

Volume 2

Master Plan and Short-term Plan of Jambi Port

Part 5

Master Plan and Short-term Plan of Jambi Port

17. PORT DEVELOPMENT SCENARIO

17.1 Industrial Development Potentials

17.1.1 Economic Activity

Population of Jambi Province has stabilized at around 2.4 million (Table 17.1.1). Population density is quite low except Jambi City, the provincial capital (Table 17.1.2). Between 1993 and 2000, GRDP of Jambi Province showed an increase in both a market price and constant price calculation basis. The increase of GRDP from 1993 to 2000 was 32.0%, with the mining sector recording the highest increase of 177%. GRDP of Jambi Province reached its maximum level in 1997 at Rp3, 268,451 million in 1997. It recorded Rp3, 251,143 million in 2000, with the agricultural sector accounting for the largest portion, Rp886, 495 million or 27.3%, followed by processing industries (Rp578, 907 million, 17.8%), and the trade sector (Rp567, 762 million, 17.5%). Table 17.1.3 and 17.1.4 show the GRDP by sector and type of expenditure.

The regional income of Jambi still mainly relies on primary products such as mining, agriculture, and forest product. Natural resources have not been utilized in a sustainable manner, however. Natural forest has undergone a massive deforestation without replanting.

17.1.2 Land-use and Natural Resources

Jambi Province has the potential for food crops, horticulture plants, plantation, livestock, and forestry. Of the total area, 2,179,440 hectares (42.7%) are secondary forest and agricultural area. Non-agricultural land is 2,920,560 hectares (57.3%). Gas and oil have been exploited at 14 sites. In addition, there are 22 potential sites for coal mining. Table 17.1.5 shows the land use in Jambi Province.

Although the forestry sector is responsible for much of Jambi Province's exports, log production is decreasing due to the rapid cutting of forests without serious efforts toward reforestation. In addition, this intensified logging has destroyed forest vegetation. Major plywood factories in the province actually relies on the logs produced in Kalimantan.

Plantation, both state owned and small holders, is one of the major economic sectors of Jambi Province. Main commodities of plantation are rubber, palm tree, *cassia vera* and coconut. These products are all export-oriented.

The price of rubber has declined on the world market. In addition, productivity of the rubber plantation is low, less than 700 kilograms/hectares/year due to poor maintenance. As a result, farmers' income is very low. This is also the case with smallholder coconut plantations.

Palm tree plantation is growing rapidly, though most of it is still unproductive. It is expected to become a main plantation commodity of the province. Similarly, Jambi Province has a production capacity of 35,000 tons/year for *cassia vera*, making Indonesia one of the biggest suppliers of this product in the international market. But this commodity has not been processed directly into semi-finished products or final products. Serious efforts have not been done to add value or increase its price. Table 17.1.6 shows

Table 17.1.1 Population By District/Municipality In Jambi Province 1990 - 2000

District Municipality	Year										
	2000	1999	1998	1997	1996	1995	1994	1993	1992	1990	
Kerinci	292,255	310,762	307,437	302,332	299,784	208,349	287,046	281,252	280,620	280,017	
Buaya Tebo	-	476,594	467,988	460,078	443,509	438,634	385,845	379,628	374,742	360,402	
Sarolangun Bangko	-	485,970	470,526	463,697	442,848	439,669	373,456	368,808	362,669	350,095	
Batang Hari	191,727	424,664	415,362	413,310	397,482	394,178	367,992	345,885	337,801	325,783	
Tanjung Jabung	-	410,290	405,380	399,888	392,373	391,018	384,866	381,296	374,533	362,380	
Kota Jambi	416,841	435,821	428,232	427,095	412,280	408,111	343,322	342,920	340,747	339,786	
Merangin	251,283	-	-	-	-	-	-	-	-	-	
Sarolangun	176,771	-	-	-	-	-	-	-	-	-	
Muara Jambi	234,083	-	-	-	-	-	-	-	-	-	
Tanjung Timur	190,085	-	-	-	-	-	-	-	-	-	
Tanjung Barat	206,305	-	-	-	-	-	-	-	-	-	
Tebo	212,934	-	-	-	-	-	-	-	-	-	
Bungo	221,686	-	-	-	-	-	-	-	-	-	
Total	2,400,970.00	2,544,101.00	2,490,925.00	2,466,606.00	2,388,246.00	2,279,959.00	2,141,507.00	2,199,489.00	2,171,112.00	2,018,463.00	

Source : BPS - Statistics of Jambi Province

Table 17.12 Area And Population Density By District Municipality In Jambi Province 1990 - 2000

District/ Municipality	Area (Sq. Km)									
	2000	1999	1998	1997	1996	1995	1994	1993	1992	1990
Kerinci	4.200.00	4.200.00	4.200.00	4.200.00	4.200.00	4.200.00	4.200.00	4.200.00	4.200.00	4.200.00
Bunga Tebo	-	12.999.00	13.600.00	13.500.00	13.500.00	13.500.00	13.500.00	13.500.00	14.070.00	14.070.00
Sarolangun Bangko	-	13.850.60	14.200.00	14.200.00	14.200.00	14.200.00	14.200.00	14.200.00	14.200.00	14.200.00
Batang Hari	4.984.00	11.421.00	11.190.00	11.130.00	11.130.00	11.130.00	11.130.00	11.130.00	11.074.00	11.074.00
Tanjung Jabung	-	10.946.00	10.200.00	10.200.00	10.200.00	10.200.00	10.200.00	10.200.00	9.588.00	9.588.00
Kota Jambi	205.00	205.38	206.00	205.72	205.72	205.72	205.72	205.72	205.00	205.00
Merangin	7.820.00	-	-	-	-	-	-	-	-	-
Sarolangun	6.380.00	-	-	-	-	-	-	-	-	-
Musirajambi	5.145.00	-	-	-	-	-	-	-	-	-
Tanjab Timur	5.330.00	-	-	-	-	-	-	-	-	-
Tanjab Barat	4.870.00	-	-	-	-	-	-	-	-	-
Tebo	6.340.00	-	-	-	-	-	-	-	-	-
Bungo	7.160.00	-	-	-	-	-	-	-	-	-
Total	52.434.00	53.622	53.436.00	53.436.72	53.436.72	53.436.72	53.436.72	53.436.75	53.337.00	53.337
District/ Municipality	Population Density (person/Sq. Km)									
	2000	1999	1998	1997	1996	1995	1994	1993	1992	1990
Kerinci	70.00	73.99	73.00	72.00	71.00	69.00	69.00	67.00	67.00	66.67
Bunga Tebo	-	36.43	34.00	34.00	33.00	29.00	29.00	28.00	27.00	25.61
Sarolangun Bangko	-	35.09	33.00	33.00	31.00	27.00	27.00	26.00	26.00	24.65
Batang Hari	38.00	37.18	37.00	37.00	36.00	34.00	34.00	31.00	31.00	29.42
Tanjung Jabung	-	37.48	40.00	39.00	38.00	38.00	38.00	37.00	39.00	37.80
Kota Jambi	2.026.00	2.122.02	2.086.00	2.76	2.004.00	1.667.00	1.667.00	1.667.00	1.662.00	1.657.49
Merangin	32.00	-	-	-	-	-	-	-	-	-
Sarolangun	28.00	-	-	-	-	-	-	-	-	-
Musirajambi	38.00	-	-	-	-	-	-	-	-	-
Tanjab Timur	35.00	-	-	-	-	-	-	-	-	-
Tanjab Barat	43.00	-	-	-	-	-	-	-	-	-
Tebo	35.00	-	-	-	-	-	-	-	-	-
Bungo	30.00	-	-	-	-	-	-	-	-	-
Total	45.00	47.45	46.62	46.16	44.69	40.00	40.00	39.00	39.00	37.84

Source : BPS - Statistics of Jambi Province

Table 17.1.3 Gross Regional Domestic Product by Industrial Origin in Jambi Province
At Constant 1995 Market Price In 1995-2000
(Million Rupiah)

Industrial Origin	2000	1999	1998	1997	1996	1995	1994	1993
	1	2	3	4	5	6	7	8
1 Agriculture, Livestock, Forestry and Fishery	866,495.00	680,435.00	833,069.00	863,969.00	878,072.00	860,034.00	761,661.00	706,742.00
a. Farm Food Crops	332,287.00	335,108.00	305,275.00	315,744.00	356,204.00	344,736.00	342,413.00	337,090.00
b. Farm Estate Crops	314,727.00	307,487.00	280,579.00	261,871.00	247,393.00	314,704.00	194,532.00	178,049.00
c. Livestock and its Products	90,495.00	88,427.00	85,436.00	94,309.00	90,111.00	82,114.00	79,916.00	73,936.00
d. Forestry	118,011.00	119,406.00	133,262.00	165,256.00	159,697.00	144,340.00	121,311.00	94,678.00
e. Fishery	30,974.00	30,026.00	28,517.00	26,789.00	24,664.00	24,082.00	23,691.00	22,790.00
2 Mining and Quarrying	275,596.00	256,986.00	247,736.00	161,210.00	140,736.00	115,510.00	106,584.00	99,482.00
a. Crude Petroleum and Natural Gas	253,465.00	233,520.00	220,659.00	115,626.00	96,899.00	74,067.00	73,761.00	65,444.00
b. Non Oil and Gas Mining	-	-	-	-	-	-	-	-
c. Quarrying	22,231.00	23,466.00	27,077.00	46,084.00	43,845.00	41,442.00	34,823.00	34,039.00
3 Manufacturing Industry	578,907.00	566,804.00	560,102.00	617,947.00	568,281.00	523,413.00	445,481.00	393,394.00
a. Oil and Gas Manufacturing	-	-	-	-	-	-	-	-
- Petroleum Refinery Manufacturing	-	-	-	-	-	-	-	-
- Liquid Natural Gas	-	-	-	-	-	-	-	-
b. Non Oil and Gas Manufacturing	578,907.00	566,804.00	560,102.00	617,947.00	568,281.00	523,413.00	445,481.00	393,394.00
- Food Stuffs, Bev. And Tobacco	97,531.00	95,490.00	87,143.00	73,823.00	70,512.00	62,875.00	62,665.00	58,201.00
- Textiles, Leather Products & Footwear	3,536.00	3,401.00	2,972.00	3,437.00	3,331.00	2,969.00	2,872.00	2,769.00
- Wood Products & Other Prod. Forestry	417,033.00	410,056.00	413,304.00	459,247.00	442,362.00	401,218.00	348,621.00	302,634.00
- Paper and Printing	23,034.00	22,611.00	23,064.00	43,334.00	36,451.00	24,115.00	3,791.00	3,608.00
- Fertilizers, Chemical & Rubber	8,337.00	8,033.00	8,015.00	18,003.00	16,869.00	13,608.00	12,417.00	11,170.00
- Cement and Non Metallic Mineral	19,167.00	18,262.00	17,041.00	12,573.00	10,280.00	9,550.00	9,438.00	9,145.00
- Basic Metal, Iron & Steel	-	-	-	-	-	-	-	-
- Goods for Metals, Machine and its other Access	3,482.00	3,428.00	3,409.00	2,977.00	2,467.00	2,485.00	2,271.00	2,443.00
- Other Product Manufacturing	5,786.00	5,534.00	5,152.00	4,453.00	3,779.00	3,593.00	3,405.00	3,303.00
4 Electricity and Water Supply	31,495.00	30,294.00	27,288.00	24,638.00	22,874.00	21,802.00	19,085.00	16,504.00
a. Electricity	24,537.00	23,232.00	20,746.00	18,235.00	16,370.00	15,890.00	13,733.00	11,657.00
b. Gas	-	-	-	-	-	-	-	-
c. Water Supply	7,308.00	7,062.00	6,542.00	6,393.00	6,504.00	5,912.00	5,346.00	4,848.00
5 Construction	69,005.00	96,407.00	116,099.00	200,021.00	195,484.00	182,150.00	172,816.00	169,931.00

6	Trade, Hotel and Restaurant	567,762.00	556,966.00	535,357.00	606,579.00	560,390.00	511,663.00	473,922.00	422,669.00
	a. Wholesale & retail Trade	499,033.00	490,878.00	472,181.00	541,933.00	500,300.00	454,746.00	418,128.00	369,670.00
	b. Hotels	9,892.00	10,446.00	10,309.00	9,699.00	7,173.00	6,654.00	6,872.00	6,356.00
	c. Restaurant:	56,897.00	55,642.00	52,867.00	54,947.00	52,917.00	20,264.00	48,919.00	47,443.00
7	Transportation and Communication	347,017.00	334,364.00	322,052.00	327,583.00	309,743.00	292,476.00	263,322.00	247,508.00
	a. Transportation	319,836.00	309,221.00	299,369.00	305,987.00	289,436.00	273,257.00	245,061.00	230,800.00
	- Train Transportation	-	-	-	-	-	-	-	-
	- Road Transportation	224,500.00	216,690.00	206,899.00	201,628.00	187,653.00	175,065.00	160,405.00	149,714.00
	- Sea Transportation	45,288.00	44,977.00	43,240.00	40,523.00	37,417.00	32,868.00	25,528.00	23,908.00
	- Air Transportation	25,482.00	24,604.00	23,639.00	24,768.00	24,658.00	24,902.00	24,744.00	24,749.00
	- Communication	6,974.00	6,543.00	6,976.00	6,533.00	6,733.00	6,447.00	6,267.00	6,079.00
	b. Communication	16,912.00	16,408.00	18,515.00	18,578.00	30,375.00	29,775.00	27,836.00	25,750.00
	- Post and telecommunication	27,172.00	25,142.00	22,683.00	21,516.00	20,306.00	19,220.00	18,261.00	16,707.00
	- Communication Service	26,860.00	24,944.00	22,514.00	21,587.00	20,151.00	19,074.00	18,127.00	16,585.00
	- Financial Ownership & Business Service	203.00	196.00	169.00	159.00	155.00	146.00	135.00	123.00
8	Financial Ownership & Business Service	139,064.00	128,761.00	126,337.00	151,070.00	143,110.00	196,693.00	181,633.00	127,481.00
	a. Banking	24,227.00	18,154.00	16,717.00	54,710.00	51,813.00	30,438.00	29,650.00	26,500.00
	b. Financial institution non banking	13,368.00	13,660.00	14,705.00	22,578.00	21,301.00	18,981.00	17,497.00	16,283.00
	c. Ownership of dwelling	97,111.00	92,941.00	91,090.00	89,776.00	86,311.00	83,890.00	81,478.00	79,119.00
	d. Business Service	4,178.00	4,006.00	3,867.00	4,106.00	3,685.00	3,384.00	3,257.00	3,209.00
9	Service	339,512.00	390,084.00	321,887.00	315,024.00	306,453.00	299,555.00	288,072.00	280,621.00
	a. Public Administration and Defence	266,924.00	269,068.00	254,904.00	252,175.00	246,695.00	239,117.00	231,104.00	226,518.00
	- Public Administration and Defence	266,924.00	269,068.00	254,904.00	252,175.00	246,695.00	239,117.00	231,104.00	226,518.00
	- Other Public Service	-	-	-	-	-	-	-	-
	b. Non Government	68,588.00	70,015.00	66,983.00	62,849.00	59,758.00	57,738.00	55,918.00	53,103.00
	- Social and Community Service	42,060.00	41,160.00	39,055.00	34,527.00	30,305.00	29,370.00	28,125.00	27,812.00
	- Amusement and Recreation service	5,061.00	3,060.00	4,964.00	5,109.00	6,044.00	5,790.00	5,729.00	5,662.00
	- Personal and Household Service	21,266.00	25,795.00	22,964.00	23,213.00	23,109.00	22,578.00	23,064.00	21,630.00
	Crises Domestic Regional Product	3,251,213.00	3,181,103.00	3,091,527.00	3,268,451.00	3,145,343.00	2,890,598.00	2,664,626.00	2,463,268.00

Source: BPS - Services of Final Provider

Table 17.1.4 Gross Domestic Regional Product by Type Of Expenditure In Jambi Province
At Constant 1993 Market Price In 1993 - 2000
(Million Rupiah)

Type Of Expenditure	2000	1999	1998	1997	1996	1995	1994	1993
1 Private Consumption Expenditure	2,042,575.00	1,963,628.00	1,796,124.00	1,738,732.00	1,679,815.49	1,559,430.00	1,452,485.00	1,377,597.00
a. Food	1,433,078.00	1,393,140.00	1,297,247.00	1,285,179.00	1,178,828.24	1,143,857.00	1,088,379.00	1,084,355.00
b. Non Food	609,477.00	596,488.00	509,877.00	523,553.00	500,987.25	469,372.98	364,106.00	343,262.00
2 Private Non Profit Institution Consumption Exp.	20,145.00	17,972.00	16,861.00	15,499.00	14,266.00	13,057.00	12,131.00	11,326.00
3 Government Consumption Expenditure	750,645.00	476,051.00	365,957.00	332,932.00	336,717.00	314,378.00	299,976.00	287,742.00
4 Gross Domestic Fixed Capital Formation	418,111.00	663,858.00	732,284.00	908,555.00	983,977.00	908,784.00	852,161.00	714,068.00
5 Change In stock	66,945.00	66,920.00	81,785.00	99,834.00	80,682.00	65,114.00	59,823.00	54,882.00
6 Export	1,466,245.00	1,063,498.00	1,460,996.00	1,500,146.00	1,331,351.00	1,237,077.00	1,108,199.00	928,763.00
7 Import	1,513,454.00	1,092,815.00	1,304,479.00	1,437,246.00	1,261,407.00	1,201,342.00	1,120,149.00	911,416.00
a. Antar Negara	80,456.00	271,425.00	310,871.00	191,344.00				
b. Antar Provinsi	1,432,998.00	821,390.00	993,608.00	1,245,902.00				
Gross Domestic Regional Product	3,251,222.00	3,161,108.00	3,091,527.00	3,246,452.00	3,146,342.12	2,890,598.13	2,664,626.00	2,463,569.00

Source : BPS - Statistics of Jambi Province

Table 17.1.5 Land use of Jambi Province

Year 1990 - 2000 (ha)	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Wetland	250,217.00	248,823.00	246,124.00	250,140.00	246,605.00	244,761.00	215,023.00	219,942.00	187,788.00	196,998.00	209,492.00
Dryland	5,099,395.00	5,104,749.00	5,098,446.00	5,023,437.00	5,096,625.00	5,099,811.00	5,128,549.00	5,123,556.00	5,809,957.00	5,146,540.00	5,194,049.00
- Land for Housing	152,068.00	147,886.00	144,141.00	142,824.00	121,493.00	130,782.00	121,997.00	136,406.00	110,817.00	162,941.00	166,373.00
- House Garden and Shifting Cultivation	565,745.00	515,942.00	493,527.00	445,418.00	458,663.00	472,194.00	476,453.00	7,800,479.00	547,514.00	471,444.00	480,675.00
- Pasture Land	20,911.00	16,287.00	15,224.00	13,753.00	19,095.00	14,984.00	14,984.00	15,995.00	18,095.00	26,753.00	26,366.00
Dyke	355.00	4,579.00	533.00	340.00	303.00	35,749.00	5.00	1,872.00	1,344.00	1,227.00	2,037.00
- Water Pond	9,907.00	3,961.00	3,905.00	4,252.00	3,930.00	19,661.00	10,297.00	17,811.00	5,693.00	5,601.00	6,316.00
- Unutilized land	204,155.00	237,375.00	256,700.00	257,460.00	224,989.00	201,664.00	181,998.00	1,289,370.00	192,437.00	188,237.00	249,335.00
- Land With Crown Wood	313,785.00	417,611.00	511,137.00	458,735.00	508,779.00	574,460.00	441,876.00	549,269.00	598,919.00	543,483.00	656,151.00
People Forest Land	1,935,699.00	2,083,392.00	1,827,394.00	1,750,698.00	2,073,091.00	2,025,611.00	2,311,228.00	1,460,984.00	2,720,726.00	2,098,813.00	1,595,954.00
Total	8,546,197.00	8,770,625.00	8,556,133.00	8,867,102.00	8,747,895.00	8,616,060.00	8,902,368.00	10,467,858.00	9,803,050.00	8,842,537.00	8,768,748.00

Source: BPS - Statistics of Jambi Province

Table 17.1.6 Forest Area by Function

1990/1991 - 2000/2001 (ha)	2000/2001	1999/2000	1998/1999	1997/1998	1996/1997	1995/1996	1994/1995	1993/1994	1992/1993	1991/1992	1990/1991
Forest Function	2300/2001	1999/2000	1998/1999	1997/1998	1996/1997	1995/1996	1994/1995	1993/1994	1992/1993	1991/1992	1990/1991
Production Forest	1,278,700	1,212,190	1,349,194	1,386,694	1,436,244	1,429,245	1,429,245	1,429,245	1,436,244	1,436,198	1,436,200
Protected Forest	191,190	191,190	197,134	161,654	181,244	181,244	181,244	181,244	181,244	181,244	181,200
Junggle	679,120	676,120	679,124	741,144	677,344	642,944	642,944	642,944	642,944	642,944	602,900
Discontinuous Woods	-	-	42,674	422,275	422,275	454,466	511,474	511,474	521,253	668,424	726,800
Total (Ha)	2,148,950	2,179,440	2,647,114	2,566,301	2,917,876	2,667,812	2,724,442	2,724,442	2,741,553	2,688,718	2,947,200

Source: BPS - Statistics of Jambi Province

Table 17.1.7 Condition of National, Provincial and District/Municipality Roads in Jambi Province
Year 1990 - 2000

District/ Municipality	Condition	Year											
		2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990	
Kerinci	Good	447.44	226.14	491.41	491.50	501,035.00	378,540.00	365.58	368.52	370.47	156.21	30.50	
	Moderate	284.98	206.03	49.06	49.06	156,826.00	127,580.00	61.43	174.84	-	68.70	179.65	
	Damaged	153.70	149.00	83.32	83.23	59,227.00	58,330.00	77,200.00	136.29	172.68	154.75	14.50	
	Badly Damaged	258.42	234.92	125.30	135.30	29,661.30	126,910.00	185.10	-	114.75	46.90	-	
Bungo Tebo	Good	310.45	302.12	851.74	821.74	775,855.00	611,275.00	612.38	573.60	518.39	164.31	168.70	
	Moderate	609.86	485.65	84.46	84.46	291,750.00	273,750.00	209.25	264.84	-	80.00	240.80	
	Damaged	461.41	606.82	152.74	152.74	609,591.00	334,375.00	64.50	756.47	269.53	689.53	9.68	
	Badly Damaged	774.50	816.32	830.33	830.33	304,796.00	763,875.00	1,098.75	-	585.43	30.00	-	
Sariko	Good	472.48	439.67	1,024.98	1,024.98	858,589.00	687,839.00	670.84	745.47	720.13	302.07	165.14	
	Moderate	825.14	775.71	183.68	183.68	829,469.00	567,670.00	562.37	418.01	-	179.23	239.70	
	Damaged	842.06	520.91	428.60	428.60	228,357.00	193,826.00	23.30	652.77	444.88	399.75	130.26	
	Badly Damaged	351.80	415.87	295.80	295.80	157,622.00	387,468.00	582.42	12.00	711.82	124.70	-	
Batang hari	Good	187.89	427.60	725.66	690.96	699,100.00	593,455.00	560.38	616.54	411.69	100.46	179.03	
	Moderate	212.79	275.41	106.11	106.11	413,773.00	370,033.00	286.99	310.49	-	305.50	172.70	
	Damaged	356.72	597.57	247.59	247.59	216,529.00	136,595.00	50.53	420,902.00	510.49	315.50	8.00	
	Badly Damaged	96.90	138.60	268.72	368.72	108,265.00	919,055.00	451.85	-	372.35	157.95	-	
Tanjung jabung	Good	90.13	137.37	506.46	506.46	73,757.00	338,048.00	346.81	382.93	353.33	588.95	59.00	
	Moderate	397.95	391.06	25.13	25.13	161,708.00	105,500.00	60.20	10.00	-	65.02	145.00	
	Damaged	455.26	245.35	124.78	54.88	392,837.00	211,864.00	45.30	721.34	39.00	397.26	21.80	
	Badly Damaged	364.46	242.23	391.18	331.38	166,418.00	530,140.00	622.68	-	665.54	-	-	
Kots Jambi	Good	333.61	275.75	245.48	230.78	396,311.00	325,395.00	324.37	322.75	322.34	219.64	32.20	
	Moderate	59.32	28.96	23.32	14.16	16,459.00	14,250.00	14.00	14.50	-	55.91	-	
	Damaged	59.96	53.77	38.57	33.05	26,050.00	36,945.00	0.25	119.40	14.50	39.36	-	
	Badly Damaged	212.06	208.87	198.73	198.73	75,050.00	83,869.00	120.07	-	119.81	-	-	
Total	Good	1,842.00	1,808.65	3,849.73	3,766.42	3,305,647.00	2,994,533.00	2,880.37	2,959.31	2,696.35	1,331.64	634.97	
	Moderate	2,389.44	2,162.82	471.76	462.60	1,869,715.00	1,458,783.00	1,194.24	1,192.17	-	754.46	977.85	
	Damaged	2,328.11	2,214.42	1,075.40	1,000.09	1,477,591.00	970,935.00	77,383.88	422,868.26	1,251.08	1,956.25	184.24	
	Badly Damaged	2,058.14	2,056.81	2,150.06	2,160.06	781,272.30	2,211,317.00	3,060.87	12.00	2,569.70	359.55	-	

Source : BPS - Statistik of Jambi Province

the composition of the forests in Jambi.

17.1.3 Roles of River Transportation

Jambi Province has some geographical constraints for economic activities. Most of the land is mountainous terrain with many rivers, requiring bridges and water transportation. With respect to space planning, Jambi can be divided into three zones: East zone, Central zone and West zone. Inter-zone transportation network is needed to support the mobility of people and goods. Out of the 8,243 kilometers of roads in Jambi, around 10% is national roads, 14% is provincial roads and the rest is district roads. Among them, only 78% of the national roads, 25% of provincial roads and 30% of district roads can be categorized as being in a good condition (Table 17.1.7). Every one square kilometer of area in Jambi province is served only by 0.15 kilometers of road. This situation has made the region rely heavily on river transportation.

Jambi can be divided into 4 river stream areas (DAS): Batanghari, Tungkal-Mendahara and Bayangkincir, and Jujuhan. The catchment area of Bayangkincir mainly belongs to South Sumatra. River transportation is developed alongside Batanghari River and its small rivers, because most parts of Jambi from Kerinci *District* to Berhala Bay belong to Batanghari DAS. This river serves to transport forest and plantation products. Some of the river ports have become centers of economic activities serving district/sub-district areas along the rivers. Due to sedimentation and tidal movement, some rivers are not navigable. Major ports are Jambi, Muara Sabak, Kuala Tungkal, and Nipah Panjang.

Table. 17.1.8 River Ports in Jambi Province

River Ports	District/Municipality	Construction Year
Kota Jambi	Jambi Municipality	1971
Suak Kandis	Batanghari District	1971
Muara Tebo	Bungo Tebo District	1971
Nipah Panjang	Tanjung Jabung Timur District	1974
Bom Baru	Jambi Municipality	No data
Talang Duku	Jambi Municipality	No data
Kuala Tungkal	Tanjung Jabung Barat District	1978
Kampung Laut	Tanjung Jabung District	1978
Sei Bengkal	Bungo Tebo District	No data
Sungai Puding	Tanjung Jabung Timur District	1978
Muara Jambi	Muaro Jambi District	1994
Muara Bulian	Batanghari District	1994
Sungai Lokan	Tanjung Jabung District	1998
Teluk Buan/Rantau Indah	Tanjung Jabung Timur District	2000

Source: Transportation Division of Level I, 2001

Table 17.1.9 Major Ports in Jambi Province

Ports	Location	Function
Talang Duku	Jambi Municipality	Export and import port
Muara Sabak	Tanjung Jabung Barat District	Export and import port
Kuala Tungkal	Tanjung Jabung Barat District	Export port and ferry serving distribution and contribution inter provinces.
Nipah Panjang	Tanjung Jabung District	Local Port

Source: City Planning, 1999/2000

Currently, trade activities are mostly carried out in Talang Duku Port. In addition to the major ports mentioned above, cargo handling is carried out at many special wharves (DUKS) along the Batanghari River and Pengabuan River. Actually, container throughput of the special wharves is larger than that of Talang Duku Port.

Table 17.1.10 Export Volume of Jambi Province by Port 1996-1998 (Tons)

Ports	1996	%	1997	%	1998	%
Kuala Tungkal	259,773	33.16	197.135	26.5	284.183	35.18
Muara Sabak	309,529	39.51	264.197	35.64	261.600	32.39
Jambi	213,611	26.80	276.847	37.34	258.635	32.02
Kampung Laut	79	0.01	2.996	0.40	2.339	0.29
Nipah Panjang	325	0.04	-	-	5	0.00
Kuah Pkl.Duri	-	-	-	-	-	-
Simbur Naik	-	-	-	-	-	-
Total	783,317	100.00	741,175	100.00	1,093,545	100.00

Source: BPS of Jambi Province

River ports in Jambi Province suffer from shallow stream and many sharp bends. As a result, vessel navigation greatly depends on the tide condition. Despite this, international trade has been increasing. Exports from Jambi in 1999 reached 1,020,433 tons with a value of US\$ 445,288,000. Between 1990 and 1999, exports increased by 158% in volume and by 95% in value. Imports in 1999 reached 90,434 tons with a value of US\$ 41,768,000. During the same period, import showed an increase of 158% in volume and an increase of 14% in value.

17.1.4 Capital Investments

Economic development of Jambi has heavily relied on natural resources. Provincial and municipal government have tried to attract investors. Recently, investment in several sectors is increasing including agriculture, fishery, agro industry, simple fishery processing, and mining.

Free trade agreement of ASEAN (AFTA), which will come into effect in 2003, is an opportunity to promote Jambi to the world market. With an open economic policy, Jambi province could invite more investment. In line with the decentralization process currently underway, Jambi Province should properly respond to this huge task.

Table 17.1.11 Domestic Capital Investment in 2000

Sector	Domestic Investment	
	Plan (Million Rp)	Realization (million Rp)
Plantation	3,109,128	1,405,165
Agricultural products	-	-
Forestry	274,022	614,880
Food Industry	380,363	24,479
Timber Industry	2,452,704	996,211
Chemical Industry	445,691	208,711
Basic Metal Industry	36,900	18,500
Pulp and Paper Industry	19,176,148	3,795,730
Tourism	1,660	-
Transportation	125,350	-
Mining	33,752	33,752
Mining services	108,343	729
Total	26,167,785	7,065,381

Source: BPS, 2000.

Domestic capital investment in 2000 fell far short of the target amount (Table 17.1.11). In particular, there was a dearth of investment in forestry-related industries such as, timber, pulp, and paper. All in all, only 27% of the planned investment was realized. Foreign capital investment records show similar trends. Forestry and agriculture account for a major part of the foreign investment. Actual investment in 2000 was equivalent to only 13% of what was planned.

Table 17.1.12 Foreign Capital Investment in 2000

Sector	Foreign Investment	
	Investment Plan (Million Rp.)	Investment Realization (Million Rp.)
Plantation	2,261,449	207,328
Food Industry	49,903	4,725
Timber Industry	2,493,932	340,560
Chemical Industry	41,680	370,341
Electricity	865,785	-
Telecommunication Service	181,968	116,392
Tourism	43,500	37,031
Total	5,938,219	743,728

Source: BPS, 2000

Due to its strategic location, Jambi Province can expect a positive economic impact of the growth triangle including Malaysia and Singapore. Batam (one of PKN, national activity center) can be a node of the growth triangle and its economic impacts will be felt in Jambi Province. The city plan of Jambi identified two areas requiring priority in development (Table 17.1.13).

Table 17.1.13 Priority Development Areas in Jambi Province

Province/Land Area	Related Sea Area	City in Land Area	National City Function
Muara Bulian Area and Surrounding Mainstay Sectors: -Industry -Plantation -Tourism -Food Crop -Fishery	Riau Mainstay Sector: Fishery Mining Tourism Orientation City: Kuala Tungkal	Jambi	PKW
		Muara Bulian	PKL
		Kuala Tungkal	PKL
		Muara Tembesi	PKL
		Muara Sabak	PKL
		Nipah Panjang	PKL
Muara Bungo and Surrounding Mainstay Sectors: -Plantation -Food Crop -Forestry		Muara Bungo	PKL
		Bangkp	PKL
		Sarolangun	PKL
		Muara Tebo	PKL
		Sungai Penuh	PKL
		Tanah Tumbuh	PKL
		Sungai Bengkal	PKL

Source: Review and Revision of City Planning of Jambi Province, 2000

PKW: Territorial Activity Center, PKL: Local Activity Center

17.1.5 Prospects of Major Sectors

(1) Mining

Mining is an important economic sector in Jambi Province, producing coal, mineral, oil and gas, marble, granite, kaolin, and limestone. Main products are oil and coal. Coal mining will become increasingly important in the coming years.

1) Coal

Coal mines in Jambi Province produced 600,000 tons in 1998 and are expected to produce 2,080,000 tons in 2003. Coal mines in Jambi are spread out in several districts: Bungo Tebo (5 sites), Sarolangun Bangko (8 sites), Tanjung Jabung (2 sites), and Batanghari (5 sites).

Coal deposits in Jambi are as follows:

- Measured deposit: 147.57 million tons in Bungo Tebo District and 36.5 million tons in Sorolangun Bangko.
- Indicated deposit: 98.1 million tons in Sarolangun Bangko and 72 million tons in Batanghari District.
- Estimated deposit: 9.75 million tons in Bungo Tebo.
- PT Sari Andara Persada produces coal in Pelepat Sub-district, Bungo Tebo District with an area of 6000 hectares. It produces an average of 8000 tons of coal per month, marketed to PT Semen Padang.

2) Oil and Gas

Table 17.1.14 Planted Area Of Smallholder Estates by Crops in Jambi Province
1990 - 2000 (ha)

Kind of Plant	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Rubber	551,525.00	554,796.00	531,325.00	538,990.00	538,634.00	520,660.00	505,443.00	501,262.00	490,453.00	459,651.00	470,896.00
Coffee	26,978.00	27,190.00	26,978.00	27,063.00	25,261.00	25,565.00	26,771.00	27,268.00	30,656.00	31,085.00	31,276.00
Candle Nut	794.00	863.00	734.00	694.00	632.00	661.00	560.00	550.00	190.00	91.00	65.00
Clove	280.00	260.00	280.00	309.00	391.00	562.00	1,015.00	1,302.00	2,591.00	5,341.00	5,339.00
Tobacco	129.00	111.00	129.00	134.00	134.00	367.00	398.00	432.00	674.00	46,489.00	276.00
Cassia vera	58,887.00	60,137.00	58,887.00	58,622.00	57,680.00	52,463.00	52,281.00	50,685.00	48,276.00	540.00	45,367.00
Tea	2,625.00	2,625.00	2,625.00	2,625.00	2,625.00	2,625.00	2,625.00	2,625.00	2,625.00	2,619.00	2,619.00
Sugar Cane	394.00	260.00	294.00	362.00	441.00	430.00	436.00	427.00	697.00	645.00	1,236.00
Kapok	189.00	63.00	189.00	180.00	194.00	186.00	188.00	158.00	177.00	127.00	120.00
Pepper	274.00	274.00	274.00	289.00	348.00	256.00	256.00	287.00	170.00	169.00	150.00
Nutmeg	-	-	-	-	16.00	17.00	17.00	17.00	17.00	27.69	27.00
Chironom	-	-	-	-	-	-	-	-	-	6.00	4.00
Cocoa	6,011.00	5,573.00	6,011.00	7,417.00	7,388.00	9,551.00	10,866.00	9,136.00	7,650.00	6,863.00	1,714.00
Coconut	129,650.00	129,599.00	129,650.00	124,619.00	117,256.00	118,401.00	118,145.90	117,225.00	116,237.00	114,401.00	113,480.00
Hybrid Coconut	5,070.00	5,070.00	5,070.00	5,798.00	4,891.00	4,120.00	6,507.00	5,236.00	5,236.00	5,335.00	4,531.00
Palm Oil	242,632.00	266,737.00	242,632.00	211,058.00	185,334.00	146,235.00	101,468.00	92,686.00	79,297.00	66,291.00	44,763.00
Aromatic Oil	-	-	-	-	-	10.00	10.00	59.00	25.00	199.00	86.00
Areca Nut	1,204.00	1,862.00	1,204.00	1,187.00	354.00	321.00	321.00	321.00	138.00	107.00	107.00
Ginger	-	-	-	-	-	15.00	68.00	145.00	205.00	-	-
Sugar Palm	741.00	736.00	741.00	741.00	741.00	729.00	724.00	724.00	422.00	-	-
Jambu Mete	-	-	-	-	6.00	6.00	6.00	6.00	6.00	-	-
Kardamon	63.00	63.00	63.00	63.00	63.00	63.00	63.00	63.00	64.00	-	-
Vanilli	43.00	42.00	43.00	51.00	124.00	243.00	75.00	6.00	-	-	-

Source : BPS - Statistics of Jambi Province

Table 17.1.15 Production of Plantation by Crops in Jambi Province
(In Ton)

Kind of Plant	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Rubber	235,925.00	230,875.00	232,345.00	229,271.00	244,267.00	288,383.00	286,986.00	195,000.00	192,442.00	175,265.00	170,878.00
Coffe	5,318.00	5,123.00	5,257.00	5,138.00	4,917.00	4,899.00	6,464.00	6,379.00	6,375.00	5,615.00	6,401.00
Candle Nut	21.00	34.00	24.00	22.00	22.00	30.00	21.00	6.00	14.00	91,520.00	101,221.00
Clove	5.00	7.00	5.00	4.00	7.54	13.00	20.00	29.00	29.00	39.00	42.00
Tobacco	33.00	63.00	34.00	55.00	144.00	70.00	21.00	558.00	238.00	189.00	50.00
Cassia vera	22,485.00	22,397.00	19,686.00	19,319.00	18,293.00	17,325.00	16,969.00	15,737.00	15,258.00	10,328.00	7,684.00
Tea	5,480.00	5,481.00	5,485.00	5,495.00	5,674.00	5,074.00	4,914.00	2,502.00	4,876.00	4,873.00	4,576.00
Sugar Cane	105.00	136.00	89.00	192.00	237.00	208.00	78.00	540.00	356.00	313.00	381.00
Kapok	63.00	63.00	65.00	65.00	67.00	69.00	160.00	6.00	15.00	10.00	9.00
Pepper	23.00	22.00	23.00	46.00	31.00	30.00	27.00	18.00	5.00	6.00	4.00
Nutmeg	-	-	-	-	2.00	1.00	-	-	-	-	-
Chincona	-	-	-	-	-	-	-	-	-	-	-
Cocoa	606.00	604.00	617.00	1,055.00	697.00	1,167.00	640.00	497.00	303.00	202.00	187.00
Coconut	121,950.00	121,528.00	121,236.00	115,709.00	115,094.00	114,887.00	114,916.00	105,372.00	97,492.00	114,916.00	98,690.00
Hybrida Coconut	440.00	440.00	435.00	704.00	702.00	2,873.00	2,889.00	1,829.00	3,266.00	3,869.00	2,523.00
Palm Oil	421,530.00	320,322.00	237,638.00	357,283.00	710,667.00	663,343.00	387,341.00	319,267.00	267,909.00	382,241.00	106,864.00
Aromatic Oil	-	-	-	-	300.00	300.00	905.00	225.00	275.00	905.00	2.00
Areca Nut	380.00	376.00	304.00	301.00	56.00	55.00	46.00	46.00	19.00	46.00	-
Ginger	-	-	-	-	-	6.00	94.00	56.00	6.00	94.00	20.00
Sugar Palm	63.00	63.00	59.00	59.00	59.00	59.00	57.00	-	59.00	57.00	3.00
Jambuj Mite	-	-	-	-	1.00	1.00	1.00	1,959.00	1.00	1.00	-
Kardamon	10.00	10.00	11.00	11.00	9.00	6.00	9.00	9.00	6.00	9.00	1.00
Vanili	32.00	-	-	-	-	-	-	-	-	-	-

Source : BPS - Statistics of Jambi Province

The oil deposit in Jambi is estimated to be 1,270,956,240 barrel, found in 12 locations in Batanghari District. Natural gas deposit is estimated to be 5,060,097,240 m³, found in 10 locations. Mineral gas deposit in Tanjung Jabung Timur District amounts to 1.2 trillion m³.

(2) Plantation

Plantation products significantly increased in volume during the period of 1993-1997. Plantation in Jambi Province comprises rubber, palm tree, coffee, tea, and cacao (Table 17.1.14, 15). Production increase is in line with an increase of the plantation area by 4.24% per year. Palm tree and rubber are main products and their plantation area has grown by 34% per year (palm tree) and 7% per year (rubber). Jambi is experiencing a gradual shift from rubber economy to palm plantation exporting crude palm oil (CPO). Production CPO in 1999 recorded 1,086,633 tons.

Jambi Province expects steady growth in plantation and forestry products, among which oil palm is expected to increase most rapidly (Table 17.1.16, 17).

Table 17.1.16 Estimate of Rubber and Forest Products of Jambi, 1998-2010

(ton/m3)

Year	Rubber	Processed Woods *)	By-product of Forest
1998	263,620	1,107,435	626
1999	281,714	1,135,121	795
2000	301,051	1,163,500	842
2001	321,714	1,192,587	893
2002	343,795	1,222,402	922
2003	367,394	1,252,962	939
2004	392,611	1,284,286	968
2005	419,559	1,316,393	1,069
2010	602,974	1,509,378	1,535

Source: BPS, Statistics of Jambi Province

*) Plywood, Lumber for Timber, Block Board, etc.

Table 17.1.17 Estimate of Plantation Products of Jambi Province, 1998-2010

(ton)

Year	Coconut	Palm Trees	Coffee	Cassia vera	Tea
1998	169,700	2,382,732	7,764	15,950	5,210
1999	174,632	3,095,635	7,806	16,559	5,252
2000	179,707	3,656,480	7,853	17,191	5,295
2001	184,930	4,104,733	7,898	17,847	5,338
2002	190,305	4,678,500	7,934	18,529	5,381
2003	195,836	5,324,600	7,988	19,236	5,425
2005	207,355	6,617,092	8,079	20,733	5,513
2010	239,325	9,847,589	8,312	25,004	5,741

Source: BPS, Statistics of Jambi Province

(3) Industry

Jambi Province is developing the industrial sector to strengthen its economic structure focusing on agricultural products processing. Most of the industry in Jambi Province produces semi-finished products such as plywood, processed woods, and rubber (Table 17.1.18). In addition, there is a pulp plant which has an annual production capacity of 300,000 tons and crude palm oil industry growing by 40% a year.

Further industrial development requires good ports which can help distribute the products both domestically and internationally. Development of river ports aiming at export and import activities will realize the following benefits:

- To support the growth of the industrial sectors which require efficient export capacity.
- To realize reduction of the transportation costs by shifting a loading port from neighboring provinces to Jambi Province.
- To provide efficient river transportation for various commodities including plantation products, forestry products, and mining products.
- To help realize the relocation of industries from industrialized nations to Jambi Province

To sum up, the prospects of the Jambi economy in the next 5-10 years are promising, particularly in mining industries and agriculture development. On the other hand, measures should be taken to preserve the existing forests since the resources have been greatly depleted. Forest preservation will lessen the siltation in the rivers and can lead to the creation of an eco-tourism industry. Human resource development is also important to help the local labor force enter high value added industries.

The competitive advantage of Jambi is the availability of various raw materials for different types of industrial development. This advantage can become greater if transportation infrastructure is properly developed.

Table 17.1.18 Value Added of Large and Medium Manufacturing Establishments
1990 - 2000 (millions Rp)

Industrial Group	Year										
	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Manufacture of food, beverage & Tobacco	942,488.90	889,316.22	282,086.60	424,771.40	89,724.07	80,666.63	-	59,536.23	9,432.25	14,999.76	9,342.15
Manufacture of Textile, Garment and Leather	651,017.19	626,264.01	168,704.65	72,135.52	71,641.78	52,737.82	-	31,168.76	7,170.79	9,460.79	7,170.79
Manufacture of Wood, rattan and willows	289,471.71	263,082.21	116,351.97	52,665.89	18,083.28	27,928.85	-	28,367.47	2,261.45	5,538.97	2,171.36
Manufacture of Chemical	1,109.14	1,007.75	513.43	444.43	67,783.30	-	-	-	-	-	-
Manufacture of Non Metallic Mineral Products	527.12	475.09	226.19	155.37	5,839.53	-	-	-	-	-	-
Manufacture of Fabricated metal product	582.01	525.66	287.24	279.86	61,389.86	-	-	-	-	-	-
Manufacture of machinery and equipment	2,528,028.65	2,177,909.62	1,161,126.03	907,338.69	919,114.46	782,116.17	-	542,058.10	392,526.97	421,306.57	352,516.91
Manufacture of Other	1,742,257.99	15,716,633.03	727,164.69	707,614.03	642,886.08	612,328.42	-	432,738.02	235,458.64	264,376.27	235,458.64
Total	785,790.66	(33,538,734.41)	433,961.44	199,744.05	286,228.38	170,317.76	-	109,337.08	1,708,682.28	2,969,802.29	117,058.28
	1,904,624.88	1,658,888.02	580,967.19	390,075.74	444,753.44	437,347.33	-	1,862,730.36	164,439.96	583,874.30	164,439.96
	1,675,086.66	1,539,811.81	438,126.37	342,267.36	378,203.06	294,151.78	-	194,983.25	129,079.65	174,432.18	129,079.65
	229,538.21	119,077.11	42,840.62	46,807.98	66,550.38	173,195.55	-	(8,131.89)	35,360.31	9,482.12	35,360.31
	2,639.36	2,343.68	2,043.24	1,372.80	56,613.72	-	-	-	-	-	-
	709.99	632.13	1,045.41	807.62	1,115.30	-	-	-	-	-	-
	1,924.57	1,715.55	1,537.63	565.38	55,498.43	-	-	-	-	-	-
	2,841.89	2,346.99	2,745.63	-	40,578.57	1,257.04	-	14,843.79	12,157.16	372.93	12,157.16
	1,475.49	1,262.98	1,279.40	-	3,530.11	394.90	-	11,038.27	6,197.64	211.97	6,197.64
	1,366.40	1,396.01	1,216.22	-	37,046.46	422.06	-	3,785.52	3,935.52	160.96	3,935.52
	883,284.10	807,679.67	3,951,807.66	332,614.45	99,611.05	41,477.29	-	-	-	-	-
	585,130.67	544,150.64	315,275.00	269,995.42	125,015.44	29,204.67	-	-	-	-	-
	288,153.43	268,489.03	3,636,532.67	62,619.33	(25,794.40)	12,271.61	-	-	-	-	-
	6,263,012.11	3,539,479.84	5,981,799.78	1,725,657.31	1,707,575.70	1,342,864.50	-	803,226.48	538,564.27	620,533.56	538,464.17
	4,666,185.12	16,429,272.69	1,499,091.49	1,392,975.32	1,226,220.30	979,027.67	-	669,958.30	379,908.72	448,411.21	379,908.71
	1,596,826.99	(12,889,792.85)	4,382,708.29	362,681.48	479,555.40	383,836.84	-	133,268.19	158,649.53	172,142.35	158,649.46

Source : BPS - Statistics of Jambi Province

17.2 Development Target

17.2.1 General Directions

The development targets for Jambi Port can be summarized as follows:

- 1) To help achieve smooth and economical flow of cargo to/from Jambi Province.
- 2) To act as an impetus for the development of new industries in Jambi Province.

Considering the present socioeconomic conditions of Indonesia as well as its policy of decentralization and privatization, the success of the development of Jambi Port depends on whether it will answer the urgent need to decrease dependence on the government sector. The central government needs to play a smaller role in the development and maintenance of port infrastructure. Since Jambi Port will continue to require maintenance dredging, a mechanism to realize sustainable port operation needs to be established. Competition with neighboring ports should be carefully examined as well to maximize the return of the port investment.

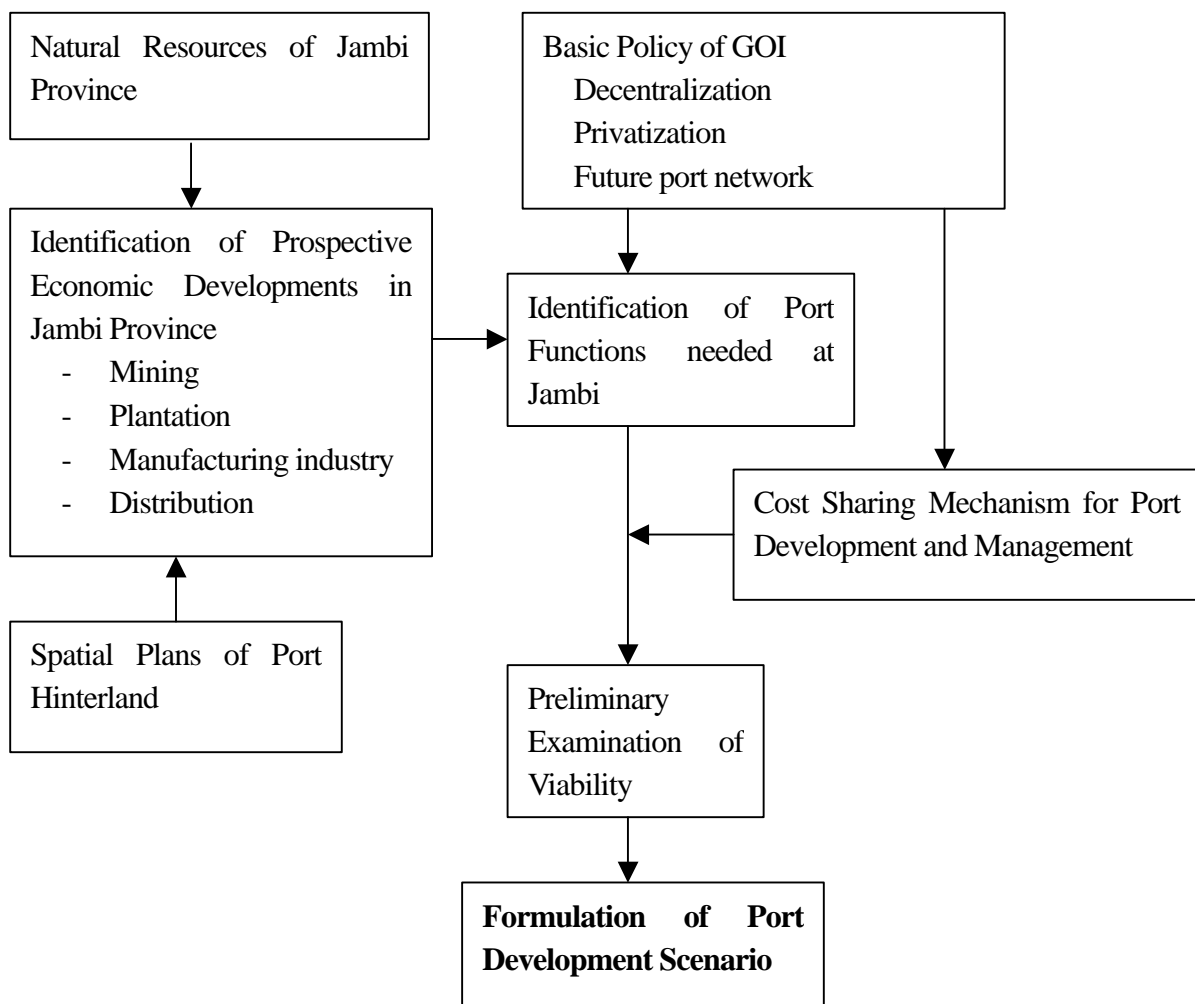


Fig. 17.2.1 Formulation of a Port Development Scenario

It is also important to determine an appropriate demarcation of roles among the ports in Indonesia. Since various port projects are underway around the principal river ports, careful examination is needed to avoid duplication of investments and to materialize balanced regional development of the country.

DGSC and IPCs are jointly preparing the Network Development Plan of Port Infrastructure in the National Port Arrangement. This was initially recommended by the JICA Study on the Port Development Strategy (March 1999). A draft plan was made available to the Study Team. The areas taken up in the study were port development, port finance and private sector participation, as well as port administration and operation. The Draft Network Development Plan basically follows the study and elaborates on the port development strategy. It identifies criteria for classifying the nation's ports. These criteria are determined according to the cargo throughput in a port. The target ports are classified in the Draft Network Development Plan as shown below. This plan classifies Jambi Port as a tertiary trunk port for most port functions.

Table 17.2.1 Roles and Functions of Jambi Port

Port functions	Hierarchy	Remarks
Container	Tertiary trunk port	Container feeder port
Conventional	Secondary trunk port	Conventional hub port
Passenger	-	-
Liquid bulk	Tertiary trunk port	Regional bulk trunk port
Dry bulk	Tertiary trunk port	Regional bulk trunk port

Source: Draft Network Development Plan of Port Infrastructure in the National Port Arrangement, 2000, DGSC/IPC's

Considering the economic activities alongside the Batang Hari River as well as the lack of an efficient road network in the province, Jambi Port needs to serve as a key transportation facility of the province. On the other hand, the shallow draft within the river and around the river mouth will not allow creation of a deep port. Consequently, the scale of port development at Jambi should be large enough to serve the economic needs of Jambi Province. However, excessive or unwarranted development needs to be avoided. This basically agrees with the port hierarchy proposed in the Draft Network Development Plan. Successful port development will bring about positive economic impacts through a sequence of events (Figure 17.2.2).

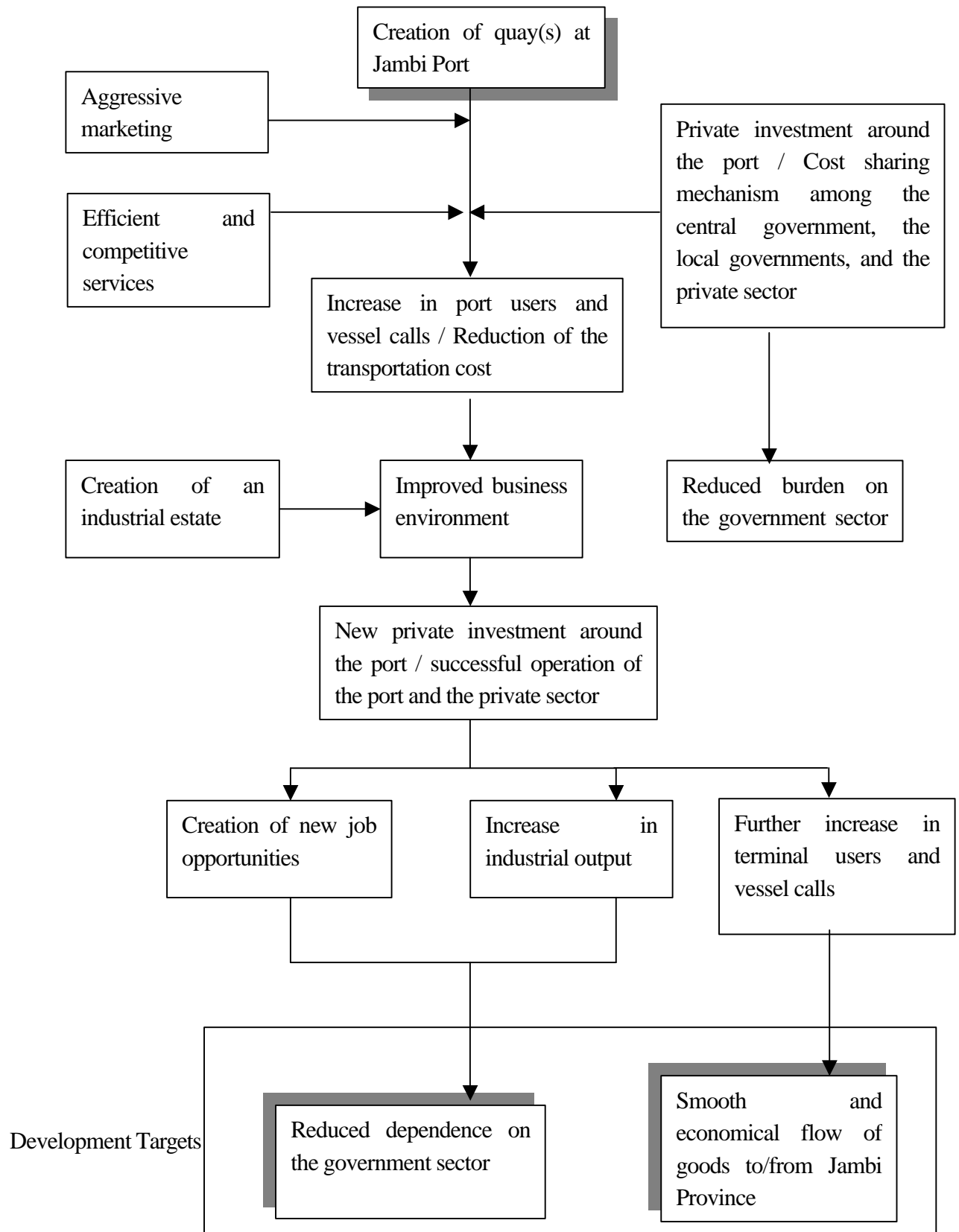


Fig. 17.2.2 Development Targets of Jambi Port

17.2.2 Container Terminal

The pace of the development of container terminals needs to be examined depending on the type of the terminal. As mentioned earlier, Jambi Port (both Talang Duku and Muara Sabak) will serve as a container feeder port catering for import/export containers of Jambi province.

Although the demand forecast of containers provides a gradually growing cargo projection, the actual demand will grow suddenly when the port succeeds in attracting a new customer (See Figure 17.2.3). The master plan is required to enable the port to respond to these requirements.

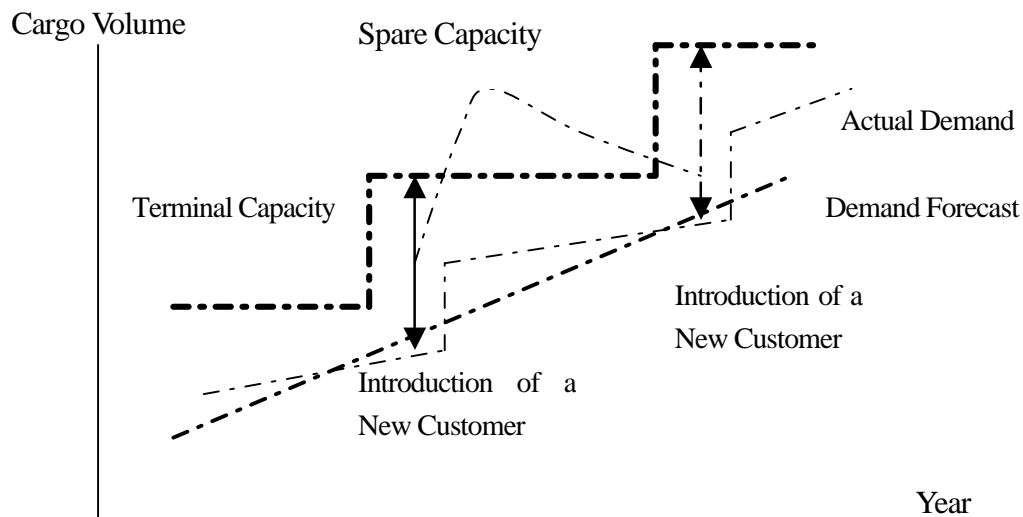


Figure 17.2.3 Demand Growth and Phased Planning

17.2.3 Conventional Terminal

Conventional terminals can act as a catalyst for regional development through providing efficient transportation of materials and products. The type and scale of the industrial development projects envisaged in the port hinterland will determine the need of the creation of additional conventional terminals. The dimensions and specifications of the conventional terminal widely differ depending on the industry it supports. Prospective industries therefore need to be identified before the planning of conventional terminals.

In Talang Duku, a new coal terminal is expected to start its operation at the end of 2001. The new bulk terminal in Talang Duku will provide a considerable capacity when it becomes operational. Consequently, the timing of further expansion of the conventional terminal needs to be carefully examined so that it can keep pace with the needs of the industrial development projects without creating an excessive capacity.

The provincial government has a development plan of an industrial estate at Parit Culum, which is within the hinterland of Muara Sabak (Figure 17.2.4). Although the development plan does not specify the industries to be developed, its targets seem to be the distribution industry and light industries (Table 17.2.2). These industries will require efficient container terminals. The Study Team learned that the provincial government hoped to invite a coal terminal to Muara Sabak. However, it

does not seem to be in line with the development strategy of Parit Culum.

Table 17.2.2 Parit Culum Industrial Development Plan up to 2010

Zone	Land Use	Area in 2005 (ha)	Area in 2010 (ha)
A1	Office	34.6	48.2
A2	Supporting Facility - Hotel - Restaurant - Hospital - Park/Sports Center	106.5	134.6
B1	Export Processing Zone (EPZ) - Custom - Insurance/Surveyor - Ready-to-use Factory Buildings	53.8	75.1
B2	Export Processing Zone (EPZ) - Container Stacking Yard - Container Storage - Truck Terminal - Railway Station - Ready-to-use Factory Buildings	186.7	343.0
C1	Factory/Production	189.6	183.7
C2	Waste Treatment - Fresh Water Treatment - Industrial Waste Treatment	24.1	33.5
C3	Factory/Production	161.4	187.1
C4	Housing	51.3	57.8

Source: Spatial Plan of Parit Culum Industrial Area, Jambi Province

Jambi Province also has a spatial plan for the Muara Sabak port area. This plan proposes that the area (374 ha) should be used for port activities, offices, and energy supply (Figure 17.2.5 and Table 17.2.3). The spatial plan of Muara Sabak focuses on the development of container handling functions and does not seem to envisage the creation of a dry-bulk handling facility.

Table 17.2.3 Land Use Plan for Muara Sabak Port Area

Zone	Area (ha)	Land use
A1	41.5	Wharf, container depot, warehouse, CFS
A2	39.3	Wharf, warehouse, CFS
A3	53.3	Wharf, warehouse, CFS, oil tank
B1	31.9	Office complex, commercial area, private facility
B2	34.5	Container depot, office complex
B3	87.7	Settlement, private facility, social facility
C1	32.9	Container depot, commercial area
C2	29.2	Truck terminal
C3	24.2	Sports yard

Source: Spatial Plan of Muara Sabak Port Area 1999-2000, Jambi Province

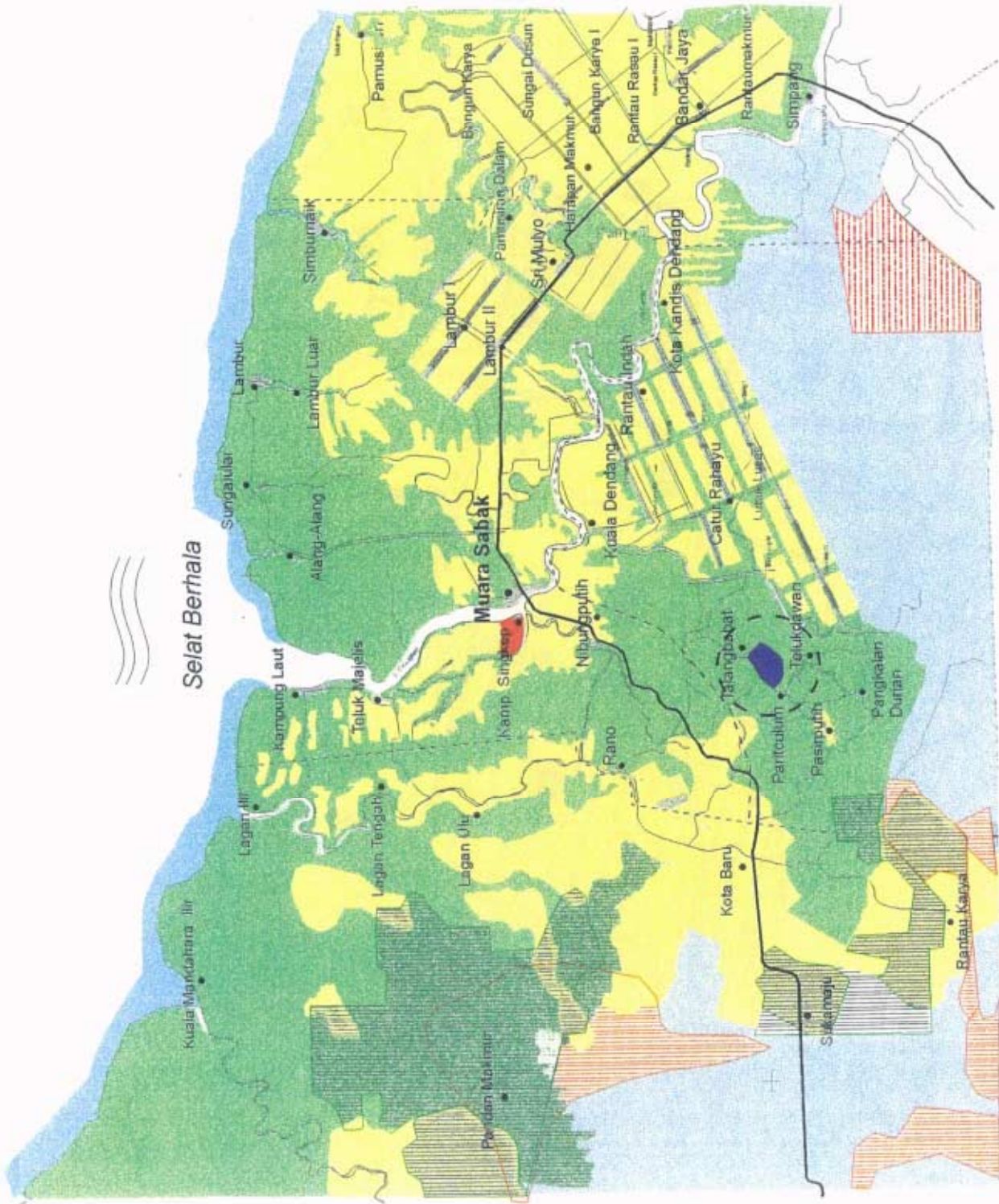


Figure 17.2.4 Muara Sabak and Its Vicinity

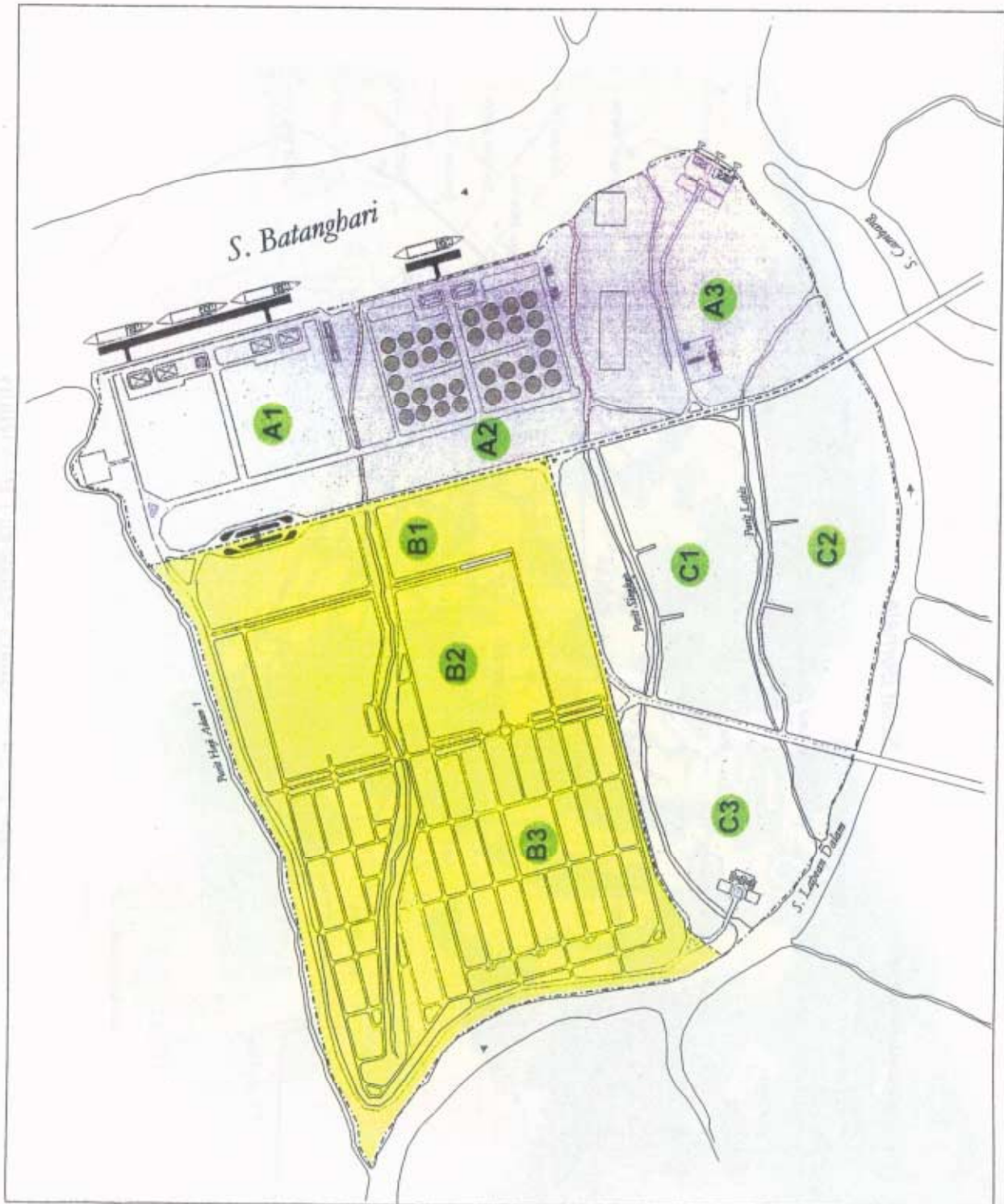


Figure 17.2.5 Spatial Plan for Muara Sabak

18. DEMAND FORECAST

18.1 Capacity of the Existing Port

In order to identify the need of port expansion, the Study Team identified the present capacity of the existing terminals. The baseline productivity (Table 18.1.1) and the maximum berth occupancy (Table 18.1.2) are the same as those used in evaluating the seven river ports.

Table 18.1.1 Baseline Productivity

Cargo Type	Productivity
General cargo	20 (t/gang/hour)
Bagged Cargo	25 (t/gang/hour)
Unitized Cargo	30 (t/gang/hour)
Liquid Bulk	120 (t/hour)
Dry Bulk	90 (t/hour)
Container (Container Terminal)	20 (TEU/crane/hour)
Container (Conventional Terminal)	10 (TEU/crane/hour)

Source: JICA Team

Table 18.1.2 Maximum Berth Occupancy

Number of Berths in the Group	Recommended Maximum Berth Occupancy (%)
1	40
2	50
3	55
4	60
5	65
6-10	70

Source: Port Development, UNCTAD

18.1.1 Talang Duku

Talang Duku has two container wharves and one general cargo wharf at present. One of the container wharves is used to handle CPO too. A coal jetty is under construction and expected to start operation toward the end of 2001 (Figure 18.1.1).

(1) Container

Existing facility: 2 berths (67m x 2, one of which is shared with CPO barges)

Average berthing time: 48 hours = 2 days (Due to the current business practice)

Working days: 365 days

Maximum cargo volume per call: 140 TEU (Due to the shallow draft)

Recommended berth occupancy ratio: 0.5 (two-berth group), 0.4 for container and 0.1 for CPO

Capacity = 2 berths x 365 days / 2 days x 140 TEU x 0.4 = 20,000 TEU

TALANGDUKU

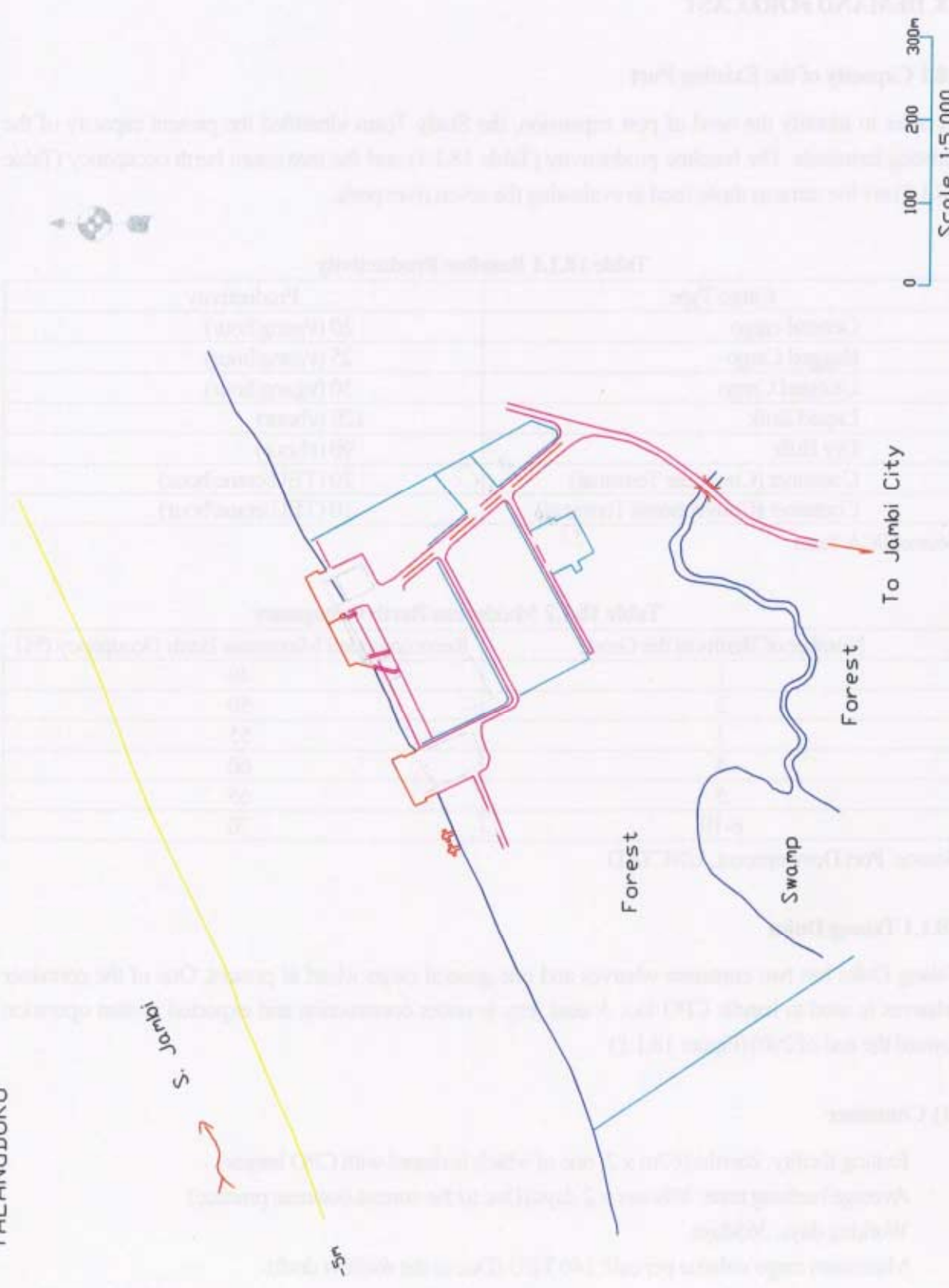


Figure 18.1.1 Present Layout of Talang Duku

Note: Talang Duku has a large container yard and thus the quayside capacity determines the overall capacity

(2) General Cargo / Bagged Cargo

Existing facility: 1berth (67m)

Gross handling productivity: 22.5t/hour/gang (general: bag=1:1)

Work time ratio: 0.8

Working days: 365days

Operation hours: 16hours (8hours x 2 shifts)

Recommended berth occupancy ratio: 0.4 (one-berth group)

Capacity = 1 berth x 365 days x 16hours x 0.8 x 22.5t/hour/gang x 2 gang x 0.4 = 84,000 t

(3) CPO

Existing facility: 1berth (67m, shared with container barges)

Net handling productivity: 400t/hour (one line)

Work time ratio: 0.8

Operation hours: 24hours

Recommended berth occupancy ratio: 0.5 (two-berth group), 0.4 for container and 0.1 for CPO, equivalent to 0.2 for one berth

Capacity = 1 berth x 365 days x 24hours x 0.8 x 400t/hour x 0.2 = 560,000 t

18.1.2 Muara Sabak

The only port facility at Muara Sabak is a jetty recently constructed with a JBIC loan. (Figure 18.1.2) Handling equipment and a marshalling yard are not provided yet. The following evaluation assumes that some yard-side equipment is made available.

(1) Container (Assuming the existing jetty is only for container)

Existing facility: 1berth (80m)

Working days: 365days

Operation hours: 16 hours (8hours x 2 shifts)

Net handling productivity: 10 TEU/hour (Conventional berth with a mobile crane)

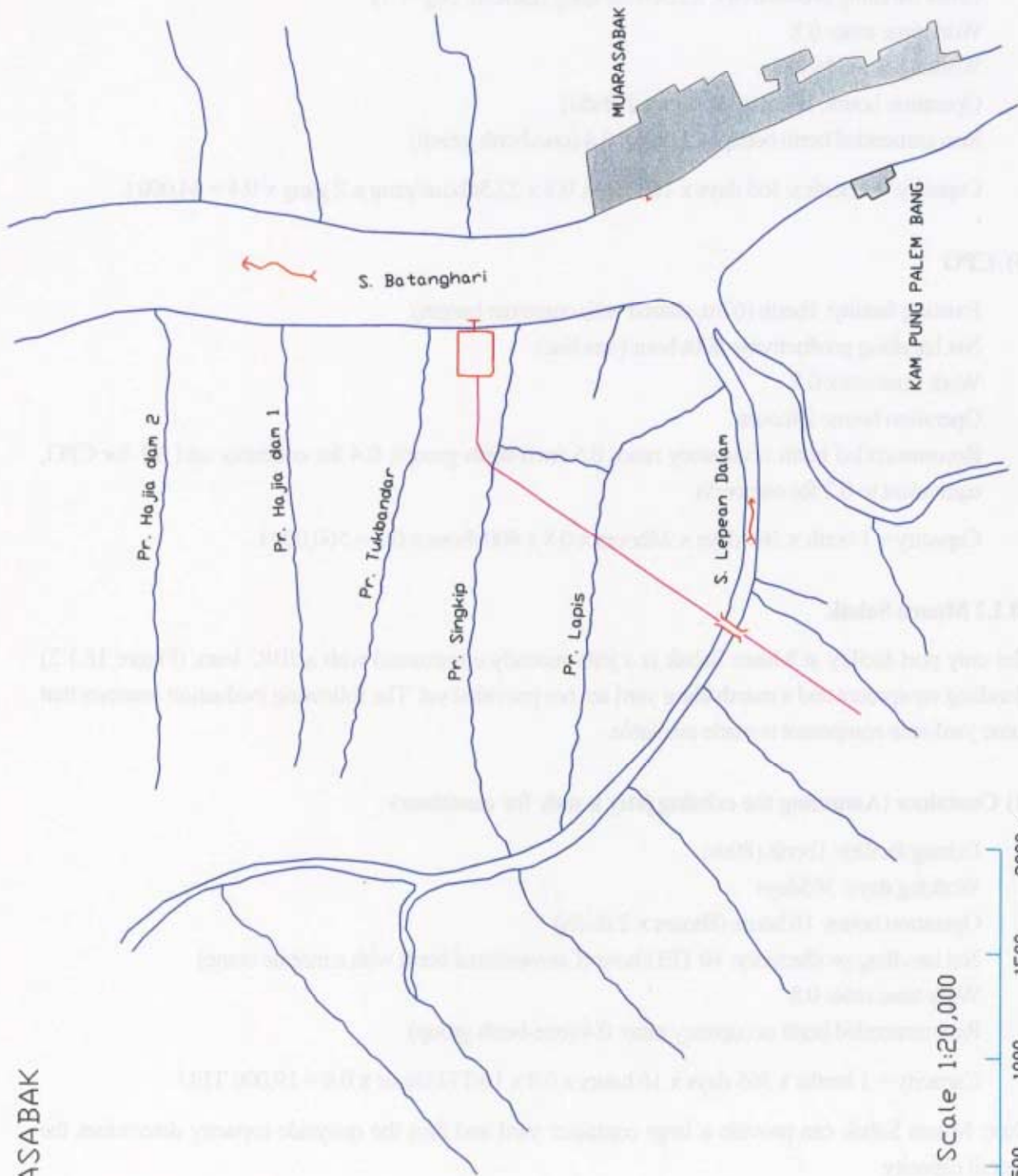
Work time ratio: 0.8

Recommended berth occupancy ratio: 0.4 (one-berth group)

Capacity = 1 berths x 365 days x 16 hours x 0.8 x 10 TEU/hour x 0.4 = 19,000 TEU

Note: Muara Sabak can provide a large container yard and thus the quayside capacity determines the overall capacity.

MUARASABAK



Scale 1:20,000

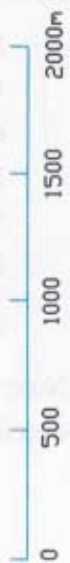


Figure 18.1.2 Present Layout of Muara Sabak

18.1.3 Kuala Tungkal

The only public port facility at Kuala Tungkal is a passenger jetty called by daily Batam services (Figure 18.1.3). Currently, several boats are operated with the following dimensions: 65-338 GRT, 140-450 seats, and around 3m draft.

(1) Passenger

Existing facility: 1 berth (75m)

Working days: 365 days

Operation hours: morning departure

Berthing time: 30 minutes

Maximum number of vessels at berth: 3

Average passenger capacity: 300 persons

Average load factor: 50 %

Capacity = 1 berths x 365 days x 2 services x 300 x 0.5 x 2 (two-way shuttle service) x 3 vessels
= 657,000 persons

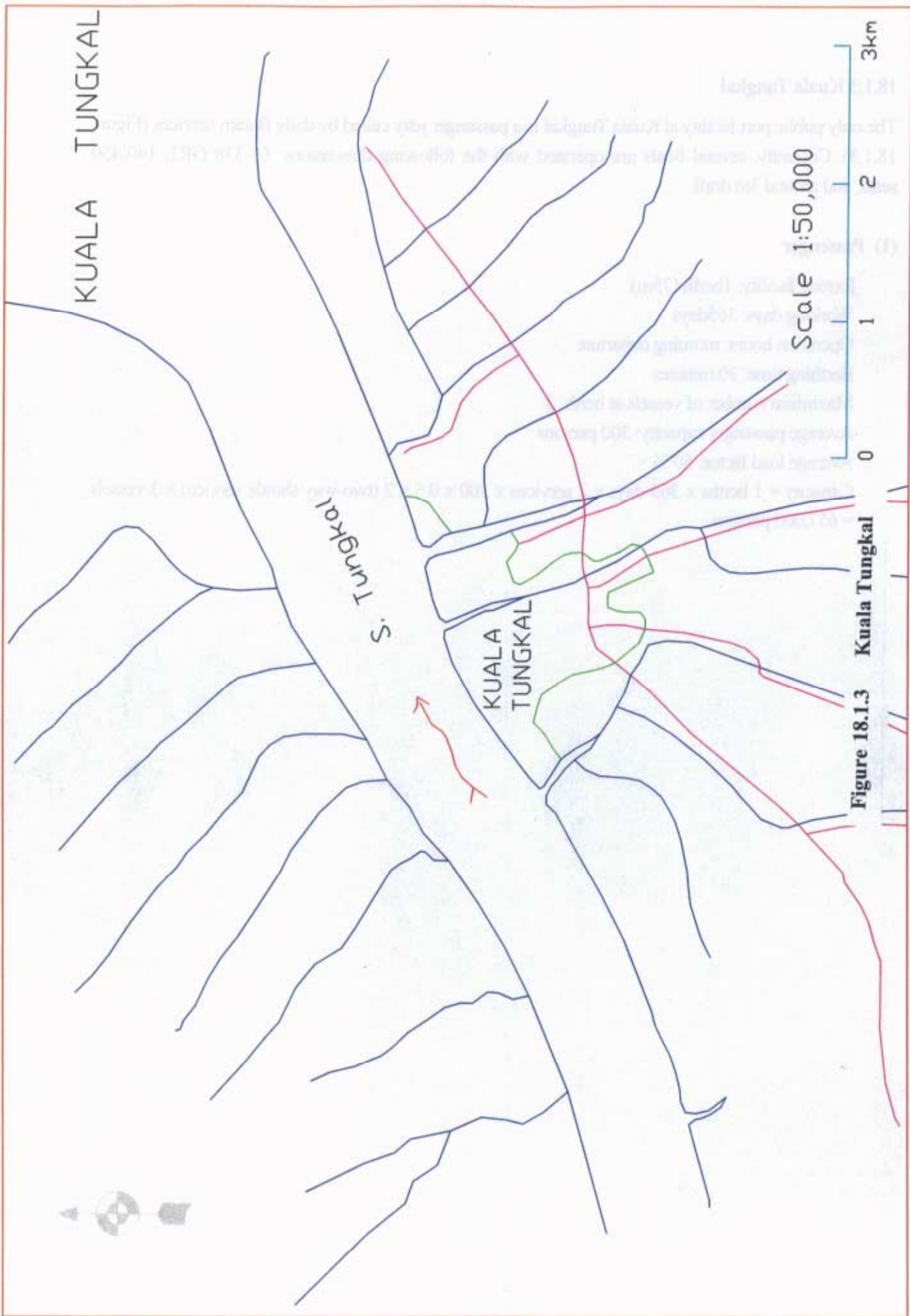


Figure 18.1.3 Kuala Tungkal

18.2 Socio-Economic Framework for Jambi Forecasts

18.2.1 Economic Indicators

(1) Introduction

Economic indicators are important elements in any transport study as they serve to underpin transport developments and this is particularly so with ports which must considering trends, fluctuations in cargo volumes, likely future traffic growth and future development needs.

Indeed, GBHN and PROPENAS have major socio-economic objectives and these are described in Chapter 2.

The socio-economic context or framework provides both a basis to plan transport investment and a basis to make transport investment decisions.

(2) National GDP

This has been detailed in Sections 2 and 5 above and is not repeated here except where relevant or for emphasis.

If the recent political and economic instability continues to be overcome and progress can be made in restructuring the financial and banking sectors, then the economic future is bright.

It is hoped that the recent events of September 11 in the USA with its consequent negative impact on the world economy will be relatively short lived. It is therefore assumed that by 2007, with the proposed opening of the port development projects, the Indonesian and world economies will be well back on track.

Table 18.2.1 GRDP Growth in Sumatra and Jambi 1993 to 2000

Year	GRDP (Rp Billions) at 1993 constant prices-Including Oil and Gas					
	1993	1996	1997	1998	1999	2000
Riau	16,230	19,808	20,434	19,645	20,311	>4.8%
Jambi	2,463	3,145	3,268	3,092	3,181	<2.5%
South Sumatra	10,732	13,521	14,208	13,239	13,659	2.5-4.8%
Indonesia	320,908	407,314	425,614	375,949	380,763	
Annual Growth		26.9%	4.5%	-11.7%	1.3%	4.8%

Source : BPS; Preliminary figures for 1999 and especially 2000

(3) Population

The population of Indonesia increased from 119 million in 1971 to 195 million in 1995.

On a regional basis, Sumatra and Kalimantan have grown faster than Java and this has been due to both regional variations in fertility and migration. Migration has been a

government promoted programme based on agricultural and industrial development in these regions.

Table 18.2.2 Regional Population Growth

Region	Population (in Millions)			
	1980	1990 % pa	1995 % pa	
Sumatra	28.0	36.5 2.3	40.8 2.5	
Kalimantan	6.7	9.1 2.9	10.5	3.0
Indonesia	146.9	178.6 1.7	193.9	1.9

Source: BPS

(4) Macro Economic Trends

After performing very strongly for many years, the Indonesian economy was badly hit by the economic crisis which started in mid 1997.

After GDP growth had reached over 8 percent in the first half of the 1990s, growth slowed in 1997 before contracting by about 13 percent in 1998 with a very modest recovery in 1999. Recovery began in 2000, with growth between 4 and 5 percent, based largely on growth in consumer spending and exports and this has continued into 2001 despite the political uncertainty in the middle of the year.

Before the crisis, the engines of growth differed by region of Indonesia. Java was fueled by manufacturing, construction and real estate. Kalimantan and Sumatra by oil and estate developments and Bali by tourism. Other, poorer areas, were fueled by infrastructure spending.

(5) National Development Plan

a) GBHN/PROPENAS

GBHN (Broad State Guidelines) and PROPENAS (the 5Year Plan), together set out the basis for national development planning in Indonesia.

To accomplish its goals within Propenas, and based on GBHN, GOI has developed 5 national priorities. One of the key priorities, is the need to accelerate economic recovery and strengthen sustainable development.

Specifically, the general objectives of this priority policy include, by 2004:

- i) Growth in GDP to reach 6-7 %
- ii) Inflation to be between 3-5 percent
- iii) Unemployment to fall to 5 percent
- iv) The poorest section of the population to fall to under 14 percent

b) Sector Development Plans

High GDP growth in Indonesia was partly associated with ‘bubble-type’ industries including construction, utilities and services. Moreover, non-oil manufacturing had concentrated in electronics, shoes, textiles and garments, all of which relied heavily on imports of raw materials or components.

Domestically owned firms that relied on domestic inputs fared relatively badly, and for example, palm oil and wood based industries were subject to quotas and export taxes.

Oil and gas exports made up less than 20 percent of total exports by value and were subject to volatile world prices, although being priced in US dollars gave substantial support to the national budget.

c) Exports

Since 1995, total exports by value have increased by 2 percent per year although in tonnage terms have been declining marginally, reflecting increases in higher value goods.

Due to the depreciation of the Rupiah, the value of exports in Rupiah terms has increased by over 350 percent between 1995 and 1999.

18.2.2 Purpose and Requirements for the Socio-Economic Framework

The purpose of the socio-economic framework is to provide a national development framework for the study.

(1) Macro-economy

Firstly, the framework helps in considering the national goals, from an economic perspective such as development of poorer areas, assistance to Eastern Indonesia and so on, thus ensuring that the study recommendations are consistent with the country’s macroeconomic objectives. In this regard it will assist in ensuring priority port selection is consistent with national objectives.

The development context forms a basis for the traffic forecasts.

A number of unknowns impact the making macro economic forecasts. For example, oil prices, depreciation of the Rupiah, real interest rates and decentralisation all pose risks, and of these, higher real interest rates could cause the most havoc.

Therefore, the fragile political climate and risks are reflected in the forecasts.

Table 18.2.3 Macro Economic Growth Scenarios

		Base Case			High Case		
	FY 00	2001	2001	2003	2001	2001	2003
GDP % pa	4.0	4.0	4.0	4.0	4.0	5.0	6.0

A high growth case would result from greater economic and political stability and faster implementation of the reform programme.

Table 18.2.4 Trends and Forecasts in Provincial Economic Growth in Sumatra

GRDP (Rp Billions) at 1993 constant prices-Including Oil and Gas										
Province	Actual						Forecast			Est. %
	1993	1996	1997	1998	1999	2000	2004	2009	2010	
Riau	16,230	19,808	20,434	19,645	20,311	20,981	23,891	28,102	29,029	3.3%
Jambi	2,463	3,145	3,268	3,092	3,181	3,331	4,002	5,035	5,272	4.7%
S. Sumatra	10,732	13,521	14,208	13,239	13,659	14,301	17,185	21,621	22,638	4.7%
Indonesia	320,908	407,314	425,614	375,949	380,763	400,182	488,279	626,155	658,089	5.1%
Percent Change	26.9%	4.5%	-11.7%	1.3%	0.5%					
Source : BPS; Preliminary figures for 1999 and 2000 Forecast by TSSS							* % per annum 2000-2010			

The following table shows similar data but in a different format.

Table 18.2.5 Growth Rates of GRDP in Sumatra

	Annual Growth Rates				
	Actual				Forecast
	1993-2000	1993-1996	1997-98	1998-99	2000-2010
Riau	3.7%	6.9%	-3.9%	3.4%	3.3%
Jambi	4.4%	8.5%	-5.4%	2.9%	4.7%
South Sumatra	4.2%	8.0%	-6.8%	3.2%	4.7%
Indonesia	3.2%	8.3%	-11.7%	1.3%	5.1%

Source: BPS and TSSS

The following table shows the projected GRDP for Jambi up to 2025. Growth to 2010 is based on various national and international sources. After 2010, the Consultants have projected continuing and consistent growth.

This data has been used as the basis for the regression analysis. However, the regression analysis was of limited use since the main commodity forecasts are not related to GRDP and exports are related to world GDP or more specifically the GDP of importing countries. Imports and unloaded cargoes, which would be related to GRDP, were often relatively small in volume.

Table 18.2.6 Jambi GRDP – Historical And Projected

Jambi GRDP In Constant Prices	
Year	In Billion Rupiah
1989	1,850
1990	2,020
1991	2,132
1992	2,266
1993	2,463
1994	2,690
1995	2,918
1996	3,145
1997	3,268
1998	3,092
1999	3,181
2000	3,308
2007	4,563
2025	9,243
Annual Growth Rates in GRDP	
2000-2007	4.7 %
2007-2025	4.0 %

Sources: BPS, Bappenas, ADB, TSSS, Consultants

(2) Population

Population forecasts are based on assumptions about fertility, mortality, migration and economic development.

Current forecasts from sources such as UNDP, World Bank and GOI suggest that the longer term growth in population may be around 1.4 percent per year between 1995 and 2009. Regional growth is likely to remain higher in Sumatra and Kalimantan.

Table 18.2.7 Population Growth Forecasts by Province

Province	Year			Growth Rate in % pa
	1999	2004	2009	
Riau	4.3	4.8	5.2	2.0
Jambi	2.6	2.9	3.1	1.9
South Sumatra	7.7	8.4	9.0	1.4

Source: BPS and TSSS

(3) Economic Prospects for Indonesia's Major Trading Partners

World Bank indicates that Indonesia's external environment is likely to become less favourable with world growth predicted to slow from 4% to 3 % by 2003. Further, the

growth in the economies of Indonesia's largest trading partners is likely to slow or remain modest.

Indonesia's largest markets are:

- i) North America
- ii) Japan
- iii) Europe and
- iv) Asia

Recent reports on the US economy indicate that a hard landing will be avoided and that there are signs of weak recovery at end 2001. The Japanese economy also remains relatively weak, with its own financial sector-restructuring programme being only slowly implemented.

The European economy also shows signs of slowing but seems likely to have a soft landing.

Asian markets are expanding but some of the developing countries in Asia have similar although not as serious structural problems as Indonesia. The newly industrialised countries in Asia have generally recovered strongly from the regional crisis that started in mid 1997. In 2000, GDP growth in some of the NICs was strong (10% and 14% in Korea and China respectively) and this is expected to continue, albeit at moderated levels.

Except for Indonesia and Thailand, GDP levels in Asia will likely recover to pre crisis levels by end 2000. Developing Asia GDP as a whole is likely to reach 6.0 % in 2001.

18.2.3 Industrial and Macro Economic Base of the Forecasts for Jambi

(1) Overview

Detailed industrial and macro economic data on Jambi province has been shown in Section 3 but further data is presented here.

Jambi is well located in Sumatra being relatively close to Singapore and having a possible role in the various growth zones or triangles such as IMS (Indonesia / Malaysia / Singapore) and SIBAJO (Singapore/Batam/Johore). Improved port access in Jambi would allow the area to benefit from development in those zones.

Natural resources in Jambi include oil, gas, coal and other minerals such as granite, kaolin and marble, as well as agricultural crops such as palm oil, pulp, tea, coffee and rubber, and higher value added fishery type products such as shrimp and shellfish.

Jambi has not developed any industry on any significant scale yet but has ambitious plans to do so under a proposed major industrial zone at Parit Culum. Initial industrial development is likely to be the processing or semi-processing of the commodities indicated above, for export or for subsequent export if finished in other regions in

Indonesia. Within the medium term, industrial development could widen significantly to include finished products, for export as well as for local and regional consumption.

(2) Parit Culum Industrial Estate

Jambi province is planning an industrial zone near Muara Sabak which would be a key development zone for the province, based on agro-forestry and other sectors and including export processing. There is no data on the level of production expected from this zone, but clearly if it were successful, the output from a 2,000 hectare area would be substantial by the year 2010.

(3) Implications For Port Development

The implications for port development are significant. The current system for much of the bulk cargoes to use private ports and loading at sea is likely to continue, and for much of the total shipping cargo to use Batanghari River. However, both in terms and of number and value, there will be an increasing need for common user port facilities for both incoming and outgoing traffic, much of which is likely to be containerised. Both containerised and non-containerised cargoes will consist of outgoing processed and semi-processed goods, and incoming of capital goods (machinery and equipment) and consumer goods for the growing economy.

(4) Use of the Industrial and Macro-Economic Data

Industrial and macro economic data and trends have been used in three ways in the forecasts:

- a) Trends and forecasts for specific commodities to feed the commodity forecasts.
- b) Macro economic forecasts of regional/provincial GDP have been analysed and used in the regression analyses for relevant traffic.
- c) Trends in industrial development in the province have also been used in the forecasts of containerised traffic.

18.3 Cargo Forecasts

18.3.1 Introduction and Methodology

The scope of work for this study requires the Consultants to forecast future transport demand in the short term by 2007 and in the longer term by 2025.

In order to achieve those objectives, various forecasting methodologies have been applied for this study, based on the technical requirements, the port and cargo characteristics, regional aspects and the stage of the study. River ports have rather different characteristics than conventional sea-ports; hence, forecasting involves two stages.

In the first stage, for the preliminary forecasts for seven ports, the consultants considered that trends provided a suitable basis for forecasts, supplemented by commodity based forecasts.

The regional development context prepared in the Progress Report, and further expanded in the two Interim Reports, forms an essential plank of these forecasts. The preliminary socio-economic background prepared in the Progress Report remains valid but has been updated as a basis for forecasting traffic at the two priority ports.

The preliminary forecasts were reviewed for the two priority ports, and further detailed and amended as necessary, based on the current information and the results of regression analysis. As was stated at that time, regression analysis can be helpful as a further indicator, but that for specific bulk commodities it provides very little guidance.

The requirements for the two ports and the forecasts have been based on the following factors:

- a) National transport and port studies with up to date forecasts such as JICA Port Study (1999) and TSSS (2000/01) and the Consultant's reviews of the preliminary forecasts
- b) Trends in cargo flows
- c) Regression, where this was found to be statistically sound, based on the socio economic framework and
- d) Regional development plans and other information such as existing port master plans and definite (under design or construction) new port facilities
- e) Trends in handling with special focus on containers
- f) Trends in public cargoes and in non-public cargo (khusus, rede, loading point)
- g) Trends in the major commodities at each port
- h) Discussions with major shipping, coal, timber, CPO and other companies in Jambi, Samarinda and Jakarta
- i) Target commodity volumes in each location

Figures 18.3.1 and 18.3.2 outline this broad methodological approach.

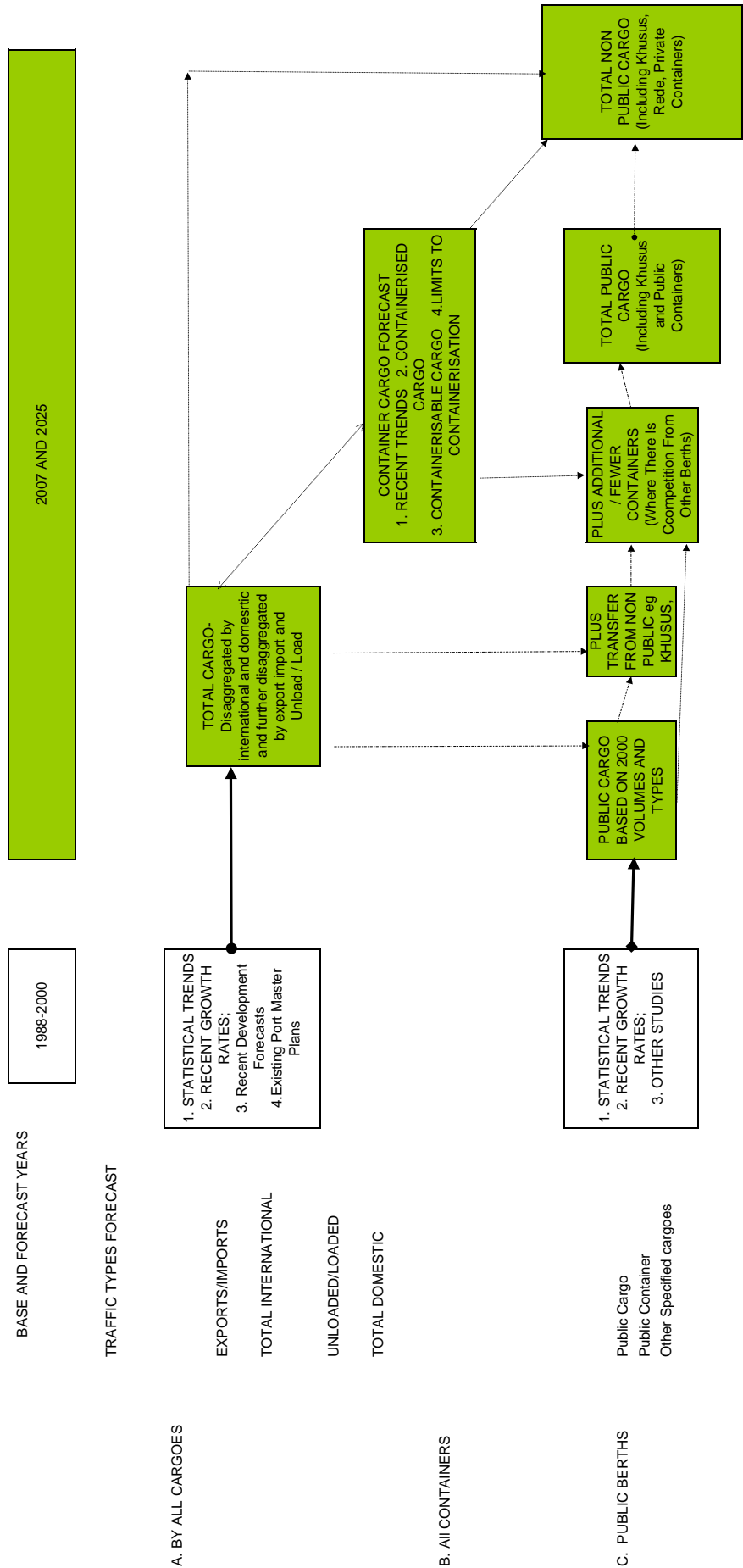


Figure 18.3.1 FORECASTING METHODOLOGY FOR THE JICA SEVEN RIVER PORT STUDY IN INDONESIA

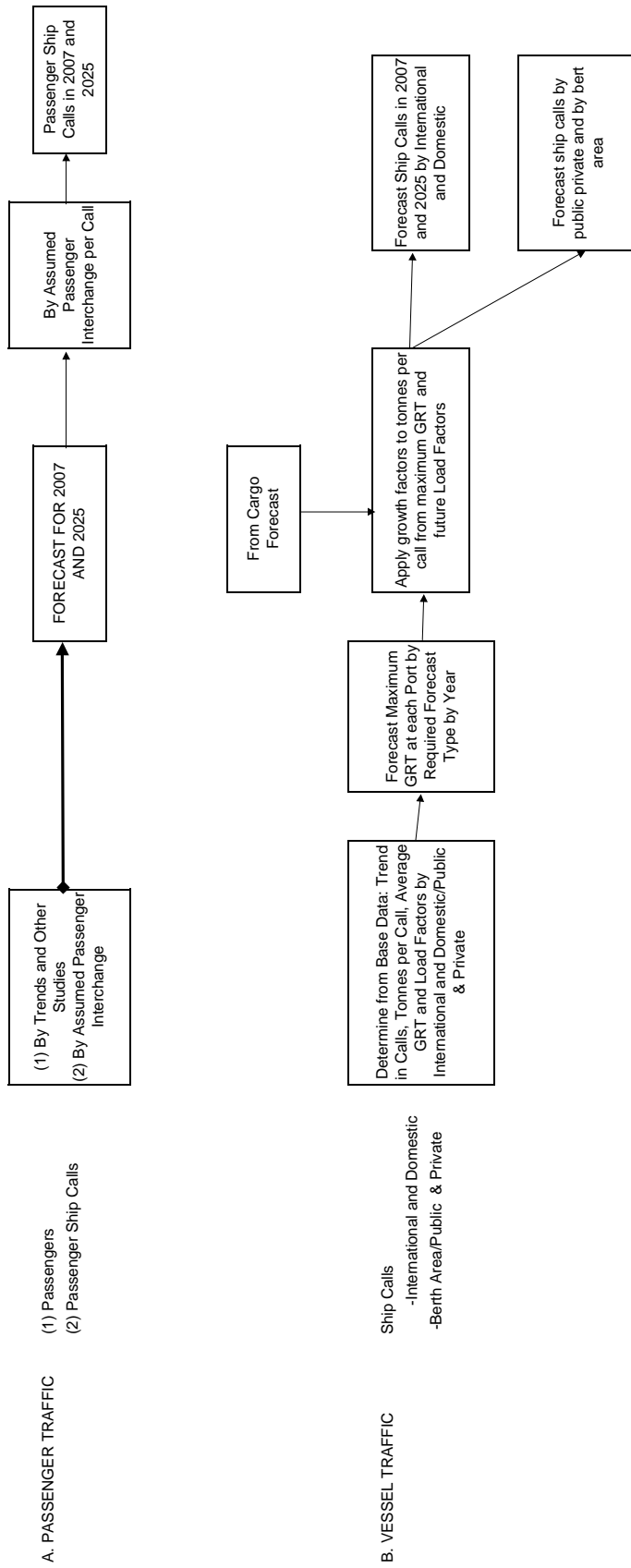


Figure 18.3.2 PASSENGER FORECASTS AND SHIP CALL FORECASTS

18.3.2 Traffic Forecasts - General Approach

Cargo forecasts are made for each target year (i.e., short term by 2007 and long term by 2025).

Estimates of long-term cargo traffic reflect the concept that cargo is not likely to expand indefinitely. For example, 7 % growth every year over 25 years means an increase of 5 times the base year volume.

The impact of any likely changes in the provision of port facilities, and their impact on port traffic are taken into account. This includes proposals by the public or private sector, and proposal which may be anticipated as part of this project's recommendations.

It should be remembered that the projections for 2025 are indicative estimates rather than definitive projections.

For each target year, the forecasts are prepared as follows:

- i) Total cargo, in tonnes, through the channel by:
 - International-by Imports and Exports
 - Domestic-by Unload and Load
- ii) Total cargo, in tonnes, at the public port facilities by:
 - Container
 - Remaining General cargo
 - Specific Bulk Cargoes, mainly coal, CPO and logs and timber

18.3.3 General Assumptions for the Cargo Forecasts for Jambi

- (1) All forecasts are related to the port development scenarios in this report. However, the forecasts are unconstrained (i.e., limitations of berths, channel or other constraints on achieving the forecast are not taken into account).
- (2) Jambi has a natural hinterland but no impact is assumed by attraction or diversion of cargoes to/from other ports since, unlike Samarinda, there is no clear basis for making such an assumption. Even with continued draught limitations for the foreseeable future, we believe traffic is likely to be transhipped at Singapore, Batam or Jakarta rather than diverted to road or to other ports.
- (3) For some cargoes, such as CPO there could be competition between neighbouring ports such as Kuala Enok. However, the port hinterland for public port facilities will remain largely as now (i.e., Jambi Province). Modern and efficient port facilities in the province are likely to attract traffic rather than lose traffic to other Sumatran ports.

The traffic forecasts try to follow a middle path between being too optimistic about attracted traffic and too pessimistic related to losing traffic should other neighbouring ports be developed.

- (4) For each port, trend-based and regression analysis were undertaken. Where the statistical relationships for cargo were strong ($R^2 > 0.75$) they were used. However, if the relationships were weak, recent trend data, as well as master plans and other sources referred to above were used.
- (5) These forecasts constitute a middle or best estimate scenario. Sensitivity analyses or other scenarios can be prepared for more optimistic and less optimistic total cargo scenarios in the feasibility study stage. In some cases, a variety of sub-scenarios for the division of public/private cargoes or distribution between port areas is considered.
- (6) The forecasts assume continued macro economic recovery, as noted in the Progress Report, and no major economic or social dislocation. Where regression is used, such recovery is explicit and where trends are used such recovery is implicit.

The socio economic framework in Section 6.2 provides the basis for the forecasts and assumes average national GDP growth of between 4 and 5 % between 2001 and 2003 moving up to 5 % by 2005 and perhaps reaching 6 % to 7 % by 2009. On this basis, GDP and GRDP is expected to average about 5 % per year between 2000 and 2010.

- (7) The base year, using existing data, is 2000.
- (8) The target forecast years are 2007 and 2025.
- (9) Modification of the initial forecast of international and domestic cargo is made to explicitly estimate:
 - Major bulk commodities
 - Containers
 - Cargoes through the public berths

(10) Commodities

All the commodities handled at Jambi (as itemised by the port) have been assessed. The main forecasts include only those commodities that either make up a significant proportion of total traffic (i.e., more than 10% currently), or those that will become significant in the future. These commodities include logs and wood products, pulp, CPO, coal, fertiliser and fuel/oil.

A further forecast is prepared, cross referenced against the initial one, that includes all the itemised commodities.

This also includes an analysis of 'containerisability' which shows the likely maximum percentage of containerisation assuming that any commodity that can be containerised will be containerised. Since this theoretical maximum is unlikely to be reached, the containerisability percentage acts as a check on Study forecasts.

(11) Containers

Container traffic has been expanding rapidly at most ports. Currently in Jambi, containers are handled at two types of locations: public port (Talang Duku) and dermaga khusus (various private wharves).

The assumptions for future proportion of containers handled in the public/other terminals are described below.

Tonnage has been converted to TEUs by assuming, from the medium term at the latest, 10 tonnes per TEU (average of full and empty) which is consistent with current port data in each port. This assumption is necessary because we note a wide variability in tonnes per TEU, even in the same port where containers are handled in different locations, and that usually the lower the container volume the lower the tonnes per TEU. However, our review of the 7 river ports, other Indonesian sea ports and Jambi container operations show a remarkable tendency to between 10.0 –11.0 tonnes on average per TEU. Hence, 10.0 tonnes per TEU is used in the Jambi port forecasts.

(12) Public Berth Cargo Forecasts

Recent trends in public cargo movements are not consistent and often not well documented.

Thus, it is also considered that, if new port facilities are provided, and management, marketing, productivity and tariffs are appropriate, then some private/khusus wharf operators may find it cheaper and more convenient to ship cargoes via the public port. A modern port will also encourage shipping companies to offer proper liner services, rather than the sometimes ad hoc operations in smaller ports, and this in turn should attract some producing companies to use these services. The very nature of the change in the economic structure in Sumatra (and Kalimantan) to produce higher value added processed or semi-processed products will also encourage diversion to container and public port services.

Therefore, varying levels of diversion of non-public berth traffic to the public port is entirely appropriate and this was also the approach taken in the Jambi port Master Plan.

Therefore, it is assumed that a proportion (9 % in Jambi) of the forecast total cargoes will transfer to the public port. In order not to over estimate these transferred cargoes, the forecasts start introducing such cargoes from 2006/7, assuming new/upgraded facilities might be available from that date. They are also introduced at a reduced rate so that the maximum of 9 % is only reached in 2009.

18.3.4 Specific Assumptions of the Traffic Forecasts for Jambi

The following specific assumptions have been made related to Jambi cargoes:

- i) Jambi province will experience continued economic growth and generate substantial cargoes through its ports

- ii) Coal, CPO and Pulp will be major growth export commodities
- iii) Traffic in Logs and timber products will grow only slowly
- iv) Currently, branch ports at Jambi operate at three main locations: Talang Duku, Kuala Tungkal and Muara Sabak. Loading (ship to ship) outside the outer bar also takes place. However, public cargo is only handled at one common user facility at Talang Duku, the remaining areas being private facilities.
- v) Kuala Tungkal traffic will largely continue to operate as it does now and will continue only to send out cargo from private wharves for the foreseeable future
- vi) Kuala Tungkal will handle all the sea passenger traffic for Jambi, as at present, and this will continue to grow quite strongly
- vii) Container traffic will be developed at the public facilities of Muara Sabak and container traffic will continue to grow at Talang Duku (although it may lose some traffic for a few years after Muara Sabak is opened)
- viii) Some private wharf traffic is very likely to transfer to the public port because:
 - Regular liner services for container will become more established calling mainly at the public wharves
 - The improved port facilities will attract some of these cargoes
 - Larger volumes of cargoes will require expenditure on more capital intensive equipment
- ix) Kuala Tungkal cargo will not use Muara Sabak port due to the distance up river to Muara Sabak and the ship size limitations which will remain there
- x) At present, Talang Duku only handles about 30 % of ALL containers. It is assumed that by 2025 the public port facilities in Jambi will handle 50 % in the Study base case and perhaps 70% in the Study higher public container scenario
- xi) It is also assumed that after implementation of this project, Talang Duku will handle 35 % of PUBLIC containers and Muara Sabak the remaining 65 % in the Base Case
- xii) It is also assumed that after implementation of this project, Talang Duku will handle 25 % of PUBLIC containers and Muara Sabak the remaining 75 % in the Higher Case, as the additional containers are likely to go through Muara Sabak

18.3.5 Methodology for Jambi Port Cargo Forecasts

The forecasts for Jambi port are prepared as follows.

- i) Trends in port cargo are prepared for the previous 12 years (i.e., 1988 to 2000). This data cover all cargoes through the public port and registered by the port as using private wharves.
- ii) Cargo is also analysed by commodity from 1995 to 2000 and trends noted.
- iii) Meetings were held with shipping companies and major commodity producers to identify how and where cargo is handled, operational problems and opportunities that might affect public port usage in the future and trends in production and shipping.
- iv) Visits were also made to the public port and some private wharves areas to understand operational handling characteristics (i.e., how, what and where cargo is currently handled).

- v) Total cargo (disaggregated by international and domestic) handled in previous years was also regressed against GRDP (Gross Regional Domestic Product) as well as national GDP to establish a correlation between cargo and economic factors. However, the regression analysis was of limited use since, for example, the main commodity forecasts are not related to GRDP and exports are related to world GDP or more specifically the GDP of importing countries. Imports and unloaded cargoes, which are related to GRDP, were often relatively small in volume.

Therefore, in some cases, the regression was a useful check on the forecasts made, but in other cases it was not. Cargo was also shown not to be correlated with national GDP in most cases.

- vi) Where the regression could show a positive link (i.e., an R^2 of greater than 0.75) the resulting cargo forecast based on forecast GRDP (shown in the socio economic framework) was compared with the forecasts based on trends made in preliminary study.
- vii) In the case of international cargoes, GRDP was shown to be correlated with cargo and the original forecasts were modified. However, in some cases the forecasts appeared excessive especially in the last 10 years of the period, 2015 to 2025, and a compromise was made between realistic trends and the results of the regression.

18.3.6 Cargo Traffic Forecasts for Jambi Port

Table 18.3.1 provides an overview of the traffic forecasts.

Table 18.3.2 shows the summary of the results of the cargo forecast in relation to the development of container traffic. It assumes that there will be no public port at Muara Sabak in 2000. It also assumes:

- i) That the proportion of public containers will increase from the current 30% to 50 % in the base case and to 70% in the Higher Scenario.
- ii) That as the proportion of public containers increases, the additional containers will be handled at Muara Sabak and hence the percentage at Muara Sabak will rise.
- iii) The maximum containerisability is the maximum theoretical level assuming that any commodity that can be containerised, will be containerised.
- iv) That the percent containerised is the Study team's estimate of actual containerisation when less than the maximum, but being consistent with it.

Table 18.3.1 Jambi Cargo Forecasts

Cargo Type	Million Tonnes per Year			Growth Rate Per Year (Average)	
	2000 (Existing)	2007	2025	2000-2007	2007-2025
International Cargo	1.06	1.6	4.0	6.0 %	5.2%
Domestic Cargo	2.45	4.0	9.4	7.3 %	4.9 %
All Cargo	3.51	5.6	13.4	6.9 %	5.0 %
Of which:					
1. Batanghari River (Public and private)	2.57	4.3	11.3	7.6 %	5.5 %
2. Kuala Tungkal (All Private)	0.95	1.3	2.1	4.6 %	2.7 %
Public Cargoes through Muara Sabak / Talang Duku	0.16 (Base) 0.16 (High)	0.39(Base) 0.47 (High)	2.34 (Base) 3.10 (High)	5.1 % 6.2 %	10.5 % 11.0 %
NOTE:					
Public cargoes exclude the bulk cargoes below					
Base and High alternatives reflect different levels of 'winning' of private container traffic					
No public port at Muara Sabak in 2000 but assumed in full operation by 2007/8					
Main Commodities (Total International and Domestic in Million Tonnes)					
Coal	0.0	0.6	2.0	0 %	8.0 %
Logs and Timber	1.2	1.3	1.5	1.2 %	0.8 %
CPO	0.3	0.8	1.8	15.0 %	4.6 %
Pulp	0.4	0.6	1.4	6.0 %	4.8 %

Table 18.3.2 Summary of Container Analysis

YEAR	Existing	Projected		Average Growth (% per Year)	
	2000	2007	2025	2000-2007	2007-1025
Total Containers (Teus)	37,000	79,000	406,000	11.4%	9.5 %
SCENARIO 1-BASE PUBLIC CONTAINERS					
Per Cent Public	30%	35%	50%		
At Muara Sabak (65% of Public)	0	18,000	132,000	0	11.7
At Talang Duku (35% of Public)-In teus	13,000	10,000	71,000	(3.5 %)	11.5 %
Total Public Containers-Base Case-Teus	13,000	28,000	203,000	11.6 %	11.6 %
Remaining Public General Cargo* (Tonnes)	86,000	117,000	309,000	4.5 %	5.5 %
Total Public Cargo (Tonnes)	161,000	394,000	2,335,000		
SCENARIO 2 –HIGH PUBLIC CONTAINERS					
Per Cent Public	30%	45%	70%		
At Muara Sabak (teus) (75% of Public)	0	26,000	213,000	0	12.4 %
At Talang Duku (25% of Public) In teus	13,000	10,000	71,000	(3.7 %)	11.5 %
Total Public Containers-High Public Case-In teus	13,000	36,000	284,000	15.7 %	12.2 %
Total Public Cargo (Tonnes)	161,000	473,000	3,145,000		
Maximum Containerisability (from Commodity Forecast)	47 %	43%	48%		
Per cent of cargo Containerised in our forecasts by year	7%	16 %	35 %		

* Remaining General Cargo is the same in both cases

The cargo forecasts were also made on a detailed commodity basis and cross referenced against the main forecasts for consistency.

Figures 18.3.3 and 18.3.4 show the forecast in chart form related to the Base and High scenarios respectively.

Tables 18.3.3 to 18.3.5 below show traffic forecasts for Base and High, and the commodity forecast which includes the estimates of maximum ‘containerisability’ as explained above.

Figure 18.3.3 Jambi Cargo Forecasts-Base Scenario

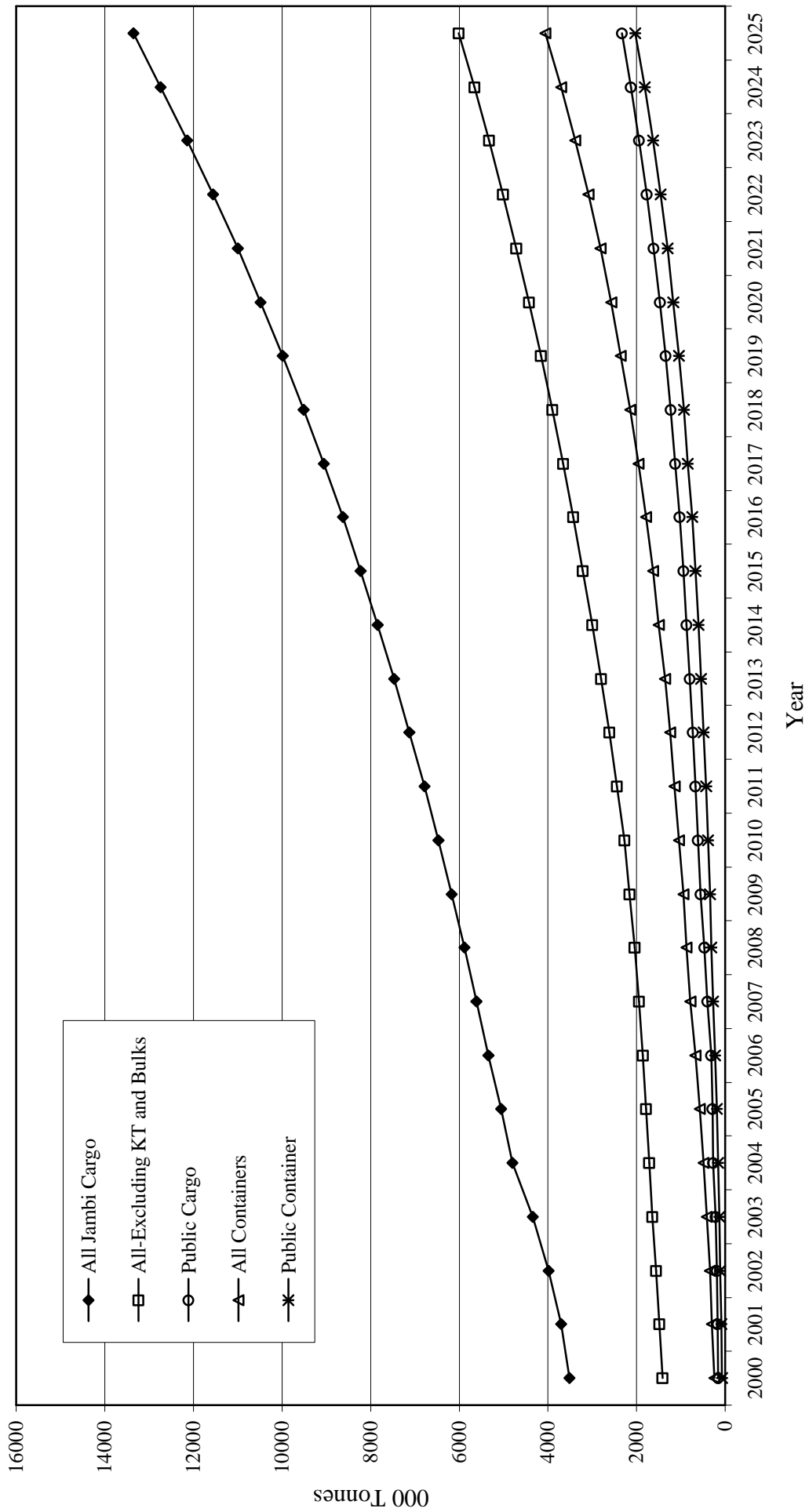


Figure 18.3.4 Jambi Cargo Forecasts-High Scenario

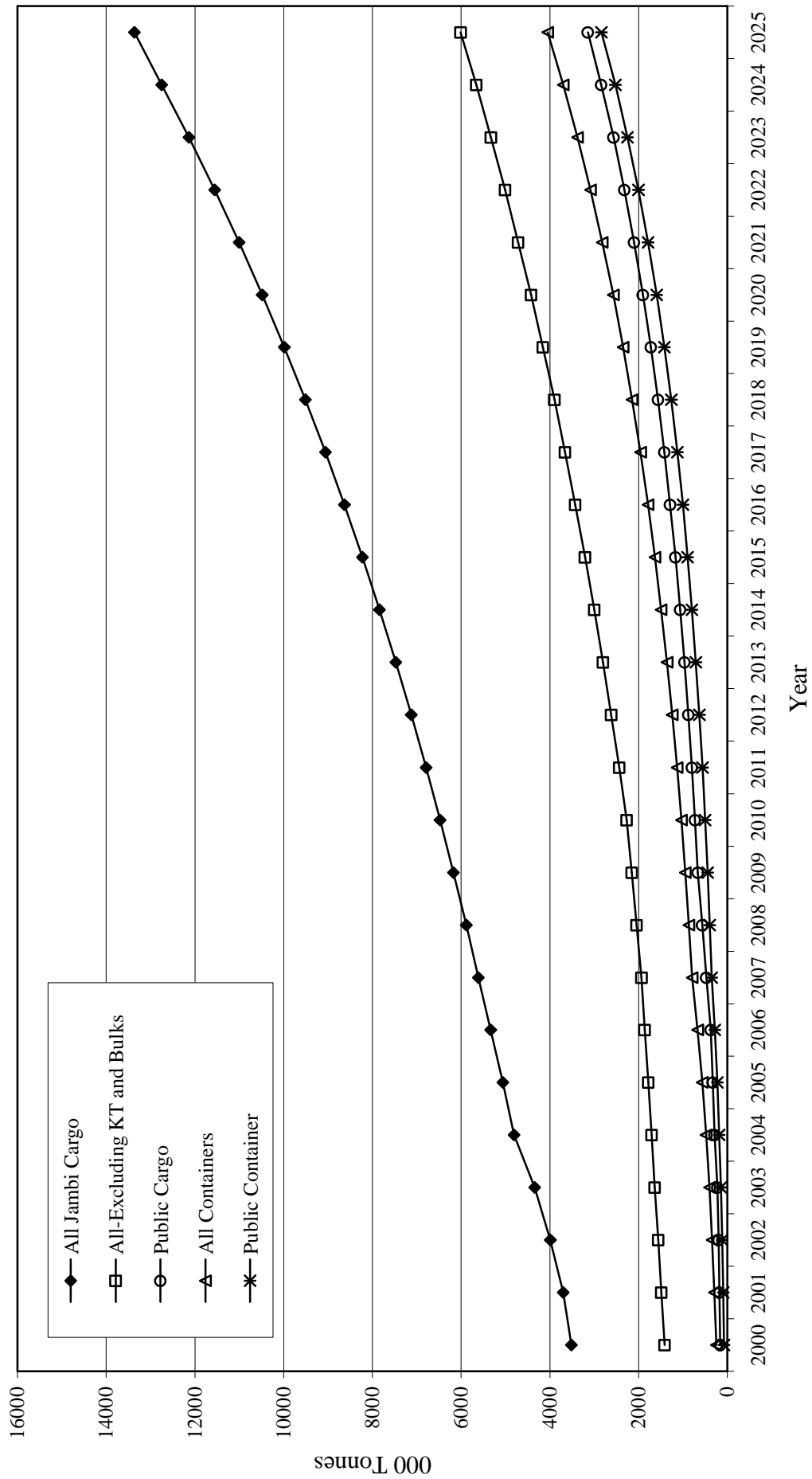


Table 18.3.4 PROJECTED PUBLIC AND CONTAINER CARGOES AT JAMBI PORT - HIGH SCENARIO

ALL BERTHS		PUBLIC BERTHS										ALL BERTHS				Container Data			
TOTAL JAMBI CARGO (All Locations)	TOTAL JAMBI CARGO (Excluding Kuala Tunggal and major Bulks)	Cargo (in 000 tonnes)		Containers Public *		Public Cargoes		Public and Private Containers		Tonnes if 30% Share Maintained	Tonnes if 70% Share Reached by 2025	ADDITIONAL CONTAINER S/DIFF 30-70%	Share of Public Containers	As % all Cargo	As % of Total without bulks				
		Existing	Existing + Attracted	Tonnes	TEUS	Remaining General Cargo	Total Public Cargo	Tonnes	TEUS										
Year	Year	Existing	Existing + Attracted	Tonnes	TEUS	Remaining General Cargo	Total Public Cargo	Tonnes	TEUS	TEUS	TEUS	TEUS	TEUS	TEUS	TEUS				
1989	1989																		
1990	1,500																		
1991	1,558																		
1992	1,853																		
1993	1,940																		
1994	2,016	187						59	6										
1995	2,668	177						82	8					3%	6%				
1996	2,490	201		65	7			170	14					3%	7%				
1997	3,075	171		81	9			240	16					8%	17%				
1998	3,507	175		85	8			258	24					7%	15%				
1999	3,118	201		76	9			317	29					10%	22%				
2000	3,518	161	75	75	13	86	161	248	37	75	75	30.2%	30.2%	7%	18%				
2001	3,700	173	173	94	16	85	179	293	42	88	94	32.0%	32.0%	8%	20%				
2002	3,991	186	186	117	17	83	200	346	43	104	117	33.8%	33.8%	8%	22%				
2003	4,343	200	200	146	21	78	224	408	51	122	146	35.8%	35.8%	9%	25%				
2004	4,805	215	254	183	23	109	292	481	53	144	183	37.9%	37.9%	10%	28%				
2005	5,064	232	272	228	29	101	329	568	63	170	228	40.2%	40.2%	11%	32%				
2006	5,337	249	291	285	32	90	375	670	67	201	285	42.5%	42.5%	12%	36%				
2007	5,613	268	355	356	36	117	473	791	79	237	356	45.0%	45.0%	16%	41%				
2008	5,886	288	426	399	40	166	565	866	87	260	399	46.1%	46.1%	17%	42%				
2009	6,173	309	503	448	45	219	667	948	95	285	448	47.3%	47.3%	18%	44%				
2010	6,474	332	537	503	50	225	728	1,039	104	312	503	48.4%	48.4%	18%	46%				
2011	6,790	357	577	565	56	236	800	1,137	114	341	565	49.6%	49.6%	19%	47%				
2012	7,123	384	620	634	63	246	880	1,245	125	374	634	50.9%	50.9%	20%	48%				
2013	7,473	413	665	711	71	256	967	1,364	136	409	711	52.1%	52.1%	21%	49%				
2014	7,841	444	714	798	80	266	1,064	1,493	149	448	798	53.4%	53.4%	22%	50%				
2015	8,227	477	766	895	90	276	1,171	1,635	163	490	895	54.8%	54.8%	23%	51%				
2016	8,634	513	822	1,005	100	284	1,289	1,790	179	537	1,005	56.1%	56.1%	24%	52%				
2017	9,062	552	881	1,128	113	293	1,420	1,960	196	588	1,128	57.5%	57.5%	25%	54%				
2018	9,511	593	944	1,265	127	300	1,565	2,147	215	644	1,265	58.9%	58.9%	27%	55%				
2019	9,985	637	1,012	1,420	142	306	1,726	2,351	235	705	1,420	60.4%	60.4%	28%	57%				
2020	10,482	685	1,084	1,594	159	312	1,905	2,574	257	772	1,594	61.9%	61.9%	29%	58%				
2021	11,006	737	1,161	1,788	179	315	2,104	2,818	282	846	1,788	63.5%	63.5%	31%	60%				
2022	11,557	792	1,243	2,007	201	317	2,324	3,086	309	926	2,007	65.0%	65.0%	32%	62%				
2023	12,137	851	1,331	2,252	225	317	2,569	3,379	338	1,014	2,252	66.6%	66.6%	34%	63%				
2024	12,748	915	1,425	2,527	253	314	2,842	3,700	370	1,110	2,527	68.3%	68.3%	35%	65%				
2025	13,364	984	1,525	2,836	284	309	3,146	4,052	405	1,216	2,836	70.0%	70.0%	35%	67%				

80%

4023

70%

199

70% SHARE

88% of containerisable cargoes containerised but in future containerisable will increase

Growth Rates Per Year	7.8%	7.5%	24.9%	24.9%	15.5%	4.5%	16.6%	39.7%	11.3%	18.0%	36.1%
1989/94-2000	7.8%										
2000-2007	6.9%	7.5%	24.9%	24.9%	15.5%	4.5%	16.6%	18.0%	11.3%	18.0%	36.1%
2007-2025	4.9%	7.5%	8.4%	12.2%	12.2%	5.5%	11.1%	9.5%	9.5%	9.5%	11.3%
2000-2025	5.5%	7.5%	12.8%	15.6%	13.1%	5.2%	12.6%	11.8%	10.0%	11.8%	35%

Table 18.3.5 Cargo Forecast by Commodity to 2025 and Containerisability Estimates

	TRAFFIC PROJECTION BY COMMODITY			MAXIMUM CONTAINERISABLE ESTIMATE		
	2000	2007	2025	2000	2007	2025
EXPORTS						
Sawn Timber	-	-	-			
Crumb Rubber	41	58	139	41	58	139
Plywood	561	550	559	561	550	559
Moulding	18	49	75	18	49	75
Pulp	127	179	382	127	179	382
General	134	215	667	134	215	667
Coal		210	700			
Agricultural Exports		54	328		54	328
CPO		75	181			
Sub-Total	880	1,389	3,031			
IMPORTS		1,389	3,031			
Ashphalt	2	3	10			
Glue	43	64	214		-	-
Methanol		-	-			
Spare Parts	13	20	65	13	20	65
General Cargo	126	191	636	126	191	636
Sub-Total	184	278	925			
UNLOAD						
Rice	4.35	5	19	4	5	19
Sugar		-	-	-	-	-
Flour	25	31	111	25	31	111
Salt	6	7	27	6	7	27
Other Foodstuffs		-	-	-	-	-
Cooking Oil		100	361	-	100	361
Fertiliser	11	21	119	11	21	60
Cement	10	12	44	10	12	44
Glue	15	18	67	-	-	-
Fuel	400	429	730	-	-	-
Petrol etc.		150	255	-	-	-
Methanol	4	5	18	4	5	18
General	106	130	471	106	130	471
Logs	438	440	500			
Sub-Total	1,019	1,350	2,723	-	-	-
		1341	2716			
LOAD						
Sawn timber	16	38	75	16	38	75
Logs	68	60	80			
Crude Oil	545	626	1,066			
Plywood	113	150	250	113	150	250
Pulp	259	416	1,018	259	416	1,018
General	5	76	423	5	76	423
Other	67	82	458	67	82	458
Miscellaneous		50	241	-	50	241
CPO	326	675	1,625			
Glue	36	44	160			
COAL		390	1,300			
Sub-Total	1435	2,608	6,695			
		2,607	6,692			
	Totals from Main Cargo Forecast			Maximum Containerisable and % of Total		
GRAND TOTAL	3,518	5,625	13,374	1,646	2,440	6,427
				47%	43%	48%

18.4 Passenger Forecasts

18.4.1 Introduction

Sea passenger traffic in Indonesia has been increasing very rapidly over a number of years and this is also true for most of the Study ports.

These long term high growth rates in passenger sea travel occur everywhere whether by ferry under DGLC/ASDP and private companies, and by DGSC/Pelni and private companies.

Such long-term trends provide an implicit basis for the forecasts, along with more recent trends.

It is assumed that there are several driving forces behind these trends, including movement for economic and social purposes between islands and especially between Java and Sumatra/Kalimantan, population movements (transmigration) and general economic development. The reduction in air capacity and the high cost of air travel has also impacted sea transport demand in the initial years of the economic crisis.

Further, in recent years, GOI has purchased a fleet of modern large passenger vessels and this has no doubt encouraged or allowed rapid increases in passenger flows. In the current economic circumstances, slow expansion of the fleet may conversely curtail expected expansion of passenger volumes.

The existing and forecast passenger movements have implications for port planning in two ways. Firstly, there is the need to cater for these passengers and ships. Secondly, as the Pelni and private vessels generally use cargo port berths, there is the need to coordinate and organise facilities in a manner that is safe and efficient for both passengers and cargo.

Given the likely continued expansion of passenger volumes to the levels expected, this will probably mean the development of separate passenger facilities at all ports as soon as possible and as soon as passenger volumes justify it.

18.4.2 Passenger Forecast Methodology

Given high recent demand and likely constraints on continued growth rates at this level, the Consultants have followed a middle course between these two conflicting influences.

Passenger forecasts have been made on the basis of trend analysis followed by a review of the results to take into account likely passenger developments. This should make the forecasts as realistic as possible.

Further, the recent very rapid passenger growth rates at most ports may be related to the economic crisis and may not continue at such high rates.

At a few ports in Indonesia, passenger growth has been minimal in recent years and this needs further explanation as to whether it is decline in demand due to other transport modes such as competition with express buses to/from Java or other ferries providing services or general decline. Quite likely it is based on income substitution effects since reduced income causes changes in travel modes.

All river ports to some extent, suffer from quite long and slow journeys on the river part of the trip and in fact Jambi province is served by a combination of fast ferries and facilities at Kuala Tungkal and then onward by road to Jambi city and other locations(outside Kuala Tungkal). This seems a good compromise and a long and slow river journey for passengers direct to Jambi city, for example, is not suggested as part of the port plans.

Very few port studies include passenger forecasts and where there are forecasts, they are usually underestimated. It would however have been hard to predict the continued and substantial increases in sea passenger trips in the Krismon period. Therefore, our forecasts do not follow historical trends, but they still represent a robust level of demand, especially in the longer term by 2025.

Further, the forecasts will depend to some extent on the regulatory and tariff policies for sea passenger transport as well as the competitive air services and actual capacity provision for sea and air transport. Further, private sector participation and privatisation could have some impact on tariffs and capacity provision. Over 25 years such policies and impacts are impossible to predict.

Therefore, such long term forecasts are more indicative, whereas short or medium term forecasts are for planning purposes.

18.4.3 Passenger Ship Calls

Passenger ship calls are based upon the above passenger forecasts. The data on passenger ship size by GRT are very weak as these vessels are generally included in the domestic ship calls and are not disaggregated.

Nevertheless, ship calls are disaggregated by size in some ports and in others the number of calls is known. Further, the Pelni fleet, which transports a large proportion of, but not all, passengers, is also known in some detail.

Therefore, in some ways similar to the methodology for projecting cargo ship calls, the projected future passenger volume is divided by the expected passenger interchange per call. The interchange per call is based upon actual current data and supplemented by data on the existing Pelni vessel fleet. As passenger volumes increase, it is assumed that larger vessels will be placed on these routes up to the existing maximum vessel capacity. If this does not occur, there will be a larger number of smaller vessels or demand will be suppressed and both of these could occur together.

Private sector passenger services which were badly affected on some routes may enter the market again in the future assuming appropriate conditions such as cost/profit based fares and encouragement of the shipping sector.

Overloading of passenger vessels is a problem and while the vessels are able to carry additional loads, compromised safety leads to accidents at sea. While we have not assumed vessel interchange greater than capacity, use of maximum ship capacity probably means that at peak times vessels will still be overloaded.

18.4.4 Passenger Forecasts

Table 18.4.1 below summarise the projected passenger traffic, together with the forecast ship calls. The tables also show the number of projected ship calls per day and this shows, in many cases, the likely large impact that passenger forecasts have upon the need for port facilities.

All very long-term forecasts are likely to be affected by competing modes to varying extents.

Table 18.4.1 Two Way Passenger Traffic Forecasts

Years	Volumes (2000 actual)			Annual Percentage Growth	
	2000	2007	2025	2000-2007	2007-2025
Passengers	134,000	245,000	590,000	9.0 %	5.0 %
Ship Calls	632	817	983	3.7 %	1.0 %

There is no data before 1995 but in 1995 there were 21,000 passengers using Kuala Tungkal. Therefore, although the 1995 to 2000 average increase was over 44 % per year on average, we would not expect a new service to exhibit continued growth of that magnitude over a long period. Current passenger services focus on Batam island so the driving force is, we believe, employment related.

18.5 Projection of Calling Vessels

18.5.1 Introduction

These forecasts are based on the base data, the forecast cargo, and the forecast maximum ship size for each port provided to the economist.

In the Interim Report 1, ship calls were forecast by total ship calls (public and non public) and disaggregated into international and domestic. In this report, due to the data needs of the Simulation model, initial forecasts and also forecast calls by port location, public and private, and by container, general cargo and the major bulk commodities were improved. Both results are internally consistent with each other.

18.5.2 Methodology for Estimating Ship Calls

- (1) Analyse the last 5 years ship call data by international and domestic to provide base year data on calls, average GRT, tonnes per interchange and load factors. Cargo data either actual to 2000 (or after 2000 from the forecasts) is related to total international cargo and total domestic cargo.
- (2) Estimate DWT from GRT by dividing by 0.7 (generally accepted ratio and confirmed by analysis of Indonesian ship data).
- (3) Show the average GRT, cargo tonnes per call (interchange), vessel load factors for 1995-1999; (load factor is calculated by dividing the cargo tonnes handled by the total DWT capacity)
- (4) Estimate the maximum GRT for each port-either from navigation rules which are available for some ports or from the estimates for the remainder
- (5) Estimate the average GRT for 2007 and 2025 (based on maximum and trends). Note that for domestic, the average is usually substantially less than the maximum so there is no problem for domestic shipping. For international ships, it is estimated that the average ship size in future is between 80-90 % of the maximum.
- (6) Estimate the future load factors for 2007 and 2025. For example if load factors are already high, no change; if low, some change based on trend.
- (7) Modify cargo tonnes per call based on the forecast GRT and load factor growth
- (8) Divide the cargo forecast by the forecast cargo tonnes per call to obtain ship calls per year
- (9) To obtain channel movements, ship calls must be doubled because one port call involves a movement in and a movement out.
- (10) Using the updated output of the Interim Report 1 as a reference point, the projection of ship calls, vessel sizes along with the traffic forecast is made as shown in Table 18.5.1
- (11) For Jambi, there is another step as it is necessary to know the volume of traffic at the difficult navigation section of river between Muara Sabak and Talang Duku. We have therefore estimated the traffic at Muara Sabak and Talang Duku/Jambi city according to the maximum GRT and the cargo estimated at these two locations. Although the

estimate is only approximate, it gives a reasonably good indication of the ship size and volume at these two locations. All Talang Duku/Jambi traffic must traverse the narrow and bending section of river.

18.5.3 Limitations of the Forecasts

- (1) Ship call baseline data is not very reliable for ship call projection and is often only sufficiently disaggregated for very broad estimates of total international and domestic ship calls
- (2) Although, Jambi is a smaller port, it turned out that the traffic is related to three distinct areas (namely, Kuala Tungkal, Talang Duku/Jambi and the downstream area of the Batanghari River in the Muara Sabak area). It was not easy to confirm that ship calls and cargo traffic had been recorded on exactly the same basis hence inconsistencies easily arose.
- (3) 1995 to 1999 data includes the economic crisis in Indonesia (although 1995 and 1996 were normal years). While there is some variation in cargo volumes over that period, ship calls and ship sizes may have been more erratic.
- (4) Also at Jambi, in extended dry periods, the river level drops even more than usual and can affect historical ship size and volumes.
- (5) Maximum/Average GRT is based on:
 - a) existing navigation rules
 - b) estimates based on ship sizes and channel characteristics
 - c) adjustment where current average GRT is already very high, relative to provided or derived maximum GRT in a. or b. above.

In some ports, the current, average GRT (especially for international ships) is greater than the stated or estimated maximum GRT. One reason is that ship calls at 'loading point at sea' or 'rede/channel loading' are included in total calls which would have the effect of over-estimating ship size. We have now excluded such traffic where it has a severely distorting affect as in Jambi. Tidal operations also impact this discrepancy and it is probable that both factors are at work.

Another reason may be because load factors for international ships appear quite low possibly suggesting larger vessels are part loaded when calling at smaller ports or inaccurate data. The load factors for the period 1995 to 1999 were reviewed and any trend assessed.

18.5.4 Other Factors

Whether ship calls increase, depends on the relative size of cargo growth relative to the increase in ship size or change in load factors. Therefore, the ship call forecast depends on both the growth in cargo and other factors.

18.5.5 Passenger Ship Calls

In addition to the forecast of cargo ships, the passenger ship forecast, estimated in Section 3.2 above, is shown. In Jambi, passenger ships are completely separate from the projected calls at Muara Sabak and Talang Duku, and hence are independent of cargo ship calls.

18.5.6 Ship Call Projections

The following tables show the estimated ship call and average GRT data with the relevant assumptions attached to each table.

**Table 18.5.1 Forecast of Ship Calls according to Location and Main Handling Type
(With Project, High Case)**

SHIP CALLS AND CARGOES 2000				
Location	Cargo Type	Cargo Volume (000 tonnes)	Ship Calls	Average GRT (not average tonnes)
Talang Duku	General	80	720	250
(Public)	Container	130	260	50 (teu)
Private Wharves (Up stream Batanghari River)	General	2,214	812	1,745
Muara Sabak (Downstream)	General Cargo	146	260	438
Total 2000	All Cargoes	2,570	2052	908

Note: Private containers not distinguished by river location so all included as general cargo

SHIP CALLS AND CARGOES 2007				
Location	Cargo Type	Cargo Volume (000 tonnes)	Ship Calls	Average GRT
Talang Duku	General	29	60	350
(Public)	Container	89	73	1,000
	Bulks (Coal/CPO)	719	512	1,150
Jambi Upstream	General	453	290	1,090
Private	Bulks (Coal/CPO)	419	293	1,150
Muara Sabak				
Public	General Cargo	88	85	900
	Container	267	200	1,020
Muara Sabak				
Private (Downstream)	General Cargo	2,109	945	1,600
	Bulk (Coal)	100	50	2,000
Total 2007	All Cargoes	4,273	2,508	1,258

Note: 'With' project, High Case; Tables on simulation give with and without project and high low scenarios to avoid duplication

Table 18.5.1 (Continued)

SHIP CALLS AND CARGOES 2025				
Location	Cargo Type	Cargo Volume (000 tonnes)	Ship Calls	Average GRT
Talang Duku Port (Public)	General	77	120	750
	Container	709	552	1,100
	Bulks (Coal/CPO)	1,367	971	1,200
Jambi – private (Upstream)	General	262	185	1,200
	Bulks (Coal/CPO)	967	722	1,260
Muara Sabak Public Port	General Cargo	232	48	3,300
	Container	2,127	474	3,700
Muara Sabak Private (Downstream)	General Cargo	4,333	773	3,855
	Bulk (Coal)	1,200	217	4,500
Total 2007	All Cargoes	11,274	4,062	2,180

NOTE: From 2007, Batanghari private/khusus traffic is divided into upstream, called Jambi (city) area and downstream called Muara Sabak area.

Data excludes Kuala Tungkal.

These data have been adapted to fit the simulation analysis's data requirements and therefore may not correspond in every case to other sources in this report.