of 13 yard blocks behind a container berth with a length of 500 m. However, the cycle time of cargo handing takes for a long time while two or three vessels are berthing at the same time due to a shortage of the number of RTG and trailers. According to port operator of PERINDO, at least 5 RTG and 15 trailers is required to add in near future.
- Some cargo handling equipments are leaving in and around the workshop due to a shortage of spare parts.
- Container Freight Station (CFS) is not generally used because LCL is only 20,000 TEU as compared with 230,000 TEU of FCL in 2006.
- The rail for quayside gantry crane has installed at container berth with a length of 500 m only out of whole container berth with a length of 850 m. In near future, It is necessary to install rails and add 1 to 2 quayside gantry cranes at multi-purpose berth as increasing container cargo traffic.

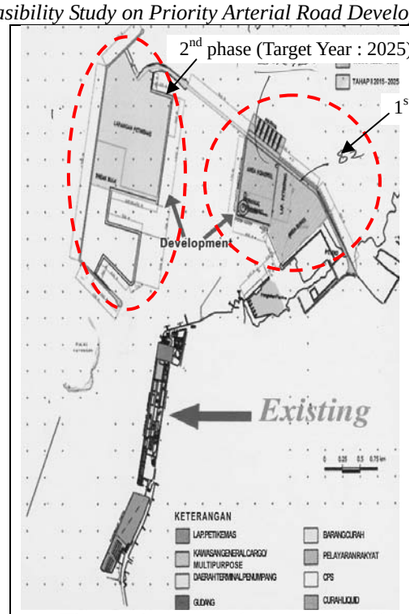
①Shortage of capacity of RTG ②Shortage of trailers ③Empty cargo in CFS ④Non-pavement at ICD

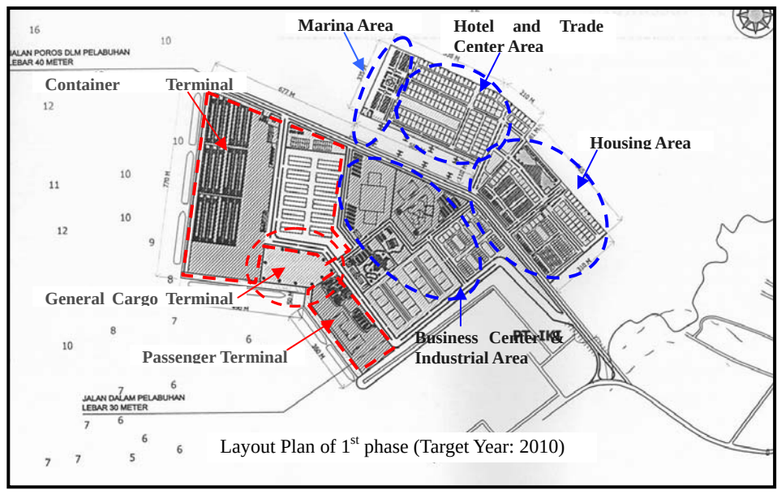


Projection of container cargo traffic (2010-2030)

Year	2,010	2,015	2,020	2,025	2,030
Container Traffic (TEU)	303,539	358,201	412,864	467,526	522,189

- The projection of container traffic during 2010-2030 was estimated based on the spastic data of container traffic for 5 years from 2002 to 2006.
- The capacity of container cargo handling at Hatta container terminal is at 350,000 TEU according to PELINDO Makassar Brunch. The capacity of container handling will be reached in and around 2015. However, the capacity will be extended by 2020 if rails for gantry crane and some cargo handling equipments such as quayside gantry crane, RTG, trailer, etc, are extended and installed on and after 2010.





Layout Plan of 1st phase (Target Year: 2010)

- The productivity of container traffic at new container terminal will be reached by 500,000 TEU/year.
- All passenger vessels will be shifted to new passenger terminal.
- A part of bulk vessels will be shifted to new general cargo terminal, but most of them will be called at existing berth.
- PELINDO IV is anxious to implement the preliminary study or feasibility study by Japanese Government such as JICA and JBIC. However, four investor have interested in the development of these facilities.

5) Accessibility

- The transportation of container cargo by trailer is limited to 1 TEU (20 ft container) at a time at Tallo bridge on Sutama street between port and ICD due to a shortage of strength of the bridge structure. It is necessary to reinforce the structure of Tallo bridge in order to transport large amount container (2 TEU) at a time.

- The trailers owned by shipping line should pay out Rp. 5,000 every time because of passing a toll road while container is transported between port and ICD.

Tall Bridge on Sutarni Street

Port Gate connected to Sutarni Street

Table A.2-4 Present Condition and Future Development Plan of Bitung Port

1) Outline

Port of Bitung is approximately 45 km from Manado City, the capital of North Sulawesi Province. As the entrance of Asia Pacific region, Port of Bitung will be the impetus for economic and hinterland growth of North Sulawesi and East Indonesia region. Port area is divided into new and old areas. The new port was constructed by Japanese loan and opened in January 2005. The new port handles domestic containers for Jakarta, Surabaya, Pantloan and Makassar at present, but it is expected that international containers will be handled exclusively in the new port in the future. The multi purpose port has three continous berths, dealing with international cargo (container and bulk), domestic cargo and passengers. The major commodities for loading/export and unloading/import are shown as follows.

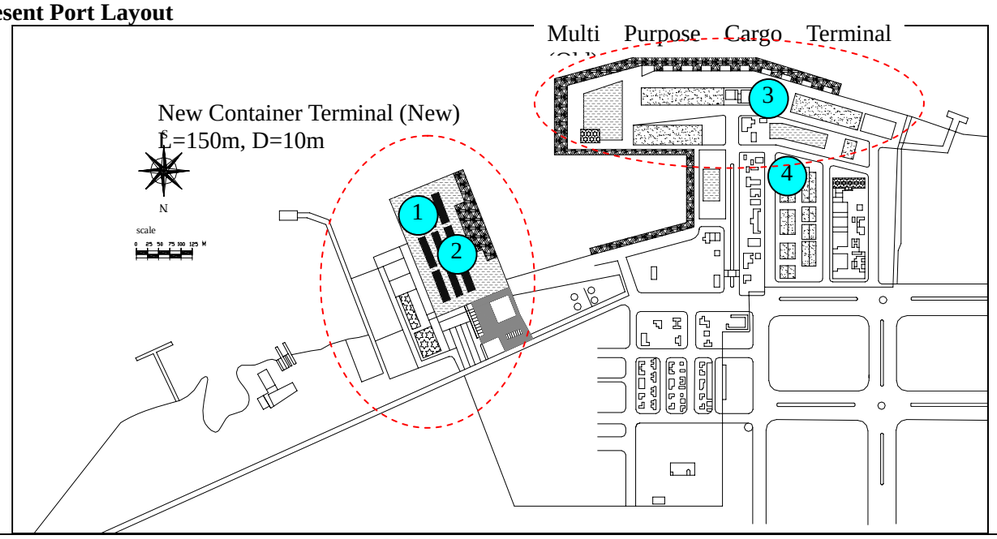
- Loading/Export : Coconuts Oil, Fresh Fish, Coconuts wood, Rattan,
- Unloading/Import : General Cargo, Mixed Goods, Rice, Wheat Flour

The major origin and destination of cargo are shown as follows.

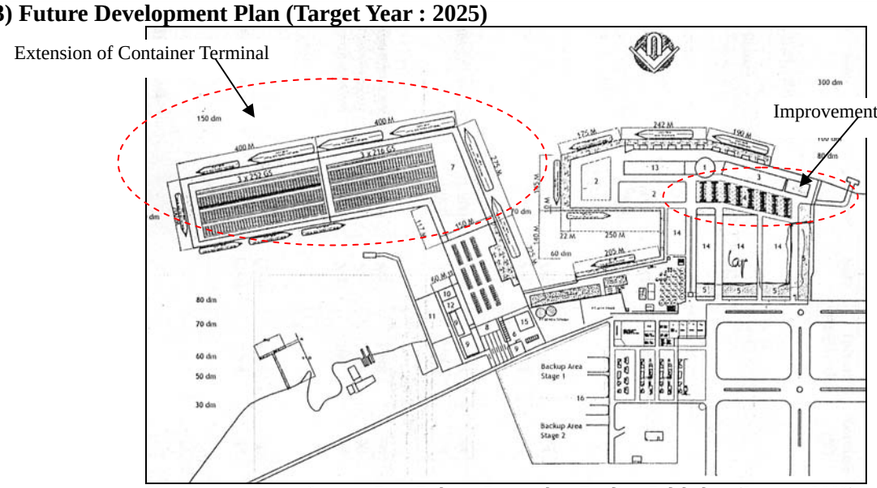
- Origin : Jakarta, Surabaya and Makassar, Destination : Jakarta, Surabaya, Makassar and Pantloan

There are 3 coconuts oil refineries and some fish processing plants in and around Bitung Port and these products are exported.

2) Present Port Layout



3) Future Development Plan (Target Year : 2025)



Source : Data Dukung Pengemban Fasilitas Pelabuhan (January, 2003)

- According to information from PELINDO Bitung office, the central government has plan to extend berth approximately 130 m and install a gantry crane and two gantry cranes in 2008.

4) Port Operation Issues

- There is a container berth with a length of 150 m and a depth of 10m in new container terminal. There is a quay side gantry crane with a capacity of 18-20 TEU per hour on container berth. The capacity of container yard in new container terminal is about 600 slots. There is a ICD which is 1 km away from the port. The capacity of berth and container yard is sufficiently up to now in consideration of present berth and open yard occupancy ration (58 % and 37 % respectively). However, all placed containers (60,000 TEU a year) at yard in Multi Purpose Cargo Terminal will be replaced to new container terminal in the near future in order to keep enough space for bulky cargo and general cargo. After that, it is expected that the capacity of container terminal will be insufficient. The expansion of container yard area is required.
- The port has 9 container trailers which consist of 6 trailers for PELINDO and 3 trailers for CSN.
- It is necessary to repair and reinforce the port facilities such as berth, apron, drainage, etc. as soon as possible since some part of these facilities was damaged remarkably due to an overage and maintenance issues.

①Container Yard

②Gantry Crane

③Damaged Drainage

④Empty Container

5) Accessibility

- The distance form Manado airport to Bitung port is about 60 km.
- The main road for Bitung port is a two-lane road with a width of 6 – 7 m and it has a lot of undulations and shape turns. The road is congested due to slowly running by heavy vehicles such as trailers and trucks.
- The road in Bitung city and road around Bitung port are eight-lane road and six-lane road respectively.

Main Road for Bitung Port

Road Condition in Bitung City

Table A.2-5 Present Condition and Future Development Plan of Kendari Port

1) Outline

Kendari is the capital of Southeast Sulawesi province, and Port of Kendari faces Kendari bay, which stretches 7 km, and is located 2 km inside from the narrow mouths of bay.

Port of Kendari consists of International Wharf, General Cargo Wharf, Passenger Wharf and Traditional Wharf. The length wharf is 270 m with a depth of -6 to -12 m, in which containers, general cargo and passenger are handled.

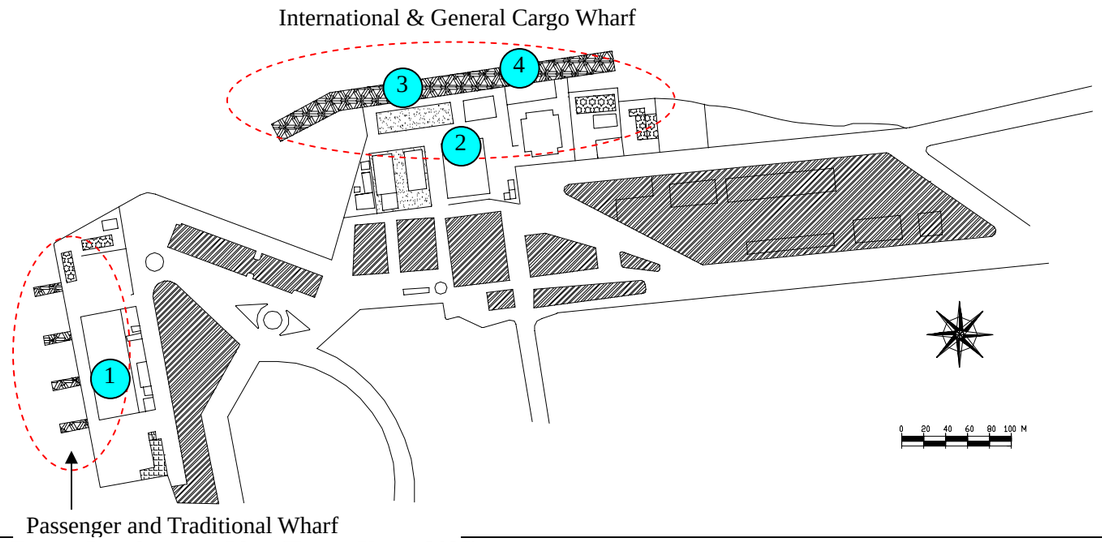
The major commodities for loading/export and unloading/import are shown as follows.

- Loading/Export : Rattan, Wood, Fish, Nuts
- Unloading/Import : General Cargo, Oil, Sugar, Asphalt, Cement, Fertilizer

The major origin and destination of cargo are shown as follows.

- Origin : Makassar, Surabaya, Biringkassi and Bontang
- Destination : Makassar, Surabaya and Japan

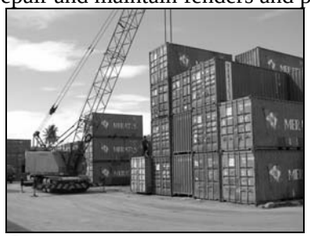
2) Present Port Layout



3) Future Development Plan (Target Year : 2025)

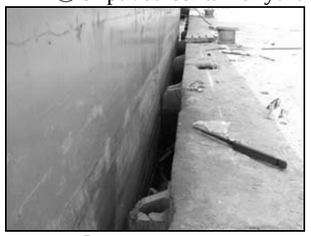
4) Port Operation Issues

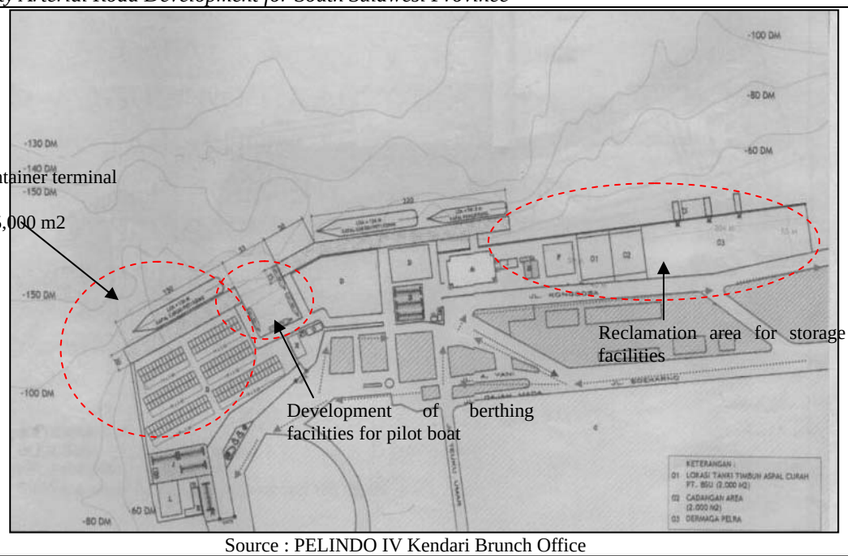
- The enough depth is secured at berth and access channel. However, it is difficult to enter port because the entrance of bay is very narrow and alignment is access channel in and around entrance of bay is a sharp bend. The maximum size of calling vessel is 115 m LOA due to the limitation of navigation.
- A large quantity of containers is placed on general cargo yard. The capacity of container yard is insufficient. It is very difficult to expand the container yard at the back of port because there are a lot of houses close to the port.
- In order to secure the container yard in port area, a navy storage and a navigation & administration office is required to remove.
- There is no ICD around Kendari port. It is necessary to construct ICD facility if container cargo volume is increasing hereafter.
- Existing container yard and parking is paved by asphalt, but the great part has collapsed remarkably.
- In order to improve the efficiency of cargo handling, cargo handling equipments such as reach stacker, forklift, etc are required to install as soon as possible because only two old mobile cranes are working at container yard and berth both.
- The berth and open storage occupancy rate are very high such as 79.01 % and 98.73 % respectively. It is necessary to improve the berth and yard capacity as soon as possible.
- It is necessary to repair and maintain fenders and pavement of apron urgently due to the serious damage.


①Overage mobile harbor crane


②Unpaved container yard


③Narrow apron


④Damaged fenders



Source : PELINDO IV Kendari Brunch Office

5) Accessibility

- The access road for Kendari port composes a two-lane road with a width of 6-7 m. .

Main Road for Kendari Port

Road Condition in Kendari City

:

Table A.2-6 Present Condition and Future Development Plan of Parepare Port

1) Outline

The position of Parepare is in the strategic area for sea transportation because Parepare is one of the economic growth area (KAPET) in east of Indonesia. The Port of Parepare is in the center of Parepare City. The distance from Makassar to the port is about 155 km.

The port consists of Nusantara Area, Cappa Ujung Area and Lontangnge Area and these are close adjacent each other. The port is located in a gulf and it is advantage port because the wave is always calm and the depth of access channel is sufficient such as 10 – 17 m.

The major commodity for loading/export and unloading/import is shown as follows.

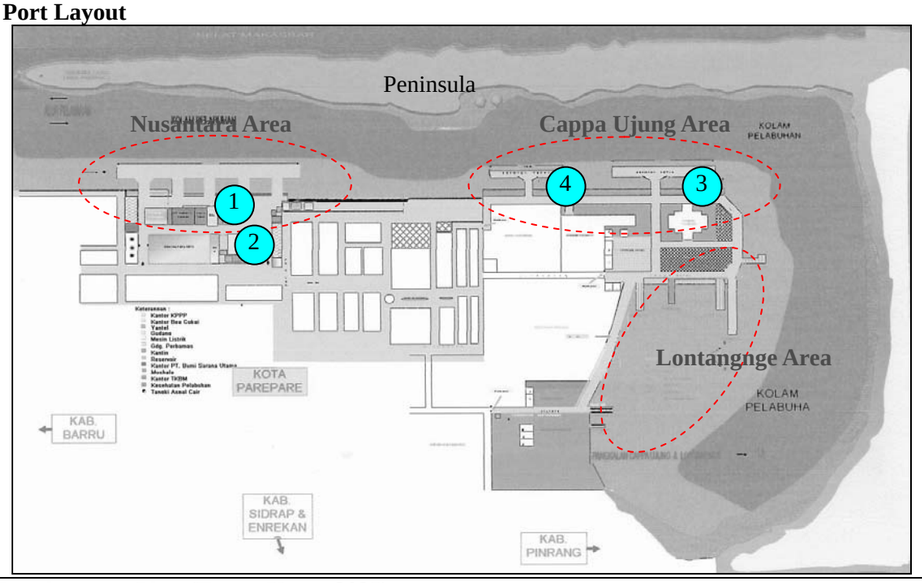
- Loading/Export : Onion, Rice, General Cargo
- Unloading/Import : Oil, Fertilizer, General Cargo, Asphalt, Wood, Fruits

The major origin and destination of cargo are shown as follows.

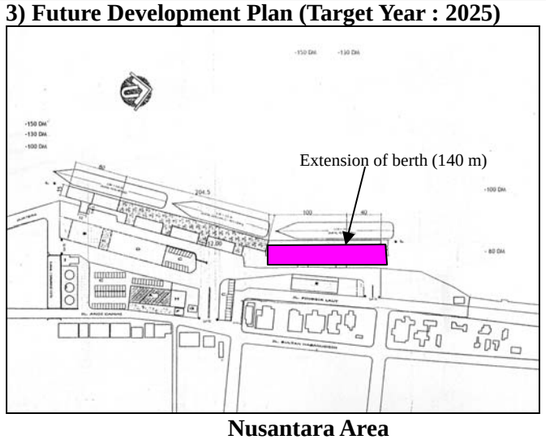
- Origin : Balikpapan, Donggala, Gresik, Makassar, Bontang
- Destination : Balikpapan, Samarinda, Tj. Priok, Nunukan, Jayapura

The rice gathered in this region is stored in warehuose that is managed by Bulog of central government 7 km away from Parepare port to the north temporaly.

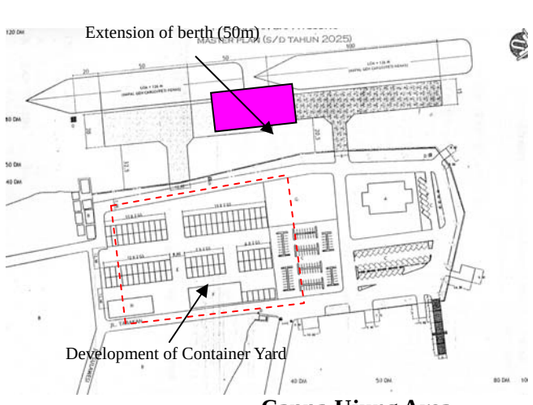
2) Present Port Layout



3) Future Development Plan (Target Year : 2025)



Nusantara Area



Cappa Ujung Area

Source : Data Dukung Pengemban Fasilitas Pelabuhan (January, 2003)

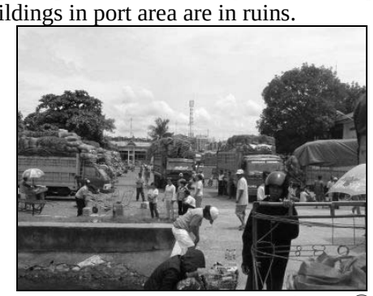
4) Port Operation Issues

Nusantara area

- Parepare port has not handled container before. It is impossible to handle container because the space of yard and parking is very limited and there is no cargo handling equipment for container in the port.
- The length of berth is 280 m and two ferries with a length of 125 m can berth at the same time. A ferry out of three ferries that has called to the port every day is waiting offshore frequently. It is expected that the extension of a berth will be required in the future.

Cappa Ujung area

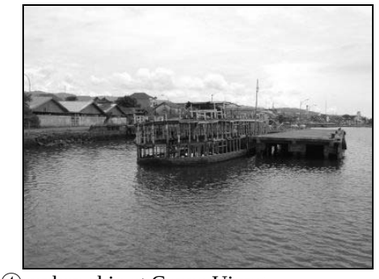
- Some parts of berthing facility such as fenders, curve stone, etc have collapsed due to an overage and maintenance issues. Some sunken ships have left in and around Cappa Ujung and Lontangnge area. Suitable port operation and management are required.
- Some buildings in port area are in ruins.



①Lack of Parking Space at Nusantara Area

②Traffic congestion around date at Nusantara

③Damaged Berth Facilities at Cappa Ujung



④sunken ship at Cappa Ujung

5) Accessibility

– The access road for Parepare port composes a two-lane road with a width of 6-7 m. The road is congested when ferries and/or vessels are berthing at the same time.

Road Condition around Gate of Port

Road Condition in Parepare City

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Table A.2-7 Present Condition and Future Development Plan of Gorontalo Port

1) Outline

The Port of Golontalo is in the center of Gorontalo city. The port has cargo berths with a length of 120 m and passenger berth with a length of 59 m, but there is no cargo yard are and cargo handling equipment in the port. The container and general cargo has loaded and unloaded by stevedoring crane on vessel.

Most of calling cargo vessels is from Surabaya. The vessel from Surabaya to Gorontalo has berth at Gorontaro port and Anggrek port. However, the large portion of vessels is calling to Gorontalo port. The sailing time from Surabaya takes for 3 days for Anggrek and for 4 days for Gorontalo, while transportation charge from port to ICD (Inland Container Deport) is Rp. 100,000 for Gorontalo port and Rp. 900,000 for Anggrek since ICD is located in Gorontalo city. As a result, shipping lines have an inclination to call to Gorontalo port.

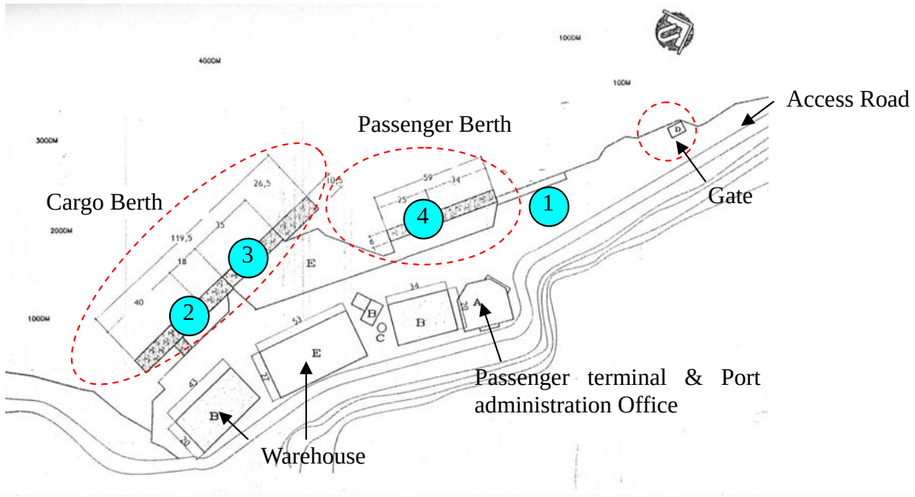
The major commodities for loading/export and unloading/import are shown as follows.

- Loading/Export : Corn, Sugar Cane, Rattan, Wood,
- Unloading/Import : Oil, General Cargo, Fertilizer, Cement, Wood

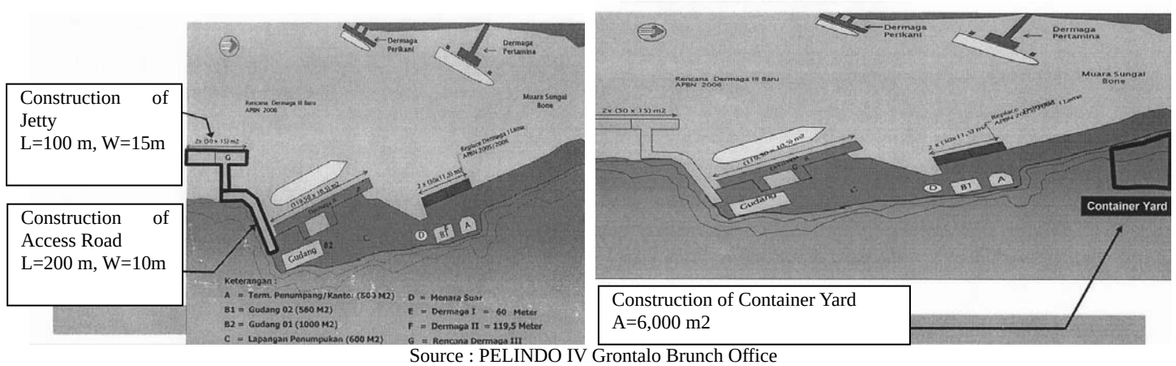
The major origin and destination of cargo are shown as follows.

- Origin : Surabaya, Bitung, Makassar, Balikpapan, Biringkassi,
- Destination : Surabaya, Malaysia, Philippines, Korea, Makassar

2) Present Port Layout



3) Future Development Plan (Target Year : 2007)

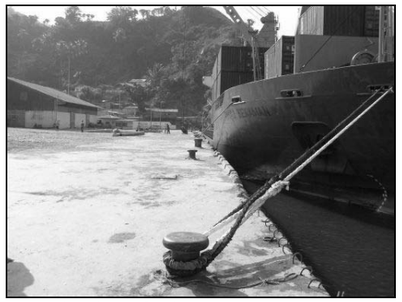


Source : PELINDO IV Grontalo Brunch Office

4) Port Operation Issues

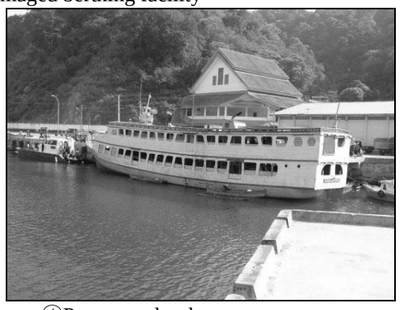
- The space of yard and parking is very small and insufficient.
- It is impossible to expand yard /parking area and warehouse to back of port area since there is a hill close to the port.
- There are lot of pot holes, cracks, etc, on road and yard in port area. The greater part of pavement has already collapsed. It is necessity to repair the pavement as soon as possible.
- -It is necessary to repair and maintain fenders and concrete curb of apron urgently due to the serious damage.

①Damaged pavement at access road and parking



②Damaged berthing facility

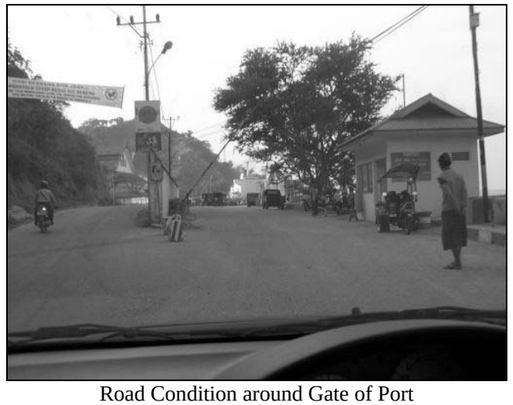
③Unloading container by stevedoring crane



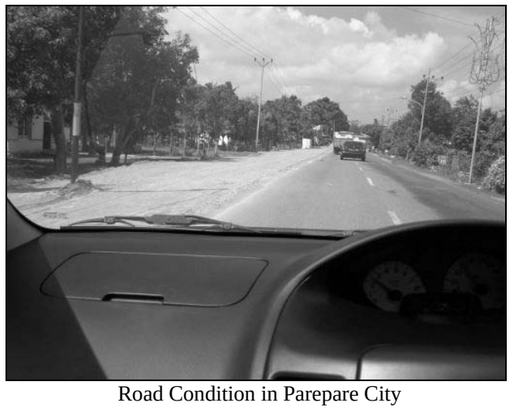
④Passenger berth

5) Accessibility

- The distance form center of Gorontalo to the port is about 2 km.
- The road for the port is a two-lane road with a width of 6 – 7 m. The traffic congestion has not occurred because traffic volume is not so much.



Road Condition around Gate of Port



Road Condition in Parepare City

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Table A.2-8 Feature of Major Airport in Sulawesi

Item		**Hassanuddin Airport (Makassar)**	**Sam Ratulangi Airport (Manado)**
1) Outline		South Sulawesi Province acts as a transit point for passengers by air from west to east and as a gateway to eastern Indonesia, which is the economic development center. Based on the strategy position of Makassar, the air transportation facilities are significant to support the function of Makassar airport as a domestic hub airport in eastern Indonesia.	As long as the development coast interested place and potential region as producer of commodities except oil and gas, it is dedicated to increase tourism facilities and also International cargo. Planning of developing Sam Ratulangi airport was started in 1993/1994.
2) Airport Facilities	Location	05°03'39" S, 119°33'16" E	01°32'44" N, 124°55'29" E
	Elevation	14.3 m	80.5 m
	Runway	L=2,500 m x W=45 m Destination 130°－310°	L=2,650 m x W=45 m Destination 180°－360°
	Taxiway	50,755 m2, Total length : 1,959 m	93,098 m2, Total length : 2,670 m
	Apron	69,147 m2 A-300, DC-10, MD-11, B737, F-100, CN-212, MD-82, F-27, CN-235	54,378 m2 DC-10, A-320, B737, MD-82, F-28
	Terminal	Passenger : 10,815 m2, Cargo : 4,000 m2	Passenger : 20,039 m2, Cargo : 1,771 m2
	Parking Area	12,272 m2	18,925 m2
	Navigation Facilities	NDB, DVOR, DME, ILS, RVR, ATIS, PSR, SSR, RDPS, DISPLAY RADAR	ILS, MNO, MWB, MD, PN
	Communication Facilities	HF/VHF, HF SSB, VHF-ER, VSAT, ADC, APP, ACC, MWARA, RDARA, etcm	Tower, APP, ATIS, HF Manado FS
3) Passenger & Cargo Traffic (2006)			

Item	Number of Flight			Number of Passenger			Baggege Volume (ton)		Cargo Volume (ton)		Post (ton)	
	Arrive	Depart	LCL	Arrive	Depart	Transfer	Arrive	Depart	Arrive	Depart	Arrive	Depart
International	155	171	4	20,413	16,380	0	1,104	909	0	85	0	0
Domestic	22,416	22,394	66	1,509,649	1,421,245	947,925	17,061	26,687	16,398	25,684	583	598
Sub-total	22,571	22,565	70	1,530,062	1,437,625	947,925	18,165	27,596	16,398	25,769	583	598
Total	45,206			3,915,612			45,761		42,167		1,181	

		Passenger	Cargo
Major OD	International	Singapore	Singapore
	Domestic	Jakalta, Surabaya, Manado, Kendari, Palu	Jakalta, Surabaya, Denpasar, Manado, Palu

Item	Number of Flight			Number of Passenger			Baggege Volume (ton)		Cargo Volume (ton)		Post (ton)	
	Arrive	Depart	LCL	Arrive	Depart	Transfer	Arrive	Depart	Arrive	Depart	Arrive	Depart
International	299	300	0	22,291	21,752	0	487	446	30	374	0	0
Domestic	7,112	7,100	435	530,426	535,265	29,600	7,208	6,793	5,100	4,050	130	40
Sub-total	7,411	7,400	435	552,717	557,017	29,600	7,695	7,239	5,130	4,424	130	40
Total	15,246			1,139,334			14,935		9,554		170	

		Passenger	Cargo
Major OD	International	Singapore, Davao	Singapore, Davao
	Domestic	Makassar, Jakarta, Surabaya,Ternate, Balikpapan	Makassar, Jakarta. Surabaya. Balikpapan. Denpasar

4) Future Development Plan	- The construction of Terminal Building (51,000 m2), Taxyway (1,917 m) and Apron (62,800 m2) has been carrying out by the budge of central government. The construction will be completed within 2007. - The procedure of bidding for new runway with a length of 1,300 m is in progress. The construction will be started within 2007. As a long term, the government will be extended up to 3,100 m. - The direction of new runway is planned at almost right angles to the existing runway. The reason why, the mountain which is located to north of existing airport is an obstacle to safety air navigation.	None
5) Airport Operation Issues	- The capacity of existing taxiway and apron has been exceeded.	The capacity of runway, apron, parking, terminal building, etc. is sufficient un to now. Therefore, there is no problem for port operation.
6) Accessibility	- A traffic jam has been occurred at access road for the airport especially in the morning and evening due to a shortage of capacity. It takes for 1.5 hours during the rush hours. - Access rod to new terminal building is a four-lane with a median (10 m in width).  Main road for Airport  Access road for new terminal building	According to the information from Angkasa Pura Manado, World Ocean Summit will be hold in Manado city in 2009. The central and local government has plans to develop some infrastructures, tourism facilities, etc. in line with the Summit. The road between Manado city and airport will be widened from a two-lane road to four-lane road by 2009.  Junction for Airport and Bitung Port  Near airport

Table A.2-9 Present Condition and Future Development Plan of Pantoloan Port

1) Outline

The port of Pantoloan is located in gulf of Palu. The port is a good natural harbor because the wave condition is always calm and the depth of access channel and basin are deep and sufficient. The port is ranked at the 3rd largest by general and container cargo handing volume among all ports in Sulawesi though there is no quayside crane and large cargo handing equipment at yard.

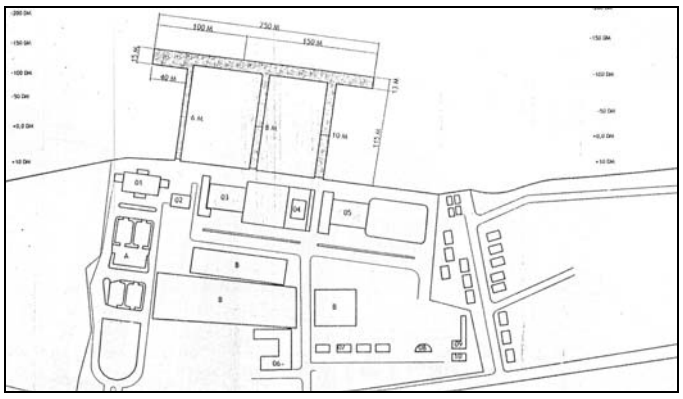
The major commodities for loading/export and unloading/import are shown as follows.

- Loading/Export : Cacao beans, Coconuts wood, Stone (Gravel)
- Unloading/Import : General Cargo

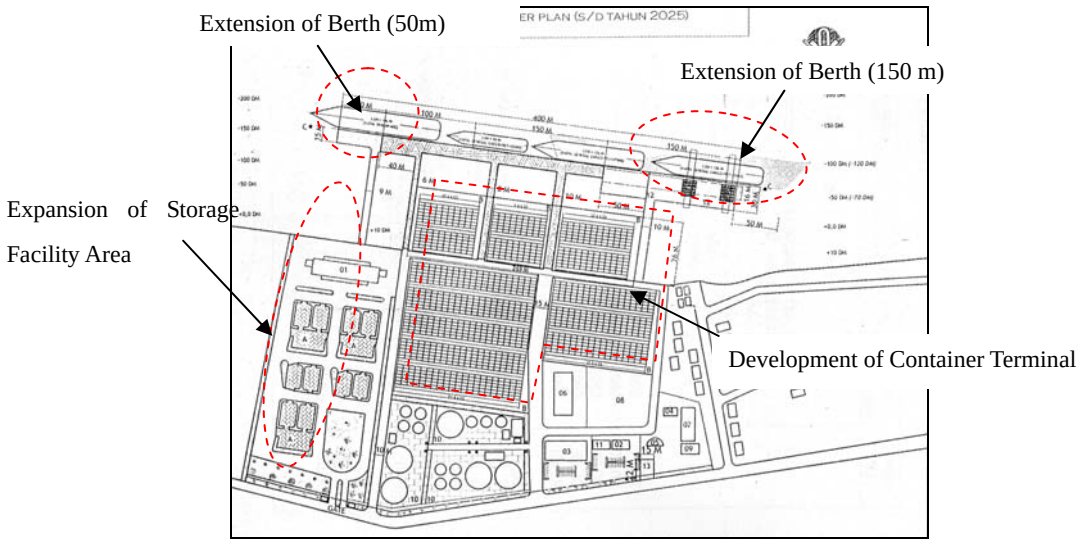
The major origin and destination of cargo are shown as follows.

- Origin : Surabaya, Jakarta, Balikpapan, Bitung, Tarakan
- Destination : Surabaya, Jakarta, Balikpapan, Bitung, Tarakan

2) Present Port Layout



3) Future Development Plan (Target year 2025)



Source : Data Dukung Pengemban Fasilitas Pelabuhan (January, 2003)

- According to the information from Pantoloan branch office of PELINDO, PELINDO has plans to extend cargo berth approximately 100 m to the east by 2008 in order to accommodate 3 vessels at the same time and improve the productivity of cargo handling.

4) Port Operation Issues

- If 3 vessels call to the port, 1 cargo vessel out of 3 should wait at offshore for long time because the length of berth is 250 m only. This case is frequently occurred recently. It is necessary to extend the berth as soon as possible.

5) Accessibility

- The distance from Palu city to the Port is about 24 km and it takes for about 40 minutes.
- The road is good condition and it consists of 2 lanes with 7 m in width.

Appendix 3

TRAFFIC SURVEY FORMS

Passenger Survey for Private Vehicle / Driver Survey for bus / Cargo Survey for Truck

Survey Station	No.		Directon Code( )	From		Date		Surveyor	
	Name			To		Weather		Supervisor	

A) Survey Time (only hour, not necessary of min.)		
B) Type of Vehicle (only motorized vehicle) 1)Motorcycle 2)Sedan/Taxi/Jeep/Combi 3)Mini Bus(incl.Pete-pete)/Small Bus 4)Medium Bus/Large Bus 5)Pick-up 6)Small Truck(2 axis) 7)Large Truck(more than 3 axis		
C) Number of Passengers (including driver)		
D) Trip Purpose 1) Commuting/Work/School 2) Business 3)Sightseeing 4) Bus driver, Truck Driver, Taxi Driver 5)Others		
E) Asal Perjalanan	Street/Port Name Kecamatan	Street/Port Name Kecamatan
F) Tujuan Perjalanan	Street/Port Name Kecamatan	Street/Port Name Kecamatan
G) How many hours for this trip ?		
H) If you get on ship or airplane/ or long distance trip 1)Ship 2)Airplane 3)Long Trip 4) or bank)Others		
I) In case of H) = 1) 2) 3) Get On Place Port Name/Airport Name or Via Large Town Name	Street/Port Name Kecamatan	Street/Port Name Kecamatan
J) In case of H) = 1)2)3) Get Off Place Port Name/Airport Name or Via Large Town Name	Street/Port Name Kecamatan	Street/Port Name Kecamatan
From here, Only for Vehicle Type = Pick up, Small Truck, Large Truck		
K) Loading Capacity (Ton)		
L) Load Factor 1)Full 2)3/4 3)1/2 4)1/4 5)less than 1/4 6)Empty		
M) Major Commodity 01)Agriculture Product(Rice, Vegetable, Fruit, etc.) 02)Plantation Product(Cacao, Coffee, Clove, etc.) 03)Forest(Log, Timber, Plywood, etc.) 04)Fishery(Fish, Shell, Prawn, etc.) 05)Mineral(Salt, Coal, Nickel, Iron, etc.) 06)Metal & Machine (Steel, Generator, Car, Motorcycle, etc.) 07)Chemical(Petroleum, Alcohol, Acid, etc.) 08)Industry/Electronics(Machine parts, Garment, HP, etc.) 09)Construction(Sand, Gravel, Concrete, Beam, etc.) 10)Others)		

Traffic Count Survey (One Direction at One Location in One Page)

Survey Station	No.		Directon Code (1 or 2) ?	From		Date		Surveyor	
	Name			To		Weather		Supervisor	
If the survey location is moved from the border for avoidance of intra kota traffics, describe the new location and the reason									

*) Location report, simple drawing map and pictures about survey point should be attached.

	Motorcycle	Car/Taxi Sedan Combi	Mini Bus Small Bus	Medium Bus Large Bus	Pick up	Small Truck 2 axis	Large Truck 3 axis more	Check (*)
07:00-08:00								
08:00-09:00								
09:00-10:00								
10:00-11:00								
11:00-12:00								
12:00-13:00								
13:00-14:00								
14:00-15:00								
15:00-16:00								
16:00-17:00								
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19:00-20:00								
20:00-21:00								
21:00-22:00								
22:00-23:00								
23:00-24:00								
00:00-01:00								
01:00-02:00								
02:00-03:00								
03:00-04:00								
04:00-05:00								
05:00-06:00								
06:00-07:00								

(*) Most Right Check Column should be filled in by 1.Ujang but Continued Survey 2.Survey Interrupted by Surveyor runaway, Too Heavy Rain or Flood. Blank means Normal Survey carried out.

Traffic Survey Location List

Survey Location Code	Survey Location Name	Survey Hours How many hours ? (16 or 24)	Direction						How many OD Interview Samples ?	
			Direction Code 1				Direction **Code 2**			
			From		To		From	To	Direction 1	Direction 2
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		
			Kota	Kab	Kota	Kab	Kota	Kota		

Traffic Count Survey Data Input Form

) Original Traffic Count Survey Sheet should be attached with input digital data.

Survey Date		Location Code	Direction Code	Survey Jam	Motorcycle	Car/Taxi Sedan Combi	Mini Bus Small Bus	Medium Bus Large Bus	Pick up	Small Truck 2 axis	Large Truck 3 axis more	Check Column Code
month	day											

Roadside OD Interview Survey Data Input Form

Survey Location Code	Direction Code	Survey Time (only hour)	Type of Vehicle	Number of Passengers	Purpose	Asal	Tujuan	Hours (Distance)	Through 1.Ship 2.Airplane 3.Town 4.No Answer	Via (1)	Via (2)	Capacity (ton)	Load Factor	Major Commodity

FORM OF TRAFFIC SURVEY ON FERYY PASSENGER ON MAJOR RUTES (ORIGIN – DESTINATION)

Day/ Date: _____ Time of Ferry Departure:_____
Routes:_____ Wheater:_____

Questions

1. Name:_____ 2. Gender: _____
3. Occupation:_____ 4. Origin: _____
5. Destination:_____
6. What is purpose of your trip?
   a. Bussines b. Picnic c. School d. Driver
   e. Furthermore
7. a. What kind of vehicle that you used to come to this ferry port?.....
   b. How long was your trip to come to ferry port from your place? .....hours.....minutes
8. a. Are you enclose your vehicle in this trip ?.....
   If yes, what kind of vehicle?.....
   b. How many person are going with you in your vehicle ?
9. Do you bring your family/friend/passangers in your car ?.....person
10. How often you use this ferry served? .....
11. Why you prefer to use ferry rather than land transortation ?
    a. Near the port
    b. For acompanying number of families
    c. For acompanying cargo/large baggage
    d. No bus route on my route
    e Saver than drive vehicle
    f. Fast then drive vehicle.
    g. Cheaper than drive vehicle
    d. Vey difficult to drive vehicle

12. Do you bring some of commudity/baggage in your vehicle?
    a. Agriculture Product (Rice, Vegetable, Fruits, etc)
    b. Plantation Product (Coffee, Cacao, Clove, etc)
    c. Forest Product (Log, Timber, Plywood)
    d. Fishery Product (Fish, Shell, Prawn, etc)
    e. Mineral (Salt,Nickel, Coal, Iron, etc)
    f. Metal and Machine (Stell, Genarator, Car, Motorcycle, etc)
    g. Chemical (Petroleum, Alcohol, Acid, etc) & fertilizer.
    h. Construction (Sand, Gravel, Pile)
    i. Daily Goods (Processed Food/Daily Use Product/Clothes, etc)
    j. Furthermore _____ (described)

Appendix 4

MAJOR COMMODITIES PRODUCED IN SULAWESI

(1) Present Situation of Trade and Distribution of Goods in Sulawesi

1) Agriculture Output and Export Amount

The trade of Sulawesi composes with six types of trades such as (a) domestic distribution within Sulawesi, (b) regional export, (c) international export, (d) regional import, (e) international import and (f) international transfer trade. Table A.4-1 shows the estimated volume of agriculture products produced and traded in and exported from Sulawesi in order of value of commodities exported to the overseas.

Table A.4-1 Agriculture Products Produced and Exported from Sulawesi (2006)

(Unit: '000 tons)

Commodity	Total Output	Distributed Volume	Domestic Distribution	Regional Export	International Export	
	Volume	Volume	Volume	Volume	Volume	Value
Unit	'000 tons	'000 tons	'000 tons	'000 tons	'000 tons	US$ Mill.
Agriculture Products						
Cocoa	350	350	0	0	350	560.0
Wheat Flour	603	362	231	46	85	51.0
Wheat	730	127			127	26.7
Animal Feed	170	170	0	0	170	13.6
Cassava	940	940	910	0	30	11.7
Coffee	57	57	52	0	5	8.6
Corn	1,300	1,130	1,060	50	20	2.0
Rice	5,300	4,240	4,030	210	0	0
Sweet Potato	160	130	130	0	0	0
Peanut	70	60	60	0	0	0
Soybean	27	27	27	0	0	0
Forestry Products						
Wood Processed	n.a.	60	0	0	60	55.2
Log	5	5	5	0	0	0
Rattan	21	21	12	9	0	0
Fishery Products						
Crustacean	11	11	0	0	11	75.0
Marine Fish	347	332	309	0	23	66.0
Inland Fish	125	100	100	0	0	0
Livestock Products						
Cow	89	71	71	0	0	0
Goat	19	19	19	0	0	0
Broiler	113	100	100	0	0	0
Total	10,426	8,312	7,116	315	881	977.6

Source: Cargo throughput data obtained from PELINDO, data of economic statistics prepared by each province, trade statistics prepared by the Ministry of Trade are compiled and summarized by the JICA Study Team

Note:

1. The unit price of the major products is estimated based on the relevant trade statistics of 2003.
2. Distributed volume means that the volume of product either processed or not but distributed in Sulawesi and its external market of both regional and abroad.
3. Wheat is not produced in Sulawesi. Whole volume of wheat is imported from Australia in a form of seed and in bulk.

2) Mining Output and Export Amount

Table A.4-2 shows the volume of mining products produced in Sulawesi and value of related commodities exported to the overseas. As appeared in these tables the main stays of Sulawesi's

economy at present are agriculture and mining.

Table A.4-2 Mining Products Produced and Traded in Sulawesi (2006)

(Unit: '000 tons)

Commodity	Total Output	Distributed Volume	Domestic Distribution	Regional Export	International Export	
	Volume	Volume	Volume	Volume	Volume	Value
Unit	'000 tons	'000 tons	'000 tons	'000 tons	'000 tons	US$ Mill.
Mining Products						
Nickel						
Nickel Ore	600	543	0	0	543	190.0
Ferro-nickel		33	0	0	33	58.7
Cement						
Clinker	300	263	0	0	263	21.0
Cement	2,000	2,000	837	1,152	11	8.3
Total	2,900	2,839	837	1,152	850	278.0

Source: JICA Study Team
Note: The unit price of mining products is based on the trade statistics of Sulawesi in 2003

Sulawesi endows a considerable size of nickel mines at Soloako in Sulawesi South, and at Pomalaa in Sulawesi Southeast as well. The nickel mines are developed and exploited by the international mining companies.

Sulawesi endows a huge clay mountain range along the eastern sea coast as well. This resource makes Sulawesi as an important cement supply center in the Eastern Indonesia. Although the volume of cement export is limited, the potentiality of supply of cement in the region is quite high.

3) Volume of Transfer Trade through Sulawesi

As for the international transfer trade, Sulawesi imports around 730,000 tons of wheat from Australia and unloads it at Makassar for stocking in 2005. Then it is re-exported in a form of wheat as it is or in a form of wheat flour after processing of which volume is around 127,000 tons and shipped to other Asian countries. The rest of wheat is processed into wheat flour, then, distributed within Sulawesi (230,000 tons) and to other regions in Indonesia, especially in Eastern Indonesia (46,000 tons). Therefore, Sulawesi can be regarded as a hub for the wheat transfer in the south-east Asia and distribution in Indonesia.

4) Volume and Value of Commodities Imported to Sulawesi

Sulawesi is located in an ideal geographical location as a gateway to the Eastern Indonesia in general and to the North-eastern Indonesia in particular. Sulawesi imports wheat, sugar and fertilizer from abroad and trans-ship them to other region of Indonesia. Sulawesi imports other products from the Northeastern Indonesia as well as other regions of Eastern Indonesia and processes them into the final product for its consumption in Sulawesi or for export to other region or abroad. For example the logs imported by Sulawesi from the region are processed to sawn wood

or plywood; or the copra imported mainly from Muluk region to coconut oil for exporting to the overseas.

Table A.4-3 shows the value and volume of agriculture products imported into Sulawesi.

Table A.4-3 Agriculture Products Imported into Sulawesi (2006)

Commodity	Total Output	Distributed Volume	Domestic Distribution	Regional Import	International Import	
	Volume	Volume	Volume	Volume	Volume	Value
Unit	'000 tons	'000 tons	'000 tons	'000 tons	'000 tons	US$ Mill.
Agriculture Products						0
Sugar	0	17	17	0	17	4.0
Tapioca Flour	0	11	11	11	0	0
Cooking oil	0	148	148	148	0	0
Coconut oil	0	34	34	34	0	0
Copra	0	60	60	60	0	0
Forestry Product						0
Log	0	106	106	106	0	0
Wood	0	10	10	10	0	0
Plywood	0	8	8	8	0	0
Fertilizer	0	257	257	234	23	97.0
Total	0	651	651	611	40	101.0

Source: JICA Study Team

Table A.4-4 shows the value and volume of mining products imported into Sulawesi.

Table A.4-4 Mining and Non-agriculture Products Imported into Sulawesi (2006)

Commodity	Total Output	Distributed Volume	Domestic Distribution	Regional Import	International Import	
	Volume	Volume	Volume	Volume	Volume	Value
Unit	'000 tons	'000 tons	'000 tons	'000 tons	'000 tons	US$ Mill.
Fuel	0	2,450	2,450	2,450	0	0
Coal	0	520	520	520	0	0
Gypsum	0	51	51	51	0	0
Asphalt	0	44	44	26	18	2.6
Total	0	3,065	3,065	3,047	18	2.6

Source: PEMASARAN VII, PERTAMINA Fuel Supply Record 2006 for fuel. Port cargo traffic data of PELINDO IV is used for other item.

Note: Both fuel and coal is imported from Balikpapan, East Kalimantan

Table A.4-5 shows the value and volume of industrial products imported into Sulawesi.

As shown in these tables, the total volume of commodities produced in Sulawesi in 2006 is around 13.3 million tons (Agriculture products 10.4 million tons and mining products 2.9 million tons) and these are processed into the commercial products of which volume is around 11.1 million tons in total. The type of process of agriculture products is limited to drying, de-husking, polishing etc. but not processing into final products which can be marketed directly in the market of consumer countries in the world.

Table A.4-5 Industrial and Consumable Products Imported into Sulawesi (2006)

Commodity	Total Output	Distributed Volume	Domestic Distribution	Regional Import	International Import	
	Volume	Volume	Volume	Volume	Volume	Value
Unit	'000 tons	'000 tons	'000 tons	'000 tons	'000 tons	US$ Mill.
Steel Product	0	50	50	50	0	0
Automobiles		300	300	300	0	0
General goods	0	398	398	392	6	n.a.
Total	0	2,005	2,005	1,981	24	0

Source: Cargo traffic data obtained from PELINDO IV.
Note: General goods mean the consumables, office equipment and other industrial products.

Table A.4-6 summarizes the outline of the products traded in Sulawesi.

Table A.4-6 Summary of Volume and Value of Products Traded in Sulawesi

Commodity	Distributed Volume	Domestic Distribution	Regional Distribution	International Trade	
	Volume	Volume	Volume	Volume	Value
Unit	'000 tons	'000 tons	'000 tons	'000 tons	US$ Mill.
Agriculture Products Exported	8,312	7,116	315	881	977.6
Mining Products Exported	2,839	837	1,152	850	278.0
Sub-total of Exports	11,151	7,953	1,467	1,731	1,255.6
Agriculture Products Imported	651	651	611	40	101.0
Mining Products Imported	3,065	3,065	3,047	18	2.6
Industrial and Consumables	2,005	2,005	1,981	24	0
Sub-total of Imports	5,721	5,721	5,639	82	103.6
Grand Total	16,872	13,674	7,106	1,819	1,359.2

Source: JICA Study Team

Agriculture product accounts around 78% of the total volume of production. Of the total 8.3 million tons around 7.0 million or 76% is consumed within Sulawesi and around 315,000 tons or 24% is distributed to the region surrounding Sulawesi. The total export volume of products is 3.2 million tons and around 45% of it is distributed to the other regions in Indonesia mostly in East Indonesia and rest 55% is exported to the overseas market. The total export value of Sulawesi products was around US$ 1.3 billion. Of the total export value the agriculture products account for around 78% and mining products accounts for around 22%.

The volume of agriculture products exported to the other regions from Sulawesi accounts for 4.6% of the total domestic consumption volume. The volume of mining products or mainly cement exported to other regions from Sulawesi is more than the volume consumed within Sulawesi.

The total volume of products imported by Sulawesi is 4.4 million tons of which around 45% is accounted for imported industrial and consumable products. This means that Sulawesi depends on most of industrial products such as steel, machinery, or a like and all consumable products to import either from other region of Indonesia or abroad.

5) Volume and Value of Commodities Exported from Sulawesi

Table A.4-7 shows the share of major products of Sulawesi in the total export volume and value of

Sulawesi by kind of product. The available data to estimate such share of export volume and value by kind of commodity in the total export volume and value is limited only for the year of 2003.

As shown in this table, the cocoa is the largest commodity exported from Sulawesi in terms of volume and the top foreign currency earner of Sulawesi followed by nickel ore. The most voluminous product is the nickel ore and followed by vegetable oil. The highest valued product per ton is Crustaceans (US$ 6,900 per ton) and followed by fish preserved (US$ 2,910 per ton) among all kind of agriculture products traded. The lowest valued product for export is animal feed (US$ 80 per ton) although its volume is quite large as 125,000 tons per year in 2003...

Table A.4-7 Export Value and Volume of Major Commodities of Sulawesi (2003)

Commodity	Value of Product Exported from Sulawesi		Volume of Product Exported from Sulawesi		Average Unit FOB Price of Product per Ton
	US$ Million	%	Tons/Year	%	US$/ton
Agriculture Products	**660**	**68**	**700,460**	**45**	**942**
Cocoa	346	36	217,000	14	1,600
Vegetable Oil[1]	116	12	292,000	19	600
Crustanceans	76	8	11,000	1	6,900
Fish Chilled/Prepared	67	7	23,000	2	2,910
Wood Processed	21	2	28,000	2	1,400
Animal Feed	9	1	125,000	8	80
Coffee	7	1	4,200	1	1,700
Mining Products	**258**	**27**	**608,000**	**39**	**424**
Nickel Ore	198	21	574,000	37	350
Nickel Alloy	60	6	34,000	2	1,780
Garment/Textile	**18**	**2**	**260**	**1**	**69,200**
Other Products	**45**	**5**	**257,540**	**16**	**118**
Total	954	100	1,566,000	100	609

Source: Compiled and analyzed by JICA Study Team based on the trade statistics of Ministry of Trade.

Major Export Commodities of Sulawesi

Table A.4-8 shows the share of Sulawesi in the total value of export from Indonesia by kind of commodities exported from Sulawesi.

As shown in Table A.4-8, Sulawesi is considered as the leading region of production and exports of nickel and its ferro-alloy as both accounts for around 80% of the total value of nickel exports from Indonesia. The Cocoa accounts around 60% of the total value of Indonesia and followed by vegetable oil which accounts for around 55% of the same.

The major products currently exported from Sulawesi to the international market are as shown in Table A.4-9 by order of annual export amount of each commodity by sector.

[1] The major vegetable oil produced in Sulawesi Island is coconut oil. Most of the vegetable oil produced and exported from Indonesia is the palm oil.

Table A.4-8 Share of Major Commodities Exported from Sulawesi in Indonesia Total by Value

Commodity	Value of Product Exported from Sulawesi (US$ Millions)	Share (%)	Value of Product Exported from Indonesia (US$ Millions)	Share of Sulawesi in Indonesia Total Export Value
Cocoa	346	36%	595	58.2%
Vegetable Oil	116	12%	211	55.0%
Crustanceans	76	8%	962	7.9%
Fish Chilled/Prepared	67	7%	1,547	4.3%
Wood Processed	21	2%	272	7.7%
Garment/Textile	18	2%	6,567	0.3%
Coffee	7	1%	274	2.6%
Nickel Ore	198	21%	250	79.5%
Iron and Ferro-Alloy	60	6%	74	80.8%
Others	45	5%	23,530	0.0%
Total	954	100%	34,282	2.9%

Source: Compiled and analyzed by JICA Study Team based on the trade statistics of Ministry of Trade.

Table A.4-9 Major Export and Import Commodities of Sulawesi

Sector	Export Commodities
Agriculture	Cocoa, vegetable oil, crustaceans, fish and marine products, coconut oil and its products, cassava, coffee
Mineral and mining	Nickel, nickel-alloy
Manufacturing	Garment, wood processed
Sector	**Import Commodities**
Agriculture	Sugar, oil palm for cooking oil, fertilizer
Mineral and mining	Coal for nickel and other mineral processing, gypsum for cement production
Manufactured goods	Steel, garment, transport equipment, general consumable goods, etc.

(3) Position of Major Commodities Exported from Sulawesi in the World Trade

The major commodities exported from Indonesia for which Sulawesi accounts a major part has been analyzed in view of world ranking by volume and value traded.

1) Agricultural Products

Most of the cash crops so called are regarded as international commodities. These are cocoa, coffee, coconut oil, cassava, etc. that have been produced, processed primarily and exported to the external market. Some crops have a long history of export to the overseas or import by the overseas merchants since several centuries ago, such as spice, clove, cocoa, coconut oil, crustaceans, coffee, and a like.

Indonesia's ranking in the world in terms of production volume of such commodities, i.e. cocoa, coffee, coconut oil; cassava, etc. are as summarized in Table A.4-10.

Table A.4-10 Ranking of Cash Crop Trade in the World (2005)

Cocoa		**Indonesia**			**Sulawesi**			
Rank	County	Volume ('000 tons)	Share (%) In Volume	Value (US$ Million)	Sulawesi Volume ('000 tons)	Sulawesi Value ($ Million)	Share (%) In Volume	Share (%) In Value
1	Cote d'Ivore	1,351	39					
2	**Indonesia**	572	16	595	351	346	62	58
3	Ghana	497	14					
4	Nigeria	361	10					
5	Brazil	155	5					
	Others	535	15					
	World Total	3,471	100				10	
Coconut Oil (CNO)		**Indonesia**			**Sulawesi**			
Rank	County	Volume ('000 tons)	Share (%) In Volume	Value (US$ Million)	Sulawesi Volume ('000 tons)	Sulawesi Value ($ Million)	Share (%) In Volume	Share (%) In Value
1	Philippines	1,184	60					
2	**Indonesia**	497	25	170	292	115	60	67
	Others	319	15					
	Total	2,000	100				15	
Coffee		**Indonesia**			**Sulawesi**			
Rank	County	Volume ('000 tons)	Share (%) In Volume	Value (US$ Million)	Sulawesi Volume ('000 tons)	Sulawesi Value ($ Million)	Share (%) In Volume	Share (%) In Value
1	Brazil	1,987	32					
2	Vietnam	793	13					
3	**Indonesia**	793	13	274	4	7	0.5	2.5
4	Colombia	694	11					
5	Mexico	310	5					
	Others	1,632	26					
	World Total	6,209	100				0	

Source: FAO Statistics

It is worth to be noted that the volume of crustaceans (sea cucumber) produced in and exported by Sulawesi is ranked at 5 in the world ranking. The unit value of the crustaceans exported from Sulawesi (US$ 6,900 per ton) is quite high and its volume is ranked at top in the rank of unit price of commodities exported from Sulawesi.

As shown in the above table, Indonesia's share in the trade volume of cocoa, coconut oil, coffee, and crustacean are quite significant and the Sulawesi's share in the total export volume of Indonesia is also quite significant especially in the export of cocoa and coconut oil. Although the presence of coffee produced in Sulawesi is not significant in terms of export volume, the unit price of coffee produced in Sulawesi or Tana Toraja is much higher than the average price of Indonesian coffee and its quality is a leading force for increased volume of coffee export of Indonesia as a whole.

2) Mining and Mineral Products (Nickel)

The major mining and mineral products produced and exported by both Indonesia and Sulawesi is the nickel and its processed ferro-alloy product. Table A.4-11 shows the ranking of nickel produced and exported in the world.

Table A.4-11 Ranking of Nickel Trade in the World (2005)

Nickel Ore		**Indonesia**			**Sulawesi**			
Rank	County	Volume ('000 tons)	Share (%) In Volume	Value (US$ Million)	Sulawesi Volume ('000 tons)	Sulawesi Value ($ Million)	Share (%) In Volume	Share (%) In Value
1	Russia	315	21					
2	Australia	210	14					
3	Canada	196	13					
4	**Indonesia**	140	9	1,932	33	455	24	24
5	New Caledonia	122	8					
	Others	517	34					
	Total	1,500	100	962				

Source: U.S. Geological Survey, Mineral Commodity Summaries, January 2006 and cargo loading data of Sulawesi Southeast.
Note: Unit price of Nickel ferro-alloy is assumed at US$ 13,800 as of 2005.

In 2006, world demand for primary nickel was at an all-time high, with most nickel producers operating at a full capacity. Primary nickel demand in the world was reported to be around 1.0 million tons. Demand was buoyed by spiraling apparent consumption in China, which was risen to 150,000 tons from 43,400 tons in 1999. China is ranked at the second largest consumer of primary nickel in 2006. China was the world's leading consumer of stainless steel since 2004, accounting for almost 20% of world stainless steel consumption. China has a large electroplating industry and a number of rechargeable battery manufacturers that use nickel as well.

(4) Inter-regional Trade of Sulawesi

The island of Sulawesi is located at the center part of Eastern Indonesia. This geographical condition makes Sulawesi as the gateway to or hub of Eastern Indonesia in general and to and from Northeastern Indonesia in particular. This geographical advantage given to Sulawesi should be strategically utilized not only for the development and betterment of economy of Sulawesi but also for Eastern Indonesia as a whole.

The major commodities traded with Eastern Indonesia are as shown in Table A.4-12.

Table A.4-12 Volume of Trade in Region by Sulawesi

Export Product	Volume (tons)	Origin Port
Agriculture Products		
Rice	213,000	Makassar
Wheat flour	9,450	Makassar
Molasses	13,000	Gorontalo
Animal feed	47,000	Gorontalo
Corn	32,000	Gorontalo
Vegetable oil	23,300	Bitung
Fruits and vegetables	5,300	Makassar
Wood processed	24,000	Makassar
Mining Products		
Rock and stones	955,000	Pantloan
Cements	954,000	Bringkasi

Appendix 5

SUMMARY RESULTS OF PCM HELD IN MANADO

(1) Summery of Seminar Results

First seminar on ITR was held in Manado on 5th June, 2007 with the participants form central and local government, NGOs and other relevant stakeholders.

Group discussion was conducted in the seminar and the discussion results integrated with ITR is summarized hereunder.

Attendant list and detailed discussion results by group were attached.

Table A.5-1 Summary Results of Discussions in Seminar

Results in Group Discussions		Reflection for ITR
Suggestion by participants	Discussions	
Strategy 3 Economic growth on the basis of Regional Economic Bloc is inappropriate.	Development policy by each province should be respected.	JST intended to recommend the utilization of existing economic linkage between provinces for the economic growth. Therefore, JST amended the title of strategy 3 with "Economic Growth on the basis of the Existing Economic Linkage"
Transportation access to the isolated area and remote islands is necessary to study.	For shipment of agricultural and fishery products, transportation access is important from the poor area to improve the economic condition.	The Study is targeting only the arterial road network development. However, importance of collector road network in the rural areas is understood and considered to some extent in the further steps of the Study.
Several road development/improvement proposals were cited; • The south coastal arterial road from Bitung to Gorontalo should be given high priority. • North-South crossing roads connecting north coast area with the south coast area such as Boul-Moutang road should be developed in Gorontalo Province. • Road improvement to/from Mamasa in the West Province, etc.		JST will pay due attention on the road development and improvement proposals identified in the seminar in the further steps of the Study.

Attendant List

Manado – Gorontalo Group

Organization	Name
Bappeda Sulut	Ir. Alex J. Wowor, M.Si, Ir. Jean Liwoso, Elvira M. Katuuk
Bappeda Gorontalo	Ir. Usman Uge, M.Si
Bapedalda Sulut	Deis Onibala, Man Kaweangin, Nike Mamahit, Robin Taubalean
Bapedalda Gorontalo	Drs. Riswan Kiu, MTD
Perhubungan Sulteng	Drs. Yasin Alimin, M.Si
Perhubungan Sulut	Marnalom, Frans S Kalangi,
Kimpraswil Sulut	JE Kenap
Kimpraswil Gorontalo	Ir. Iwan Mokoginta
Bina Marga Pusat	Sudibya W
Bappenas	Uke M. Hussein
Departemen Perhubungan	A. Wahyudi
Pekerjaan Umum (Biro)	Ing Wing K
Bina Marga Pusat	Yany Agustin

Palu – Mamuju – Luwuk Group

Organization	Name
Bappeda Sulteng	Ir. Richard Tandaju, M.Si
Bappeda Sulbar	Dr. Ir. Akhsan Djalaluddin
Bapedalda Sulteng	Drs. Rifai Lof
Bapedalda Sulbar	Drs. Muh. Ilyas
Perhubungan Sulbar	Drs. Hasanuddin T, MM
Perhubungan Gorontalo	Ir. H. M. Jamal Nganro, M.Si
Kimpraswil Sulteng	Ir. Yanmart Nainggolan, CES
Kimpraswil Sulsel	Ir. H. Faisal Lukman, MT
Bina Marga Pusat	Rien Marlia
Bappenas	S. Budiharsono
Perhubungan	Abdul Muis

Makassar – Kendari Group

Organization	Name
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Bappeda Sultra	Drs. Suharno
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Detailed Discussion Results by Group

(Manado – Gorontalo Group)

Provinces	Potentials	Problems	Existing Policy
North Sulawesi	- Gold Mining - Agriculture - Strategic Position - Rare Animal - Fishery in border islands - Tourism	- Accident rate in the road is high - Number of traffic is not balanced with the existing road capacity - Crossing north-south road networks is not yet available - Still many isolated areas - Sector-oriented, region oriented - Border area is still undeveloped and not yet taken into account in this study	- Laws No. 38 of 2006 regarding Road - Ministerial Regulation No.: 5 and 376 regarding Road Status and Function - Government regulation No.: 78 regarding management of outer small islands. - Regarding empowerment of domestic sailing,
Gorontalo	- Maize Producer - Fishery and marine - Agriculture and Farming - Gold mining - Culture as tourism potential - Coconut	- Maize producer areas are not yet directly connected with marketing areas - Farmers are not yet familiar with Better maize seed. - The existing condition of Manado-Gorontalo Main road is still very bad - Transportation cost is high - Limited access to maize producers areas	- Laws No. 38 of 2006 regarding Road

Suggestion to JICA Study
1. All sectors must be taken into consideration and made as reference in formulating the master plan of arterial road of Sulawesi Island, 2. Regional Economy Development Plan should be based on plan formulated by Sulawesi Regional Development Cooperation Board (BKPRS). 3. There should be a special accelerated program to exit from the undeveloped condition, 4. Access road for maize development should also be considered by JICA Team Study 5. Boul-Moutong route should be considered to improve access between the northern coast and southern coast.

Conclusion
1. Marine transportation policy as provided in the blue book of Transportation Department needs to be considered and taken into account into the study. One of the recommendations made in the blue book is that Bitung Port should be planned as of the international port. 2. Width and access road to arterial road needs to be reviewed 3. Direct access from overseas to Sulawesi Island is very limited yet. Therefore, more international access needs to be opened for all sectors development. 4. Fishery and marine potential are necessary to be particularly developed 5. Transportation networks as planned by JICA should be connected until Sangihe Talaud Island at north of Manado. 6. Cooperation with private sector is required in order to implement the Master Plan in future. 7. Development of crossing south coastal area road should be prioritized and the development of the crossing north coastal area is put in the second priority.

Development Vision Proposal
To adopt the slogan or vision made by BKPRS.

Note: BKPRS (*Sulawesi Regional Development Cooperation Board*) was established in 2000, under the agreement of four provincial governors in Sulawesi Island with its official status based on UU. No.22/1999.
The vision of BKPRS is "Safe, prosperous and civilized island prioritizing local self-reliance or self-sufficiency in challenging globalization"

(Makassar – Kendari Group)

Potentials	Problems	Existing Policy
1. Agriculture 2. Plantation 3. Fishery & coastal marine resources 4. Mining & Gases 5. Makassar Industrial Region (KIMA)	1. Infrastructure facilities (Quality & Quantity) 2. Human resources 3. Over fishing & illegal fishing 4. Euphoria of autonomy 5. Gap of transportation mode 6. Processing for agricultural products 7. Sources of energy 8. Geographical condition (Many islands & separated) 9. Local Government Tax (PAD) 10. Unemployment 11. Product marketing 12. Distribution of population	1. Industrial core based on agricultural product 2. The quality of agricultural product 3. Integration of policies toward region & transportation mode 4. Developing quality & quantity of strategic transportation networking 5. Controlling environmental pollution 6. Regulation of PERDA (local regulation)

Suggestion to JICA Study
1. Developing of Sulawesi arterial road transportation network should consider dimension of economics and ecology (social & environmental) comprehensively 2. The core of commodity must be supported by good infrastructure such as transportation network, electric source, and communication facilities. 3. Considering current policies, which have been resulted by national, regional, and local policies, such as Tatrawil (Regional Transportation Regulation/Order), RUTR Sulawesi (Regional Spatial Plan of Sulawesi), and other policies due to BKPRS (Sulawesi Regional Development Cooperation Agency). 4. Road network transportation should also consider to the pavement quality of road, such as capacity of road reaching more than 8 tons 5. The zoning of economics regional bloc must be explained in the study method and integrated with others discipline of science. 6. Clustering and priority development of road transportation 1, 2 and 3 should consider developing of new established regions (Kabupaten). 7. Makassar Core is ok 8. Transportation in remote islands (S-E Sulawesi) should be paid attention to. 9. There is a ranch (cow) in the hinterland of Siwa.

Development Vision Proposal
Developing good quality of agricultural product supported by manufacture industries and transportation network to become a center of goods distribution domestically and internationally based on sustainable development.

(Palu – Mamuju – Luwuk Group)

Potentials	Problems	Existing Policy
Agriculture 1. Productive land (80%), marginal land (12%), and unproductive (8%) 2. Mainstay commodity (cocoa, coconut, coffee, clove, coconut/oil palm, fish, rattan, and wood) 3. Crude Palm Oil **Mining** 1. Oil and gas (**Karama** offshore oil field) 2. Coal, nickel, gold, and iron ore **Tourism** 1. Ecotourism and marine tourism 2. Mamasa's culture (similar to that of Tana Toraja)	**Agriculture** 1. Production zone cannot be reached by lack of road. 2. Developing of agriculture industry still limited 3. The area of agriculture products (sources) not necessary to be developed as industrial region/area 4. Lack of farmers human resources **Transportation** 1. The current road has no standard as an arterial road 2. Establish new road access (Kebun kopi (near Palu), Mamuju-Luwuk, Mamuju- Tana Toraja, Mamasa- Tana Toraja, Palu-Toli-Toli, and West Tappalang) **Others** 1. Lack of consideration to the new established region 2. Lack of explanations concerning on tourism potencies. 3. Energy issues 4. Telecommunication issues 5. Clean water issues 6. Financial problems 7. Geographical condition 8. Lack of synergy between local government 9. The interest of investment is low 10. The security condition	Perda (Provincial and Regency Policy)

Suggestion to JICA Study
1. Appropriate method, deciding long term plan for arterial road. 2. Blocking resulted is not supported by an appropriate method. 3. The accuracy of data and information should be verified in the field. 4. Considering to the national and provincial spatial plan (RTRWN/Province), Tatrawil and other studies resulted is needed. 5. The core of industry should be re-considered. Local small/medium industry is important. 6. Mamuju-Palu road should be Priority I. 7. Quite a lot of transmigration (28 locations x 500 HH, cacao and rice) in the southern coastal area from Luwuk to Buabuang. 8. Meat processing at Palu and Mamuju are not recommendable since no ranch the hinterland area.

Development Vision Proposal
To implement the Sustainable Development Synergy of Mamuju-Palu-Luwuk.