Impacts of Coal Railroad Transportation Project on GDP Promotion and Unemployment Reduction in Bengkulu Province, Indonesia

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ABSTRACT

A massive, advanced and integrated railroad system for coal transportation (referred to hereafter as "Project") from Muara Enim, Sumatra Selatan Province to the new coal port at Pulau Baai, Bengkulu Province, Indonesia is developed by a private investor together with the local government (PEMDA) of Bengkulu Province to make the best use of abundant coal resources in the region. This paper analyzes the impact of this Project on the Bengkulu economy, which is currently considered low. The Gross Domestic Product (GDP) is adopted as the economic indicator. The study combines the theories of export base and economic base, economic and regional developments, cost-benefit analysis and economic impact study with the empirical data. The results show the Project's financial feasibility with Cost-Benefit Ratio of 1.61, Internal Rate of Return of 21.1% and Payback Period of 5 years, which will provide a significant contribution to the Bengkulu GDP growth and a decrease of 821,600 people among the unemployed.

Keywords: railway coal transportation, GDP, decreasing unemployment, Bengkulu Province, Indonesia.

1. INTRODUCTION

Indonesia has one of the largest coal reserves in the Asia-Pacific region, with proven reserves of 7 billion tons, and these are found mostly in Kalimantan and Sumatra, with resources estimated at 32.9 and 27.3 billion tons respectively (Indonesian Ministry of Energy and Mineral Resource). Sumatra has 27.4 billion tons of coal resources and 2.7 billion tons of proven reserves, according to the Indonesian Coal Mining Association, suitable for power-generating activities, with sub-bituminous, low sulphur and ash content and average per Kgcaloric value of 5,000 – 6,000 calories.

Although resources in Sumatra are comparable in quantity with Kalimantan, Sumatra (especially Bengkulu and South Sumatra Provinces) is producing and exporting small quantities of coal compared with its potentials due to inadequate infrastructure (hauling access and port) for coal transportation. To meet this infrastructural inefficiency, a private investor together with the local government (PEMDA) of Bengkulu Province has developed a massive, advanced and integrated coal transportation system ("Project") including the followings:

A double track railway of ± 265 km in length to exclusively transport coal from major coal mines in Muara Enim, South Sumatra Province and around Bengkulu Province, as well as significant coal resources estimated at 16.6 billion metric tons in the immediate hinterland of the railway (Kurniawan, 2010) to a new coal port in Pulau Baai, Bengkulu Province, Sumatra, Indonesia. The Project will have a minimum capacity of 40 millions metric ton per annum (MTPA) and 100 MTPA for future plan.

The introduction of the Project may have significant and positive impacts on Bengkulu economy. According to Bengkulu Statistics Center (Badan Pusat Statistik / BPS Bengkulu, 2010), Bengkulu Province has a low GDP, a low income per capita, and a high rate of unemployment compared with other provinces. Although rich in natural resources, especially coal, Bengkulu has a poor infrastructure and geographical disadvantages of being isolated due to difficult natural terrain along with the neighboring provinces of South Sumatra, Padang and Jambi, which might somehow badly affect its economy.

This study is therefore conducted to analyze the impact of the development of a coal port and railroads to Bengkulu economy. The methodology used in this study is shown

in Figure 1. The economic indicator is the GDP. The impact on Bengkulu GDP may thus indicate the importance and value of the Project to the economy of Bengkulu.

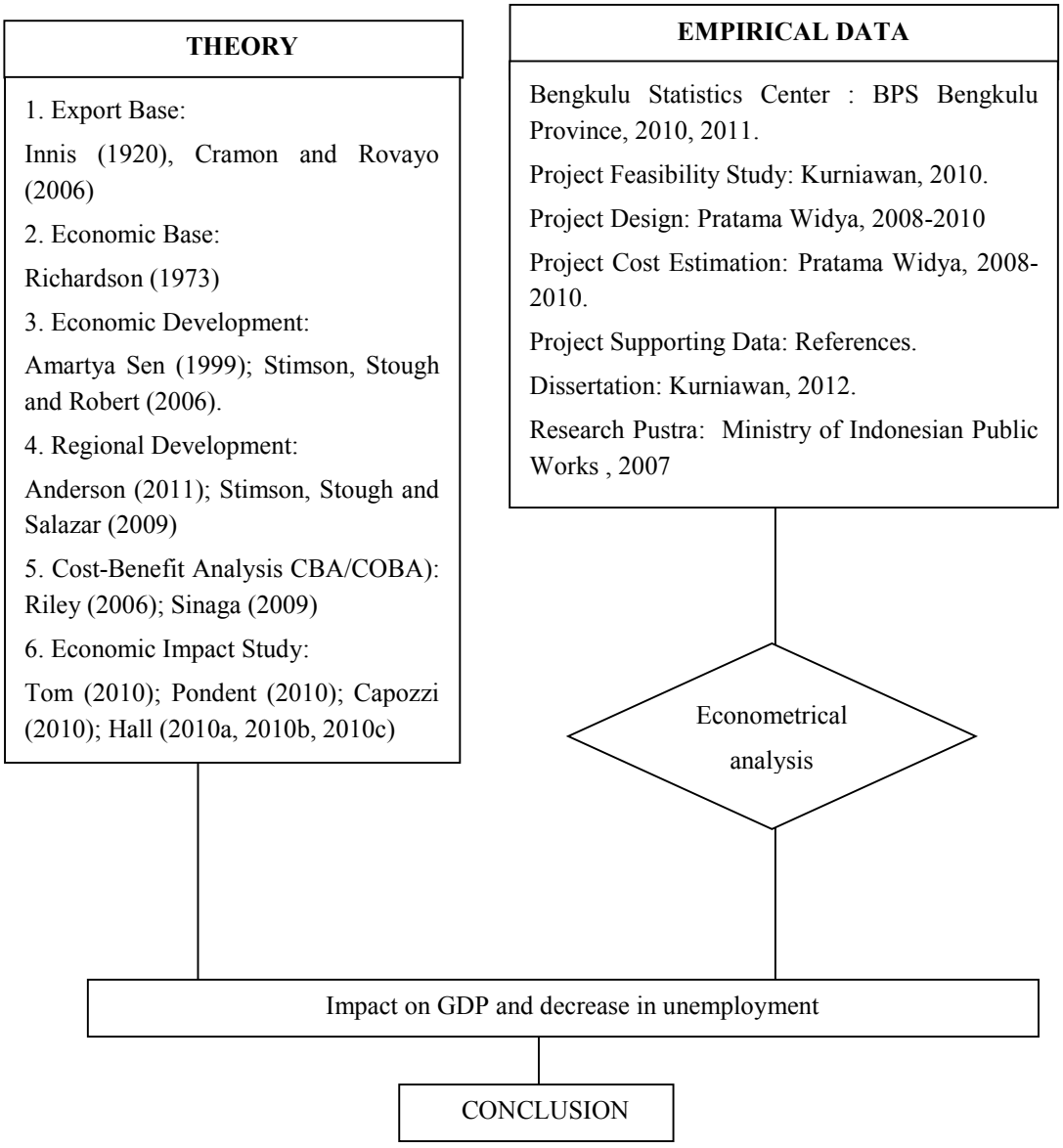


Figure 1: Study Methodology

The export-base theory was introduced by Harold Innis (England), in early 1920, and developed by North (1955), Dusenberry (1950), Andrews (1953) and deeply stressed by Cramon and Rovayo (2006). This theory refers to the Neo-classical

approach to regional growth based on resource areas in North America with the growth of the industry by exporting goods and services from region to region (Cramon and Rovayo, 2006).

The economic-base theory was first stated by Harry W. Richardson in 1973 (Arsyad, 2010), and it maintains that the main determinants of economic growth in an area are directly related to the demand for goods and services from the outside. Regional development strategies based on this theory usually give emphasis to the national and international markets (Arsyad, 2010).

Economic and regional development theory was well determined by Amartya Sen (1999), [Arsyad (2010); Stimson, Stough and Roberts (2006); Stimson, Stough and Salazar (2009)].

Cost-Benefit Analysis (CBA/COBA) is a technique for assessing the monetary social costs and benefits of an investment project over a given period of time. The investment criteria methods of project and their application might be determined by five models: (1) Net Present Value / Worth (NPV); (2) Cost-Benefit Ratio; (3) Profitability Index; (4) Payback Period; and (5) Internal Rate of Return / IRR (Gray et al., 1986; Riley, 2006; and Sinaga, 2009).

Economic impact study was described and studied by Pondent (2010); Capozzi (2010) and Hall (2010a, 2010b, 2010c).

Econometrical analysis method is carried out in the project's feasibility study on secondary time series data for the years 2011 - 2040, using the regression and path analysis with Eviews program (Kurniawan, 2012).

The framework of variable links is as follows:

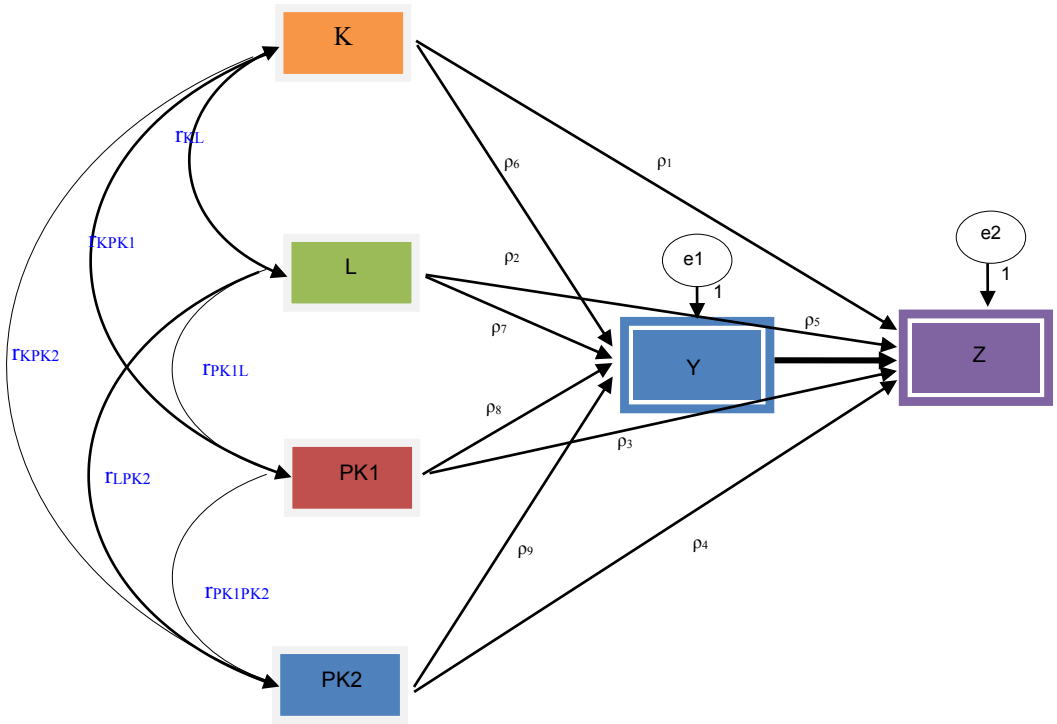


Figure 2: Framework of Variable Links

Independent variables : K, L, PK1, PK2

Dependent variable : Z

Intervening variable : Y

Where,

K = Private investment (Capital)

L = Labor

PK1 = Government expenditure on development

PK2 = Government expenditure on education and healthcare

Y = Private output

Z = GDP

e = Disturbance variable (error)

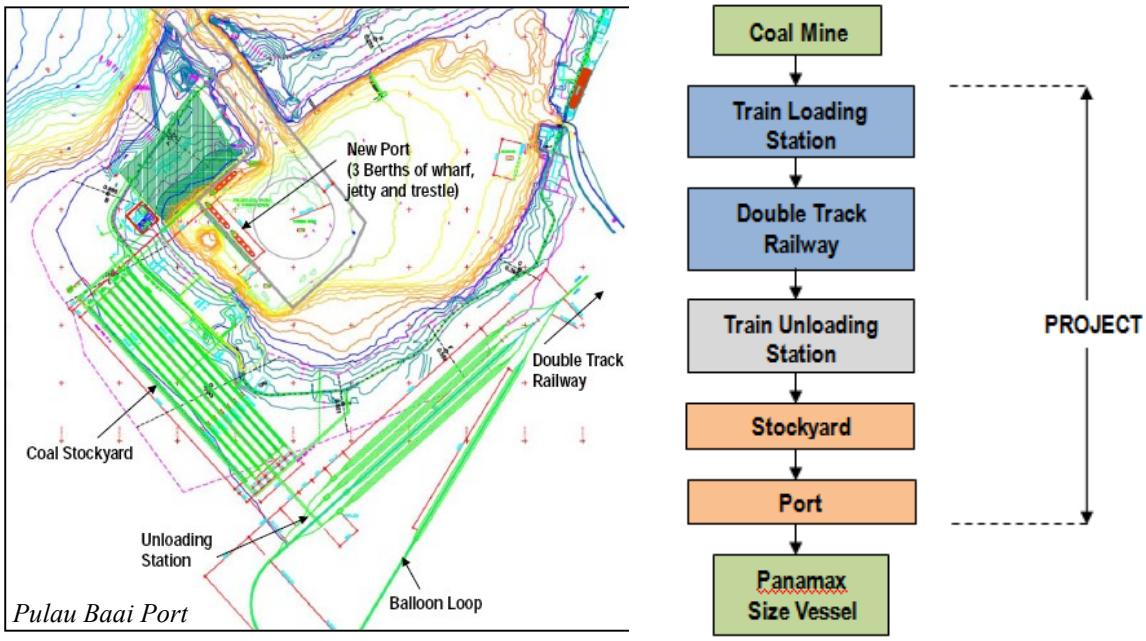
r = Correlation coefficient

ρ_1, ρ_9 = Path coefficient

2. PROJECT DEFINITION STATEMENT

The project is to develop an integrated coal transportation system from coal mines in Bengkulu and Sumatera Selatan Provinces to Pulau Baai Port in Bengkulu Province. The system is designed to be of high capacity, efficient and reliable, and equipped with advanced facilities to meet the target minimum capacity of 40 MTPA and maximum 100 MTPA in the future. The railroad alignment has been chosen as the most efficient route through the selected areas from the mines to the Pulau Baai Port considering all key factors such as geographical obstacles, existing infrastructure, protected, restricted, populated and environmentally sensitive areas (Kurniawan, 2010).

The coal transportation model is shown in Figure 3, while the adopted key elements in this coal railroad transportation Project are shown in Table 1. The required significant amount of electricity for this Project will be supplied by other parties.



Source: Kurniawan, 2010

Figure 3: Coal Port Plan and Coal Transportation Model

Table 1: Coal Transportation System - Key Elements

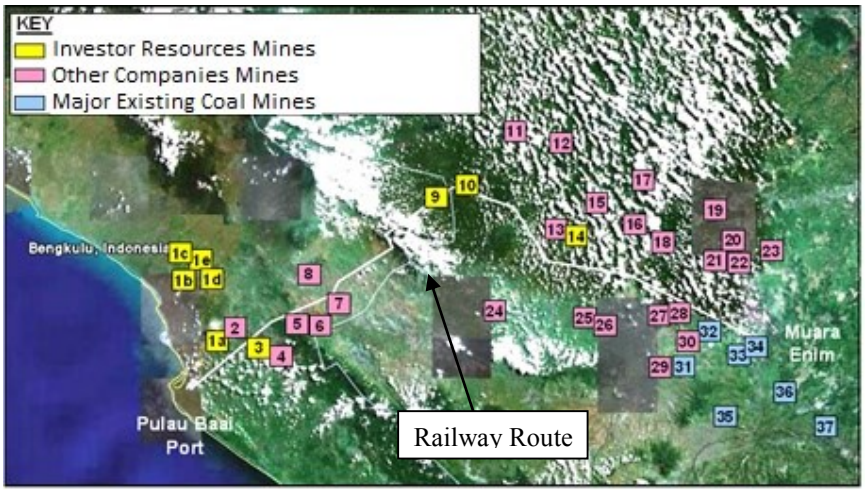
No	ITEM	REMARKS
A	**PORT**	**PulauBaai, Bengkulu Province**
1	Wharf, jetty and trestle	3 berths for 3 Panamax vessels (70,000 DWT). Operating: 320 days/annum, equipped with 3 ship loaders.
2	Stockyard terminal	2,000 m x 500 m, storage capacity: 5.5 million metric ton. Consists of 6 rows of coal stockpiles with 7 track lines for 3 stackers and 4 re-claimers. Conveyor system for coal hauling.
3	Train unloading station	Wagon Dumper: 2 sets for 40 MTPA, or 4 sets for 100 MTPA. Coal crushing system and ± 5 km in length, balloon loop.
4	Port operational facilities	Operational office, control tower, port authority, immigration and custom, fire station, hospital, warehouse & workshop, dormitory, security and safety office, police station.
5	Port facilities and utilities	Water & effluent treatment, fuel & water refueling, utilities, lighting, coal sampling & laboratory, fire protection, dust suppression, iron removal, metering devices, security system.
6	Dredging and reclamation	Dredging the port basin and channel to – 15 LWS level. Major dredging: ± 14,000,000 m^3, Annual: ± 500,000 m^3. Reclamation: Stockyard and eroded area.
B	**RAILROAD**	**Route: MuaraEnim (South Sumatra) to PulauBaai (Bengkulu)**
1	Railroad track	265 km double track (50 m ROW), standard gauge 1,435 mm, flat footed UIC 60 -25 ton axle load, pre-stressed concrete sleeper. Max 1.5 % max grade (loaded & unloaded), 800 m min curve radius.
2	Operating	320 days/annum, 21 hour average turn around/trip. Speed: 80 km/hour (straight), 40 km/hour (curve).
3	Train loading station	3 locations: Tabapenanjung, Kota Padang and MuaraEnim Facilities: balloon loop, crushing, stockyard, train loader, office.

4	Train set operation	21 train sets for 40 MTPA: 42 locomotives & 1575 wagons.
5	Train	Electric powered, with Diesel unit for emergency (4 locomotives).
6	Crossing	Major bridges (>300m): 18 units, minor bridges (<300m): 17 units.
7	Tunnel	4 km in length.
8	Signaling and communication	Computerized and distance monitoring.
9	Railroad facilities and utilities	Marshaling yard, maintenance stations, siding stations, switching, security fencing, drainage, loading station facilities & utilities.
C	**MAIN EQUIPMENT**	**Coal Handling and Railroad**
1	Wagon dumper/ tippler	O type, triplicate wagon dumper (triplet), capacity: 27 cy/hour.
2	Stacker and re-claimer	Slewing 44m, counter 295 tons, height: 13.5 m, capacity: 6,000 tons/hour.
3	Ship loader	Long traveling, luffing type, capacity: 6,000 tons/hour.
4	Conveyor belt	Shed type, width: 2,000 mm, speed: 5 m/second.
5	Locomotive SS4B type (electric)	6,400 HP, average speed: 80 km/hour, max speed: 100 km/hour.
6	Locomotive SS4B type (diesel)	8,700 HP, average speed: 80 km/hour, max speed: 100 km/hour.
7	Train wagon	C80 wagon, capacity: 80 ton, max speed: 100 km/hour.
D	**POWER**	**Electricity from Power Plant**
1	Electricity demand	165 MW for Railroad, 30 MW for Port (200MW for whole operation).
2	Electricity supply	Mine Mouth Coal Fired Steam Power Plant (developed by sister's company) Underdevelopment State Owned Geothermal Power Plant

Source: Kurniawan, 2010; CCCC, 2008 - 2009; CCFD, 2009; CNR Datong, 2009; CRCC, 2009; CSR, 2006; Dahlian, 2009; PratamaWidya, 2008 – 201; QRRS, 2009; and Shenyang, 2009

3. EXPORT AND ECONOMIC BASE THEORIES

Figure 4 shows an overview map of coal mines and resources along the railroad alignment which has been estimated at 16.6 billion tons of coal resources (Kurniawan, 2010). According to the export-base theory, the abundant coal resources may promote opportunity for economic growth in Bengkulu Province from coal exploitation, transportation and export through the Pulau Baai Port in Bengkulu.



COAL	CALORIE	RESERVES (MILLION TON)	REMARKS
	4500 - 7100	117.25	Investor Resources' Mines
	<5100, 5000 - 7000	10,388.78	Other Companies' Mines
	<5100, 5000 - 7000	6,105.96	Major Existing Coal Mines
Total Resources = 16,611.99			

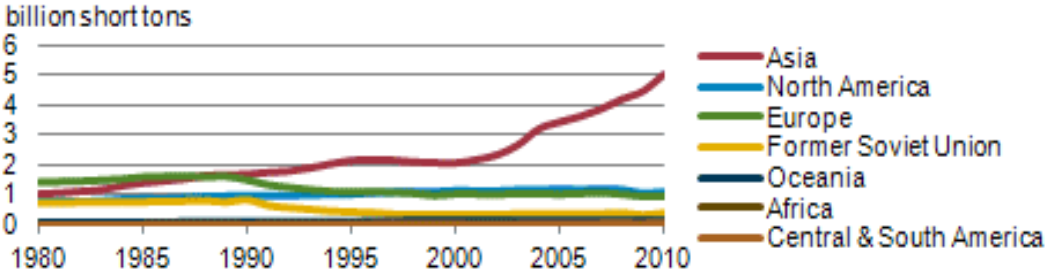
Source: Kurniawan, 2010

Figure 4: Map of Coal Mines along the Railroad Alignment

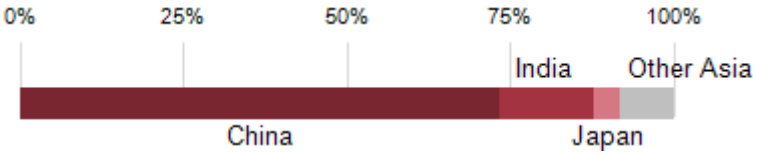
Coal is one of the most important commodities globally today and is one of the main fuel source for the world's electricity production. According to US Energy Information Administration the worldwide coal consumption has doubled since 1980, mainly driven by increase in Asia as shown in Figure 5. The Asian demand is dominated by China and India, where the former accounts for 73 percent of Asia's

consumption and almost half of global coal consumption. Furthermore, the domestic demand for coal is also increasing to meet the Indonesian energy shortage.

According to the economic base theory, this promising coal demand particularly in China and India as well as from Indonesian market, and together with the introduction of this coal transportation Project, will determine significant economic growth in Bengkulu Province.



a. World Coal Consumption by Region (US Energy Information Administration)



b. Coal Consumption Share in Asia (U.S. Energy Information Administration, 2011)

Figure 5: Worldwide Coal Consumption

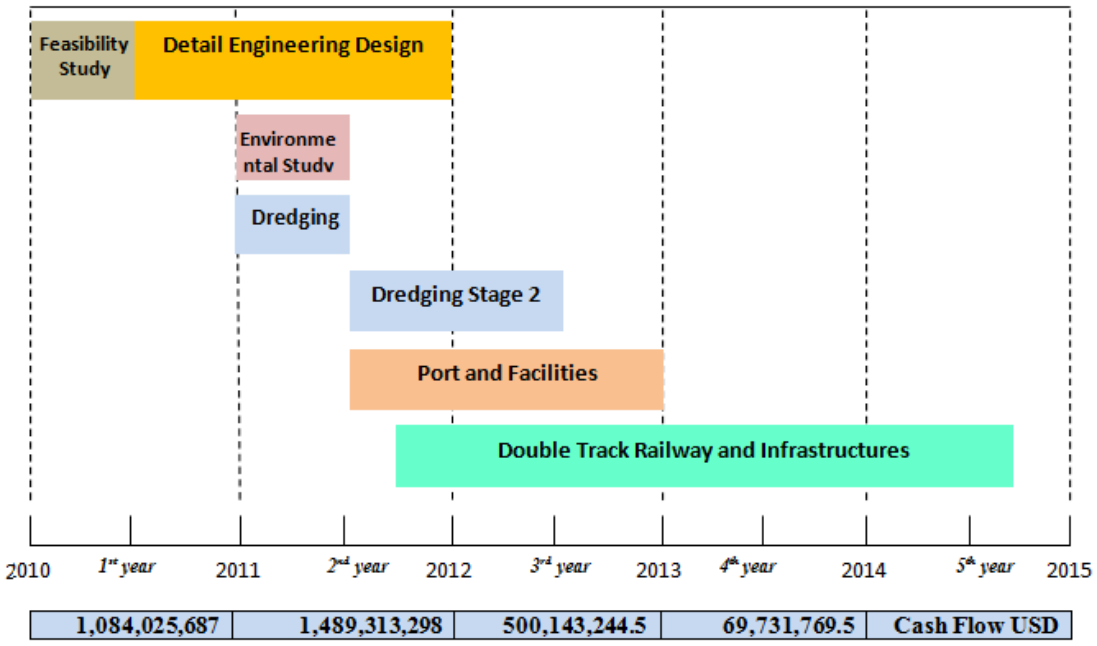
4. COST-BENEFIT ANALYSIS

The Project investment value = Project cost + contingency fee + cost of debt. The Project cost covers the entire development cost from design stages, licenses, land acquisition, construction, and procurement of main coal processing equipments until project handover. Contingency fee is the unexpected cost incurred during construction due to an inaccuracy, price escalation, and other unpredictable issues, while cost of debt is a value of interest during the construction. Table 2 shows the estimated Project investment value, and Figure 6 shows the cash flow distribution during the Project construction that is estimated at 3.5 years.

Table 2: Investment Value of the Coal Transportation Project

NO	ITEM	TOTAL COST (USD)
1	Feasibility study , Engineering design and Environmental study	50,655,375
2	Dredging work (from existing up to – 15m at channel & basin)	80,006,750
3	Coal port (for 3 Panamax vessels) including facilities	310,548,054
4	Stockyard area (2.000 x 500 m^2) including facilities	364,667,266
5	Double track railroad (265 km) including facilities	2,077,341,627
6	Cost of debt, interest payments during construction	120,000,000
7	Contigency cost	139,994,928
	Total (excluding VAT)	**3,143,214,000**

Source: Pratama Widya, 2010b



Source: Kurniawan, 2010

Figure 6: Project Time Schedule and Cash Flow during Implementation

Based on the investment value, this Project can be categorized as a Mega Infrastructure Project that requires substantial investment funds. The financial model adopted for this study is as follows:

Investor equity : 30%

Loan/ external fund: 70% ("Joint In", "Joint Support" and "Public Support" to the potential investor partners, banks and public market)

Revenue for this Project will be mainly from unloading service fee at the developed port, vessel passing fee through the dredged Pulau Baai channel, and railroad transportation fee from the coal mines to the Pulau Baai port. Table 3 shows the Project revenue during the project lifetime. The unit rate fees are according to the investor contract agreement with the coal mine clients.

Table 3: Project Revenue Sources

No.	ITEM	VOLUME Million mT	CONTRACT RATE USD / mT	YEARLY REVENUE Million USD
A	Port			
A.1	Unloading fee at Pulau Baai Port, Bengkulu	40	5	200
A.2	Channel fee at Pulau Baai, Bengkulu	40	4	160
B	Railroad			
B.1	Coal mines at intermediate hinterland of railroad route,	20	14.5	290
B.2	Major existing coal mines in Muara Enim	20	14.5	290
	Total			**850**

Note: Contract rate will increase in every 8 years after operation starts.

Table 4: Assumed Project Financial Analysis

No	ITEM	REMARKS
1	Inflation Rate	Year 2010: 6.96% (Bank of Indonesia). Assumed rate: Year 1 – 5: 6%, Year 6 – 10: 5%, Year 11 – 30: 4%.
2	Operation and Maintenance	Basic operation: 1%/yr of investment Basic maintenance: 1.5%/yr of investment Electricity: US$0.8/kwh (under development state-owned geothermal power plant).
3	Miscellaneous Expenses and Salvage Value	Miscellaneous expenses and royalty: 0.5%/yr of operation cost. Salvage value: 1% of investment.
4	Settlement and Interest	Settlement period: 15 years (after construction completed). Loan model: 70% of investment (USD 2,200,249,800). Interest rate: 10% of flat (Bank of Indonesia, 2010).
5	Depreciation	Basic depreciation period: 15 years.
6	Tax	Tax value: 30% of net income (Indonesian Tax Regulation).

Source: Kurniawan, 2010

The cost-benefit analysis of the Project is based on the Project revenue and cost drivers (Tables 3 and 4). The financial analysis for the first stage of Project lifetime (30 years of operation) is summarized in Table 5, where three analysis models are adopted: (1) Cost- Benefit Ratio; (2) Internal Rate of Return (IRR); and (3) Payback Period.

Table 5: Cost-Benefit Analysis during the Project Lifetime

Table 5.1: Benefit-Cost Ratio and Internal Rate of Return

YEAR OF		INVESTMENT (USD)	OPERATION AND MAINTENANCE (USD)	MISCELLANEOUS EXPENSES (USD)	SETTLEMENT (USD)	INTEREST (USD)	DEPRECIATION (USD)	REVENUE/ BENEFIT (USD)	NET INCOME (USD)	TAX (USD)	CASH FLOW (USD)	PRESENT VALUE (USD)		NPV_0 / (NPV_0 - NPV_1)	COST BENEFIT RATIO	IRR (%)
NO	PROJECT											10%	15%			
		1	2	3	4	5	6	7	8	9	10					
1	2011	751.229.801	7.588.180	37.941				-	(7.626.121)	-	(7.626.121)	(6.932.144)	(6.630.912)			
2	2012	1.032.094.116	10.425.193	52.126				-	(10.477.319)	-	(10.477.319)	(8.658.456)	(7.921.901)			
3	2013	346.599.268	3.501.003	17.505				-	(3.518.508)	-	(3.518.508)	(2.643.455)	(2.313.419)			
4	2014	48.324.116	488.122	2.441				-	(490.563)	-	(490.563)	(335.055)	(280.455)			
5	2015		194.808.000	974.040	146.683.320	220.024.980	209.547.600	850.000.000	77.962.060	23.388.618	264.121.042	163.992.755	131.294.570			
6	2016		204.548.400	1.022.742	146.683.320	198.022.482	209.547.600	850.000.000	90.175.456	27.052.637	272.670.419	153.895.185	117.875.422			
7	2017		214.775.820	1.073.879	146.683.320	178.220.234	209.547.600	850.000.000	99.699.147	29.909.744	279.337.003	143.327.816	105.002.779			
8	2018		225.514.611	1.127.573	146.683.320	160.398.210	209.547.600	850.000.000	106.728.686	32.018.606	284.257.680	132.606.208	92.923.836			
9	2019		236.790.342	1.183.952	146.683.320	144.358.389	209.547.600	850.000.000	111.436.397	33.430.919	287.553.078	121.922.505	81.722.585			
10	2020		248.629.859	1.243.149	146.683.320	129.922.550	209.547.600	850.000.000	113.973.522	34.192.056	289.329.065	111.536.355	71.493.212			
11	2021		258.575.053	1.292.875	146.683.320	116.930.295	209.547.600	850.000.000	116.970.856	35.091.257	291.427.199	102.116.091	62.627.705			
12	2022		268.918.055	1.344.590	146.683.320	105.237.266	209.547.600	850.000.000	118.269.169	35.480.751	292.336.018	93.138.255	54.637.602			
13	2023		279.674.777	1.398.374	146.683.320	94.713.539	209.547.600	850.000.000	117.982.390	35.394.717	292.135.273	84.602.375	47.471.982			
14	2024		290.861.768	1.454.309	146.683.320	85.242.185	209.547.600	986.000.000	252.210.817	75.663.245	386.095.172	101.658.859	54.555.248			
15	2025		302.496.239	1.512.481	146.683.320	76.717.967	209.547.600	986.000.000	249.042.393	74.712.718	383.877.275	91.861.832	47.140.129			
16	2026		314.596.089	1.572.960	146.683.320	69.046.170	209.547.600	986.000.000	244.553.841	73.366.152	380.735.289	82.847.999	40.662.529			
17	2027		327.179.932	1.635.900	146.683.320	62.141.553	209.547.600	986.000.000	238.811.695	71.643.508	376.715.786	74.514.383	34.996.897			
18	2028		340.267.130	1.701.336	146.683.320	55.927.398	209.547.600	986.000.000	231.873.217	69.561.965	371.858.852	66.860.222	30.046.195			
19	2029		353.877.815	1.769.389	146.683.320	50.334.658	209.547.600	986.000.000	223.787.218	67.136.165	366.186.653	59.873.480	25.707.145			
20	2030		368.032.927	1.840.165				986.000.000	616.126.908	184.838.072	431.288.836	64.089.521	26.351.748			
21	2031		382.754.244	1.913.771				986.000.000	601.331.984	180.399.595	420.932.389	56.867.966	22.351.510			
22	2032		398.064.414	1.990.322				986.000.000	585.945.264	175.783.579	410.161.685	50.367.855	18.949.470			
23	2033		413.986.991	2.069.935				1.184.000.000	767.943.074	230.382.922	537.560.152	59.991.713	2.203.997			
24	2034		430.546.470	2.152.732				1.184.000.000	751.300.797	225.390.239	525.910.558	53.379.922	18.354.278			
25	2035		447.768.329	2.238.842				1.184.000.000	733.992.829	220.197.849	513.794.980	47.371.897	15.567.988			
26	2036		465.679.062	2.328.395				1.184.000.000	715.992.542	214.797.763	501.194.780	42.050.242	13.231.542			
27	2037		484.306.225	2.421.531				1.184.000.000	697.272.244	209.181.673	488.090.571	37.192.501	11.177.274			
28	2038		503.678.474	2.518.392				1.184.000.000	677.803.134	203.340.940	474.462.194	32.880.230	9.441.798			
29	2039		523.825.613	2.619.128				1.184.000.000	657.555.259	197.266.578	460.288.681	28.998.187	7.962.994			
30	2040		544.778.637	2.723.893				1.215.432.140	667.929.610	200.378.883	467.550.727	26.790.857	7.060.016			
							3.143.214.000		9.844.557.999	2.960.001.153		2.066.165.899	1.133.663.764	2,216	1,608	21,079
			INCLUDING 4-6% INFLATION RATE	FLAT			DEPRECIATION 10% AFTER OPERATION	FLAT REVENUE EVERY 9 YEARS AND WILL BE ADDED BY SV AT YEAR 31TH		30% FROM NET INCOME AFTER OPERATION		DF_0 = DISCOUNT FACTOR AT 10%	DF_1 = DISCOUNT FACTOR AT 15%			

Source: Kurniawan, 2010

Table 5.2: Payback Period

YEAR OF		INVESTMENT (USD)	OPERATION AND MAINTENANCE (USD)	MISCELLANEOUS EXPENSES (USD)	DEPRECIATION (USD)	REVENUE/ BENEFIT (USD)	NET INCOME (USD)	TAX (USD)	CASH FLOW (USD)	CAPITAL'S RETURN
NO	PROJECT									
		1	2	3	4	5	6	7	8	9
1	2011	758.817.981	7.588.180	37.941			(7.626.121)	-	(7.626.121)	2.207.875.921
2	2012	1.042.519.309	10.425.193	52.126			(10.477.319)	-	(10.477.319)	2.218.353.240
3	2013	350.100.271	3.501.003	17.505			(3.518.508)	-	(3.518.508)	2.221.871.747
4	2014	48.812.239	488.122	2.441			(490.563)	-	(490.563)	2.222.362.310
5	2015		194.808.000	974.040	209.547.600	850.000.000	444.670.360	133.401.108	520.816.852	1.701.545.458
6	2016		204.548.400	1.022.742	209.547.600	850.000.000	434.881.258	130.464.377	513.964.481	1.187.580.978
7	2017		214.775.820	1.073.879	209.547.600	850.000.000	424.602.701	127.380.810	506.769.491	680.811.487
8	2018		225.514.611	1.127.573	209.547.600	850.000.000	413.810.216	124.143.065	499.214.751	181.596.736
9	2019		236.790.342	1.183.952	209.547.600	850.000.000	402.478.107	120.743.432	491.282.275	(309.685.539)
								PAYBACK PERIODS =		5 th Year

Source: Kurniawan, 2010

The cost-benefit analysis result shows the key financial values of the Project: Cost-benefit ratio of 1.61, IRR of 21.1%, and payback period of 5 years.

The Project cost-benefit ratio is much greater than 1.0, indicating that the Project produces benefits from the investment, and according to Gray (1986), is considered feasible.

The Project IRR of 21.1% being greater than the adopted interest rate or discounted market rate of 10% (Bank of Indonesia, 2010) indicates a high rate return from the investment. Although the interest rate is assumed flat for the 30-year period of Project lifetime, the high IRR value may still accommodate the possibility of increasing

interest rate. It is however unlikely that the interest rate may be higher than 15%, and the current trend shows reductions in interest rate (Bank of Indonesia, 2010). According to the general practice in oil and gas project in Indonesia, the acceptable minimum IRR value is 15% (Sinaga, 2009) due to the high risk degrees associated in the energy sector. As considered a Mega Project with high risks, the Project IRR value also meets the above-suggested IRR value. According to Sinaga (2009), a Project with payback period of 5 years is considered worth investing.

The cost-benefit analysis therefore suggests that this Project is financially feasible to develop and operate for a 30-year period of project lifetime, and presented high financial values are attractive in the eyes of investors.

5. IMPACT TO BENGKULU GROSS DOMESTIC PRODUCT

Regression and path analyses based on secondary data produce the following summary of direct, indirect and total influences between variables presented by the feasibility study:

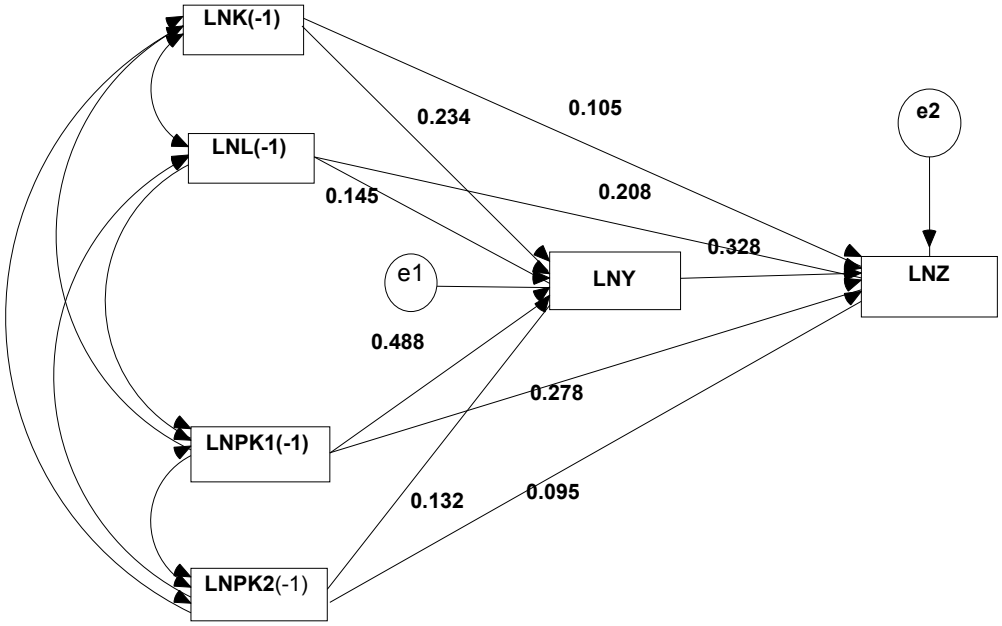


Figure 7: Framework of Direct, Indirect and Total Influences between Variables

Table 6: Summary of Direct, Indirect and Total Influences between Variables

Independent Variable	Influence Type	Dependent Variable	
		LNY	**LNZ**
LNK(-1)	Direct Influence	0.234	0.105
	Indirect Influence	-	0.077
	Total Influence	0.234	0.182
LNL(-1)	Direct Influence	0.145	0.208
	Indirect Influence	-	0.048
	Total Influence	0.145	0.256
LNPK1(-1)	Direct Influence	0.488	0.278
	Indirect Influence	-	0.160
	Total Influence	0.488	0.438
LNPK2(-1)	Direct Influence	0.132	0.095
	Indirect Influence	-	0.043
	Total Influence	0.132	0.138
LNY	Direct Influence	-	0.328
	Indirect Influence	-	-
	Total Influence	-	0.328

Source: Kurniawan, 2012

The analysis data shows that private output has significant contributions to increase in GDP of Bengkulu Province.

One of major contributions from the Project to Bengkulu GDP is its corporate income tax paid to the Bengkulu Local Government (PEMDA). Bengkulu and National Income Tax Agency in 2011 received a contribution of 3.4% and 70% from their GDP respectively (Indonesian Director General of Taxes). The Project income tax is set at 30% according to Indonesian Tax Regulation as shown in Figure 8.

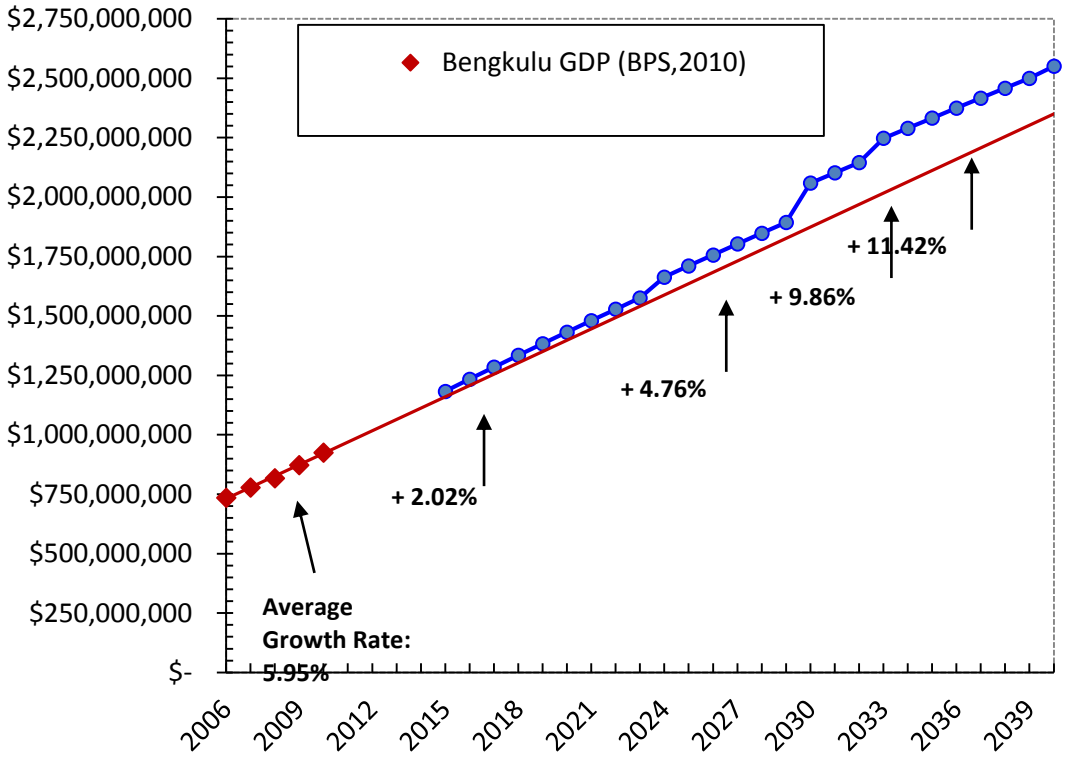


Figure 8: Impact of Project Income Tax on Bengkulu GDP Growth

Figure 8 presents the impact of Project income tax on the growth of Bengkulu GDP during the Project lifetime. The Bengkulu GDP growth is optimistically predicted to be linear based on the statistic data of Bengkulu GDP with a constant price base (BPS Provinsi Bengkulu, 2010) and compared with the addition of Project income tax.

It shows that after the Project comes into operation, the Project income tax will increase the Bengkulu GDP by 2.02% in 2015. The Bengkulu GDP growth will rise higher, by 4.76% by 2024, due to increases in the Project revenue (coal transportation unit rate increases in every eight years), and 9.86% by 2030 due to diminishing cost items such as settlement, interest payment and depreciation. With one unit increase in coal transportation unit rate, the Bengkulu GDP growth is estimated at 11.42% by 2033. This income tax contribution especially after 2024 gains a growth rate equal to, or higher than, the average GDP growth rate from year 2006 to 2010 (5.95%).

Furthermore, it is estimated that the Project income tax may only account for 1.98% of Bengkulu GDP at the beginning, but it will be a significant income for Bengkulu GDP by 2033, providing 10.25% of the total Bengkulu GDP as shown in Figure 9.

The above discussions indicate that the Project income tax alone provides significant benefits for Bengkulu GDP growth. This therefore highlights the importance of the Project to the economy of Bengkulu Province.

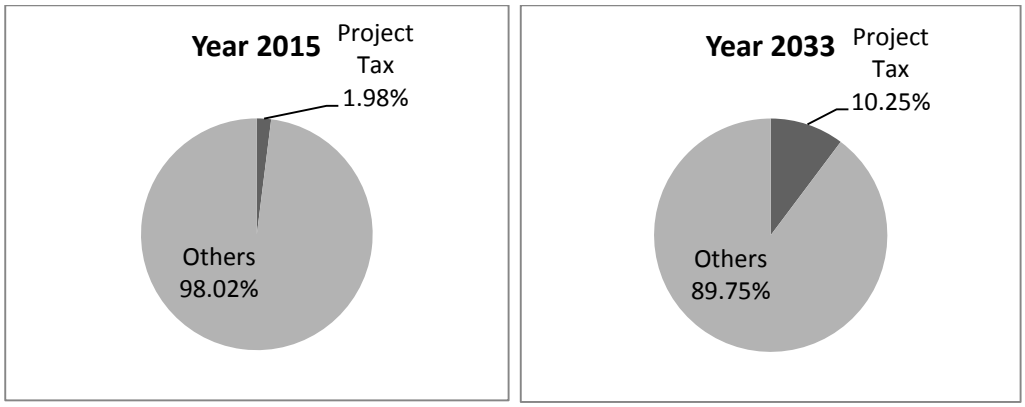


Figure 9: Share of Project Income Tax in Bengkulu GDP

Further studies can be conducted to analyze the impact of this Project operations to other economic indicators, such as: income per capita, local and regional developments, employment opportunities, infrastructure development, and export of other commodities through Pulau Baai Port, Bengkulu.

6. IMPACT ON BENGKULU UNEMPLOYMENT

Working population in Indonesia consist of people of age 15 to 64. In the last four years, the number of laborers in Bengkulu has increased significantly. The working population in Bengkulu in 2012 comprised 1,769,053 people, with an increase of 7.56% in the years 2005- 2012, (BPS, 2012).

The quality of labor force in Bengkulu in terms of education is considered relatively low. Most Bengkulu workers only finish primary education.

Bengkulu labor force by education and employment in May 2012 can be seen in Table 7.

Table 7: Labor Force in Terms of Education and Employment in May 2012 (BPS 2012)

No.	Labor quality	As %	Labor quality	As %
A	Education Level		Employment	
1	Non educated / primary school drop out and primary school graduated	47.22	Plantation	58.53
2	Junior high school graduated	21.72	Trading	15.31
3	Senior high school graduated	22.89	Services	14.12
4	Academy and university graduated	8.17	Others	12.04

Source: BPS 2012

Labor force participation rate (TPAK) is a ratio of the labor force and the overall size of national population of the same age range in 2012, namely 74.85%. Therefore, Bengkulu has a total of 74.85% x 1,220,800 or 913,768.8 workers.

The followings are estimated demand for labor for the Project:

Table 8: Estimated Labor Demand for the Construction of Coal Port and Railroad Project Without Their Multiplier Effects

No.	Item	Labor demand		
		Expatriate (Men/ Month)	Skilled (Men/ Month)	Unskilled (Men/Days)
A	Feasibility study and Engineering design	3,043	39,734	746,633
B	Dredging work (From existing up to – 15m at channel & basin)	7,073	9,079	4,340,079
C	Coal port (For 3 Panamax sizing)	3,300	57,750	24,458,675
D	Stockyard area (2,000 X 500 M2)	1,995	12,470	8,009,917
E	Double-track railroads (265 Km) and 20-Km balloon loop	6,200	31,719	13,047,958
	Total (Person)	515	3,589	39,611
	Total demand (Person)	43,715 persons		

Table 9: Estimated Labor Demand for Operation of Coal Port and Railroad

Operational Activities	Estimated Labor Demand (Person)		
	Expatriate	Skilled	Unskilled
Jakarta Management Head Office	6	22	10
Coal Port Operation	31	205	237
Coal Railroad Operation	23	279	279
Maintenance Dredging	2	15	25
Total		**1,134**	

Ministry of Indonesian Public Works, in 2007, conducted a research on contribution from infrastructure projects to job opportunities within projects themselves and in other sectors as well. The result shows that a project worth one trillion rupiah may create employment for 28,000 workers. Therefore, this Project capitalized at US$3,143,124,000 may create 31 x 28,000 = 868,000 jobs.

The statistical analysis from feasibility study shows that 30 time series data indicate 24,648,000 workers totally can be absorbed during 30 years with an average of 821,600 workers every year with standard deviation of 144,450. Employment trend graphs show the labor force tends to increase from year to year (Table 10 and Figure 10).

Table 10: Labor Description Data

Statistics

L: Labor (ribu orang)

N	Valid	30
	Missing	0
Mean		821.60
Std. Deviation		144.45
Minimum		168.00
Maximum		882.00
Sum		24,648.13

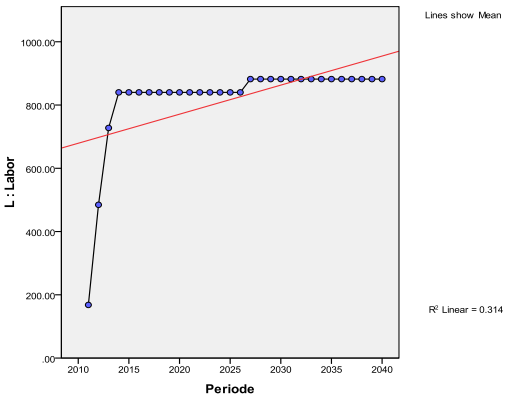


Figure 10: Labor Trend

7. CONCLUSION

This paper analyzes the impact of the railroads for coal transportation from Muara Enim, Sumatra Selatan Province, to the new port at Pulau Baai, Bengkulu, on Bengkulu GDP. The study combines the theories of export and import base, economic and regional developments, economic impact study and cost-benefit analysis with the empirical data. The results show that the Project is financially feasible and has high attractiveness towards investors. The generated Project tax income from output promotes the Bengkulu GDP growth, provides a major income to Bengkulu GDP and helps reduce unemployment rate. This study also shows the significant and important value of the Project to the Bengkulu economy and decreases in the unemployment.

8. ENDNOTES

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