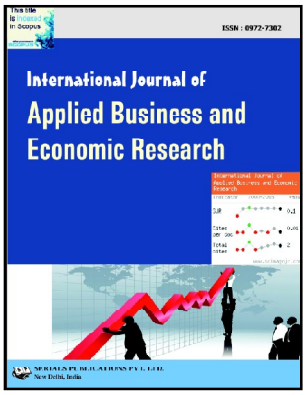

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Study of the Impact of Railway Coal Transportation Project to Contribute the Growth of Gross Domestic Product in Bengkulu Province, Indonesia

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Abstract: The advanced and integrated coal transportation system, namely Railway Project from Muara Enim, Sumatra Selatan Province to 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 optimize the abundant coal resources in the region. A study is conducted to analyze the impact of the introduction of this Project on the Bengkulu economy which is currently considered as low. A Gross Domestic Product (GDP) income is adopted as the economy 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 presented in this paper show the Project's financial feasibility with a Benefit Cost Ratio of 1.61, Internal Rate of Return of 21.1% and Payback Periode of 5 years, which will provide a significant contribution to the Bengkulu Gross Domestic Product (GDP) growth.

Keywords: Railway Coal Transportation, GDP, 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 which 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 particularly in Bengkulu and South Sumatra Provinces is producing and exporting insufficient amounts of coal 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 are developing a massive, advanced and integrated coal transportation system ("Project") as follows:

1. A double track railway of ± 265 km 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
2. New coal port in Pulau Baai, Bengkulu Province, Sumatra, Indonesia. The Project will have a minimum 40 Millions Metric Ton per Annum (MTPA) capacity and 100 MTPA for future plan.

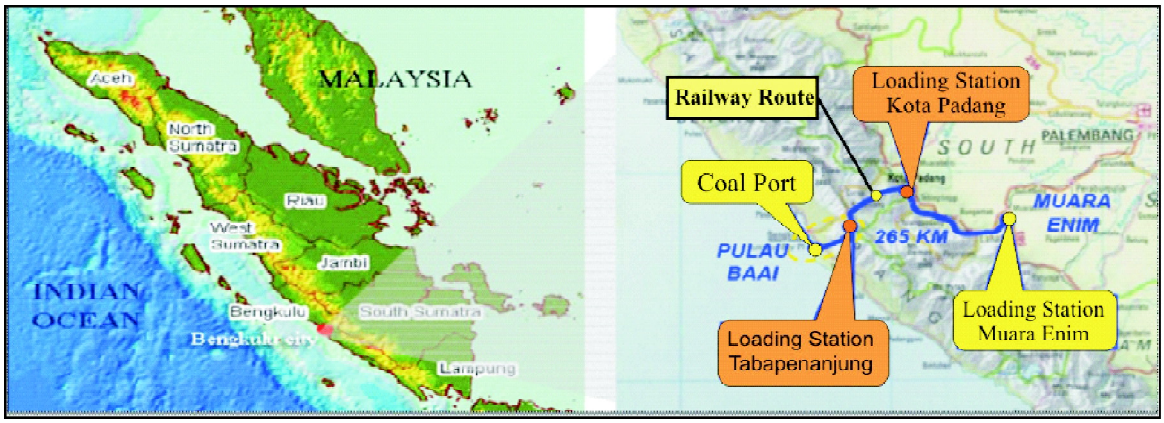


Figure 1: Coal Port and Railway Route from Muara Enim to Bengkulu, Indonesia

Source: Kurniawan (2010)

The introduction of the Project may have significant positive impact on the Bengkulu Economy. According to the Bengkulu Statistic Center (Badan Pusat Statistik / BPS Bengkulu, 2010), Bengkulu Province has low Gross Domestic Product (GDP) income, low income per capita, and a high rate of unemployment in Indonesia. Although Bengkulu province has an abundance of natural resources particularly coal, it has poor infrastructures and geographic disadvantages of being isolated due to difficult natural terrain from the neighboring provinces of South Sumatera, Padang and Jambi,reasons which might contribute to its poor economy.

A study is therefore conducted to analyze the impact of the development of a coal port and railway to/ on the economy of Bengkulu Province. The methodology used in this study is shown in Figure 1. The applied economy indicator is the Gross Domestic Product (GDP) income. The impact to the Bengkulu GDP may thus indicate the significance/relevance and value of the Project for the economy of Bengkulu Province.

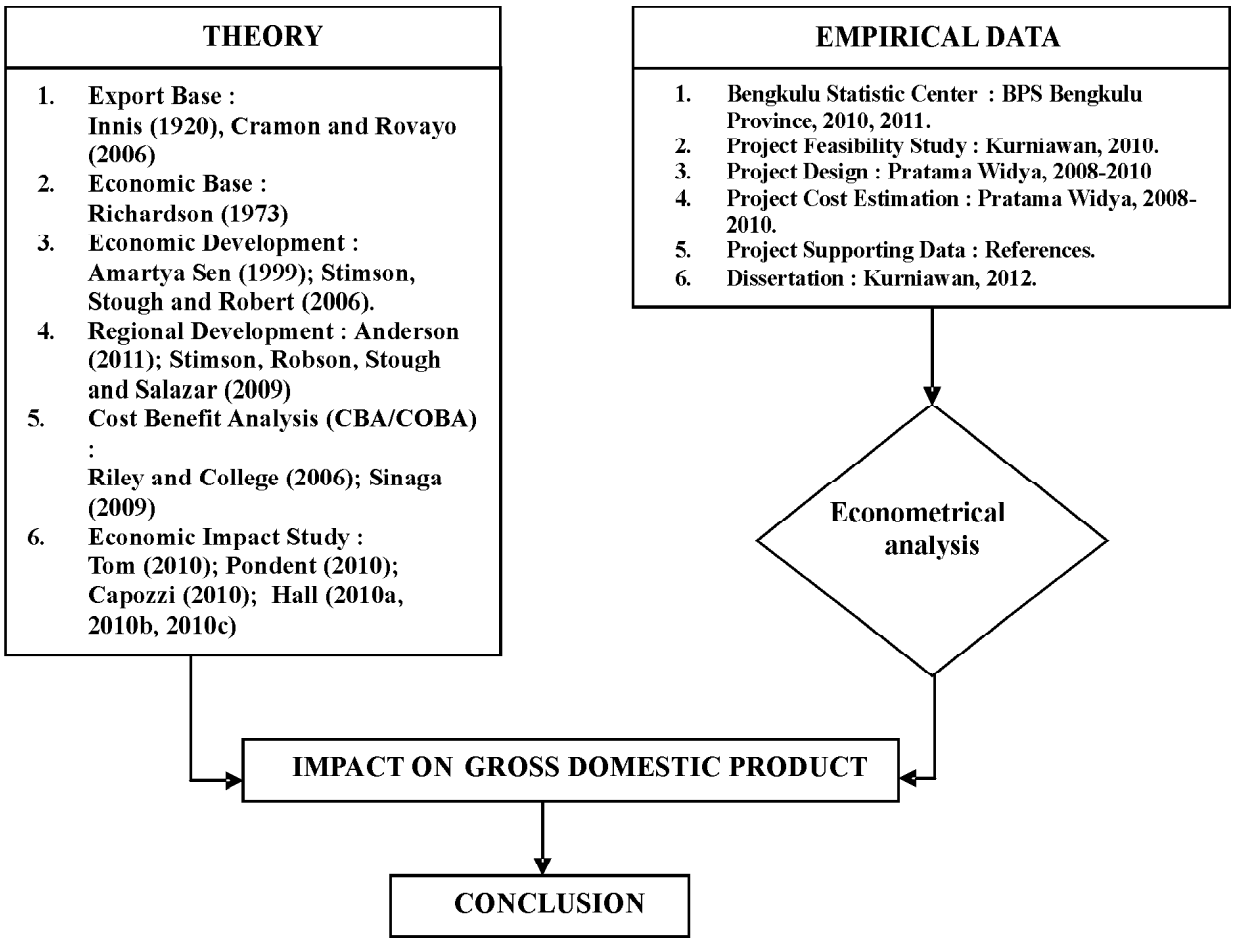


Figure 2: Study Methodology

The export base theory was introduced by Harold Innis (England), at the beginning of year 1920, and developed by North (1955), Dusenberry (1950), Andrews (1953) and specifically stressed by Cramon and Rovayo (2006). This theory refers to the Neoclassical approach to regional growth based on resource areas in North America with the economic growth of the industry by exporting goods and services from region to region because of the resources of an Area (Cramon and Rovayo, 2006).

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

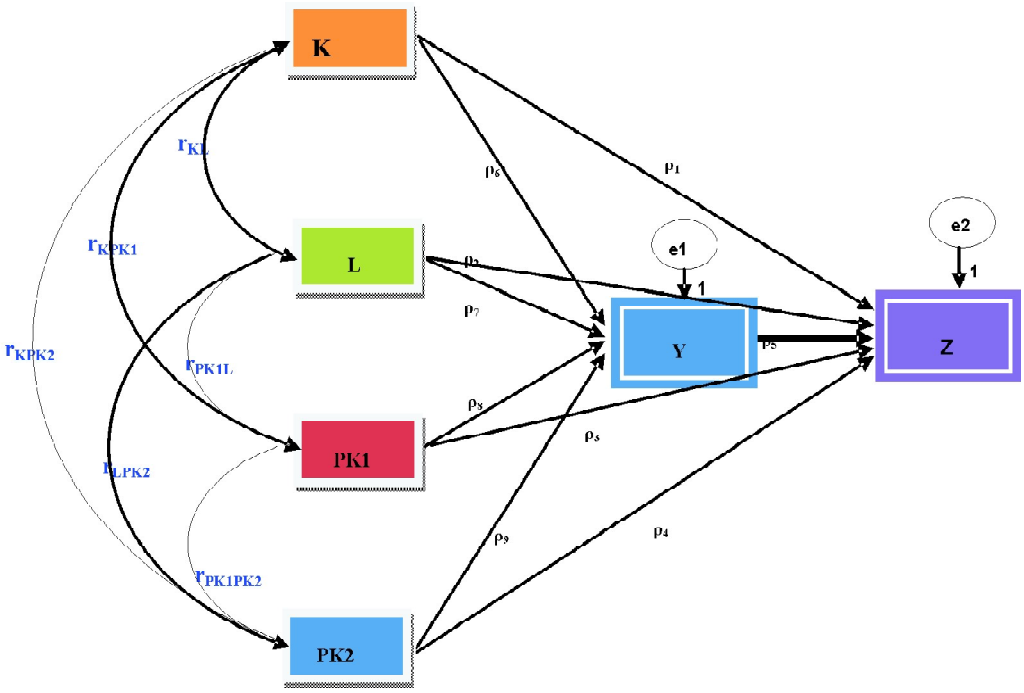
The economic and regional developments theory was well determined by Amartya Sen (1999), source : Arsyad (2010); Stimson, Stough and Robert (2006); Stimson, Robson, Stough and Salazar (2009).

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

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

The econometrical analysis method had been carried out from the project feasibility study as a secondary time series data from year of 2011 - 2040, using the regression and path analysis with Eviews program (Kurniawan, 2012).

The Variable links Framework is as follows,



Independent Variables : *K, L, PK1, PK2*
Dependent Variable : *Z*
Intervening Variable : *Y*

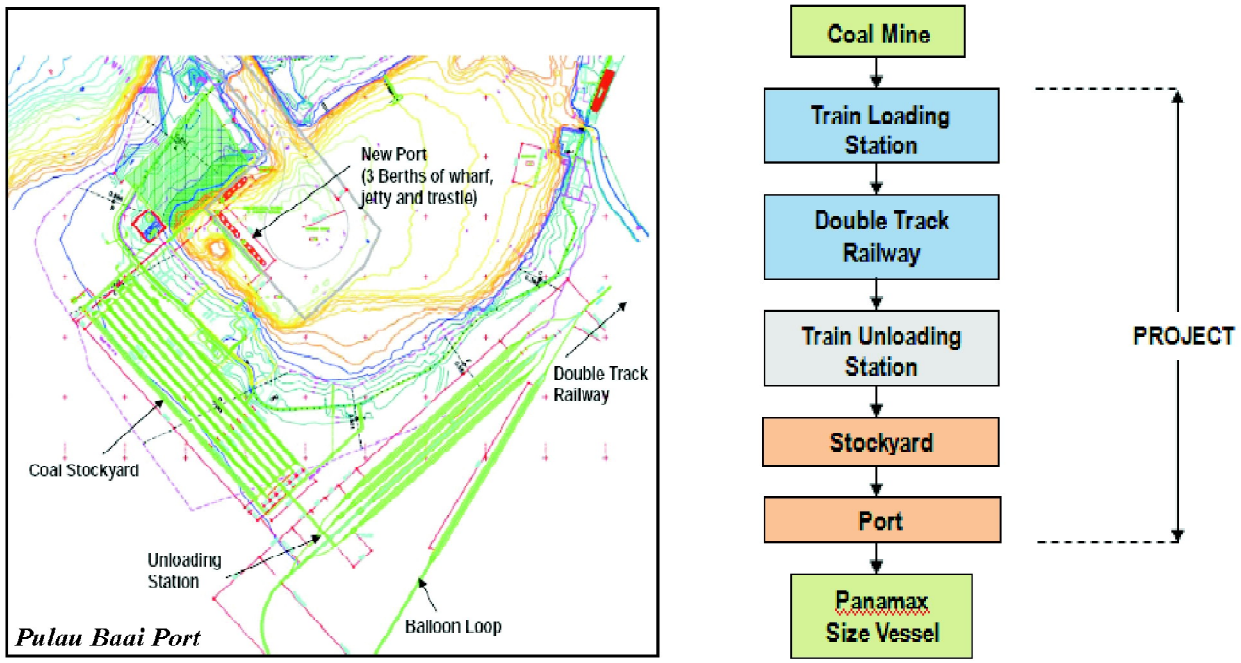
Where,

K	=	Private Investment (Capital)
L	=	Labor
PK1	=	Government Spending for Development
PK2	=	Government Spending 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 the coal mines in Bengkulu and Sumatera Selatan Provinces to Pulau Baai Port in Bengkulu Province, capable of high capacity, an efficient and reliable system, and equipped with advanced handling equipments to meet the target minimum capacity of 40 MTPA and maximum 100 MTPA for future plan. The railway alignment has been chosen as the most efficient route through the selected area 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 railway 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 millionmetric ton.Consists of 6rows coal stockpiles with 7 track lines for 3 Stackers and 4 re-claimers.Conveyor system for coal hauling.

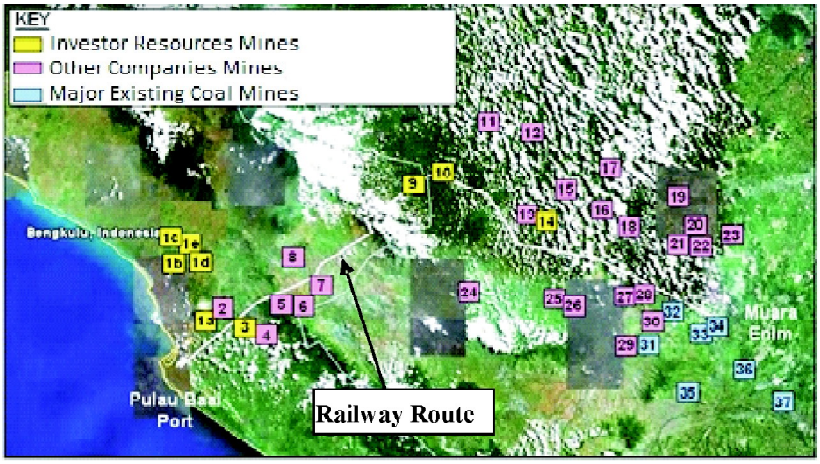
contd. table 1

No	*Item*	*Remarks*
3	Train Unloading Station	Wagon Dumper:2 sets for 40 MTPA, or 4 sets for 100 MTPA.Coal crushing system and ± 5 km lengthBalloon 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 &wastewater treatment, fuel &water refueling,utilities, lighting, coalsampling &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.Capital dredging: ± 14,000,000 m^3,Annual: ± 500,000 m^3.Reclamation: Stockyard and eroded area.
B	**RAILWAY**	**Route: MuaraEnim (South Sumatra) to PulauBaai (Bengkulu)**
1	Railway 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 MuaraEnimFacilities: 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 length.
8	Signaling and Communication	Computerized and distance monitoring.
9	Railway Facilities and Utilities	Marshaling yard, maintenance stations, siding stations, switching, security fencing, drainage, loading station facilities & utilities.
C	**MAIN EQUIPMENT**	**Coal Handling and Railway.**
1	Wagon Dumper/ Tippler	O type, triplicate wagon dumper (triplet), capacity: 27 cy/hour.
2	Stacker and Re-claimer	Slewing 44 m, counter 295 ton, height 13.5 m, capacity: 6,000 ton/hour.
3	Ship loader	Long travelling, luffing type, capacity: 6,000 ton/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 Railway, 30 MW for Port (200MW for whole operation).
2	Electricity supply	1. Mine Mouth Coal Fired Steam Power Plant (developed by sister's company) 2. 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; Shenyang, 2009)

3. EXPORT AND ECONOMIC BASE THEORIES

Figure 4 shows an overview map of the coal mines and resources along the Railway alignment which has been estimated at 16.6 billion tons of coal resources (Kurniawan, 2010). Referring 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.



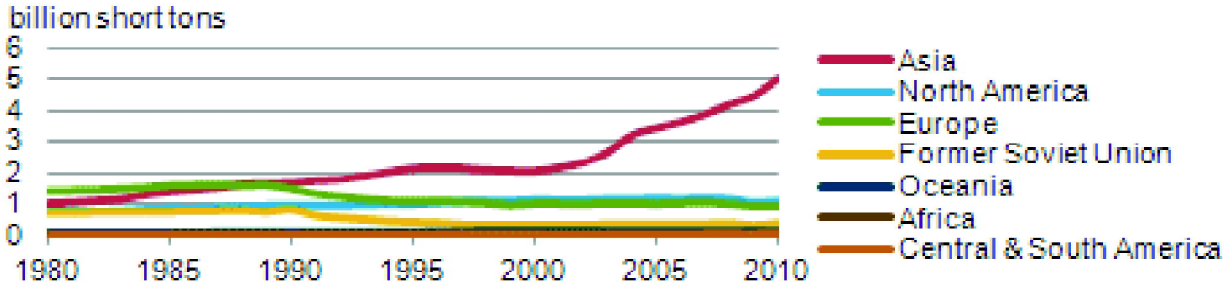
COAL	CALORIE	RESERVES (MILLION TON)	REMARKS
	4500 - 7100	117.25	Investor Resources Mines
	<5100, 5000 - 7000	10,388.78	Other Companies Mines
	<5100, 5000 - 7000	6,105.96	Major Existing Coal Mines
Total Resources = 16,611.99			

Source: Kurniawan, 2010

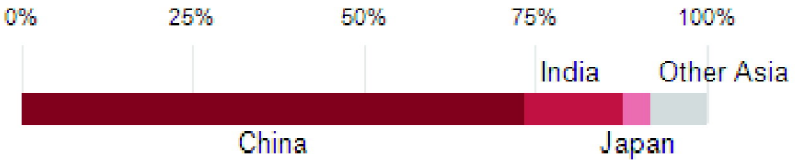
Figure 4: Map of Coal Mines along the Railway Alignment

Coal is one of the most important commodities globally today and is one of the main fuel sources for the world's electricity. According to the U.S. 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 first accounts for 73 percent of Asia's consumption and almost half of the global coal consumption. Further, the domestic demand for coal is also increasing to meet the National energy shortage.

Based on the economy base theory, this promising coal demand in particularly for China and India as well as for the National market and together with the introduction of this coal transportation Project, will determine significant economy growth in Bengkulu Province.



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



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

Figure 5: Worldwide Coal Consumption

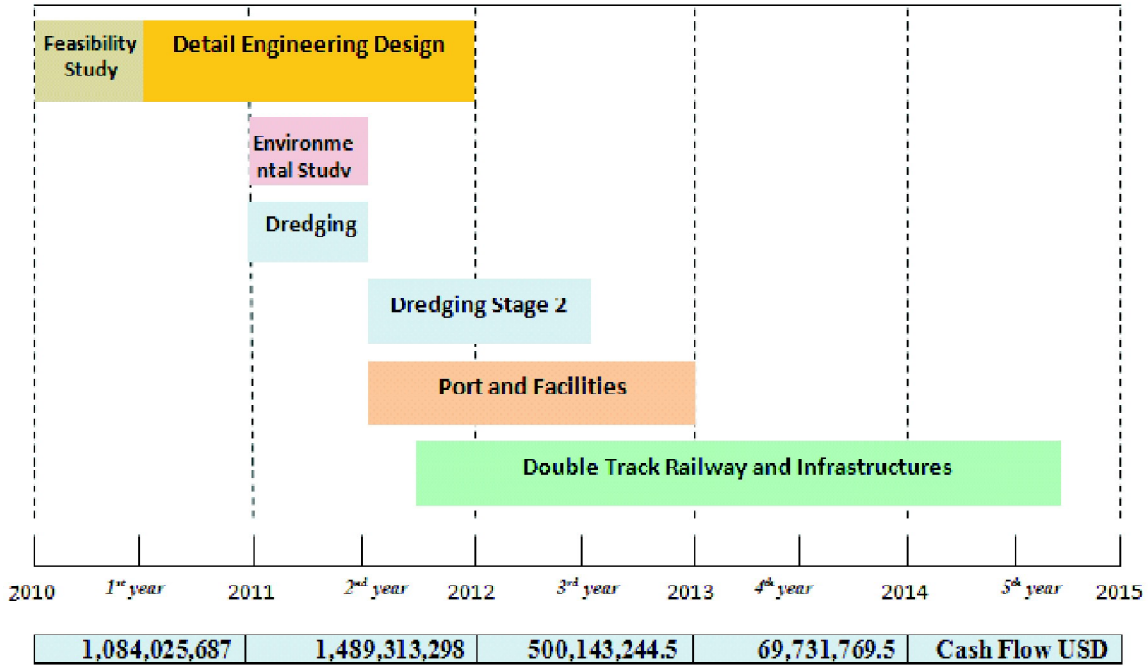
4. COST BENEFIT ANALYSIS

The Project investment value is equal to = Project cost + contingency fee + cost of money. The Project cost covers the entire development cost from design stages, licenses, land acquisition, construction, main coal handling equipments procurement until project hand over.The contingency fee is the unexpected cost incurred during construction due to an inaccuracy, price escalation, and other unpredicted issues, while cost of money 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 development which is estimated 3.5 years for construction.

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 Railway (265 km) including Facilities	2,077,341,627
6	Cost of Money, Interest rate 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 Development

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)*

The revenue drivers of this Project will be mainly generated from the unloading service fee of coal at the developed Port, vessel passing fee through the dredged Pulau Baai channel, and Railway coal 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 Drivers

No.	*Item*	*Volume*	*Contract Rate*	*Yearly Revenue*
		Million mT	*USD / mT*	*Million USD*
A	Port			
A.1	Unloading fee at Pulau Baai Port, Bengkulu	40	5	200
A.2	Channel fee atPulau Baai, Bengkulu	40	4	160
B	Railway			
B.1	Coal mines atintermediate hinterland of railway 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 commence (Kurniawan, 2010).

Table 4
Project Driver for Financial Analysis Assumption

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 : USD 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% investment (USD 2,200,249,800). Interest rate : 10% flat (Bank of Indonesia, 2010).
5	Depreciation	Basic depreciation period : 15 years.
6	Tax	Tax value : 30% net income (Indonesian Tax Regulation).

Source: Kurniawan, 2010

The benefit cost analysis of the Project is conducted based on the Project revenue and cost drivers (Tables 3 and 4). The financial analysis for the first stage of Project period (30 years 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 Periods.

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	7.586.180	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)	(8.858.456)	(7.921.901)			
3	2013	346.599.266	3.501.003	17.505				-	(3.518.508)	-	(3.518.508)	(2.643.455)	(2.343.419)			
4	2014	48.324.116	488.122	2.441				-	(490.563)	-	(490.563)	(335.055)	(290.455)			
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	99.689.147	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	106.726.686	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	111.496.397	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	71.483.212			
11	2021		258.575.053	1.292.875	146.683.320	116.930.295	209.547.600	850.000.000	116.970.858	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	292.936.018	93.136.255	54.657.602			
13	2023		279.674.777	1.398.374	146.683.320	94.713.539	209.547.600	850.000.000	117.862.390	35.384.717	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	101.858.859	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	383.677.275	91.861.832	47.140.129			
16	2026		314.596.089	1.572.980	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	371.868.852	66.860.222	30.046.196			
19	2029		353.877.815	1.769.389	146.683.320	50.334.658	209.547.600	986.000.000	223.767.218	67.130.165	366.198.653	59.873.480	25.707.145			
20	2030		368.032.927	1.840.165				986.000.000	618.126.908	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	22.354.516			
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	16.354.276			
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	32.680.230	9.441.786			
29	2039		523.825.613	2.619.128				1.184.000.000	657.555.259	197.266.578	460.288.681	28.996.187	7.962.994			
30	2040		544.778.637	2.723.893				1.215.432.140	667.929.610	200.378.883	467.550.727	26.790.657	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 Periods

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; Benefit Cost Ratio of 1.61**,** IRR of 21.1%**, and** Payback Periods of 5 years**.**

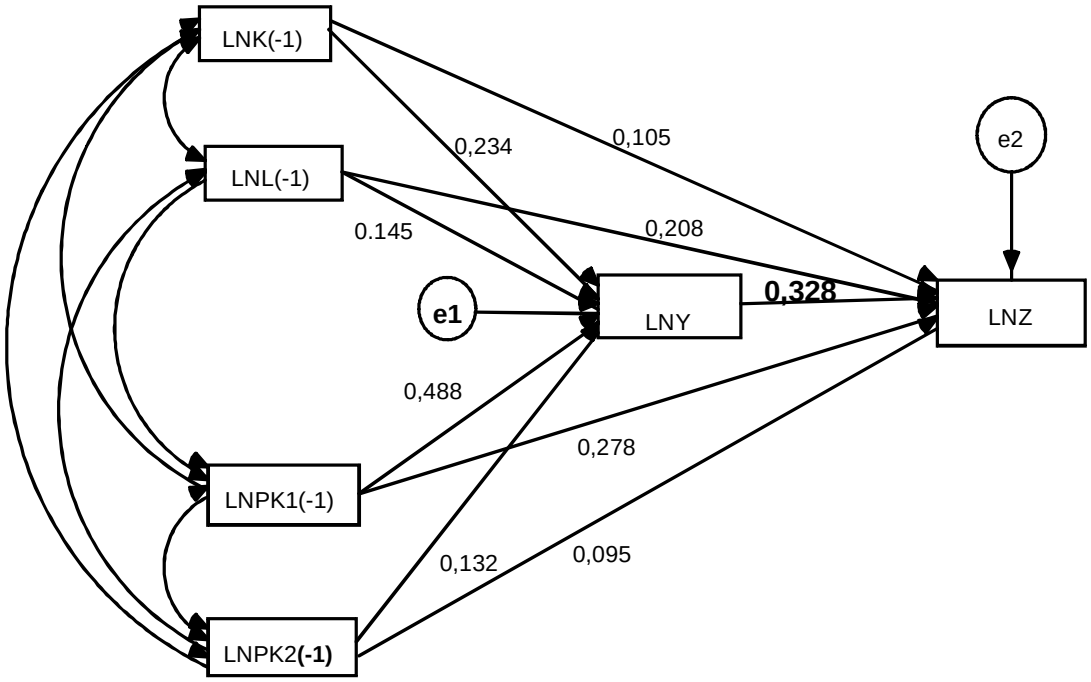
If the 'Project' benefit cost ratio is much greater than 1.0, it indicates that the Project is driving benefits from the investment, and according to Gray (1986) is considered feasible.

If the Project IRR of 21.1 % is greater than the adopted interest rate or discounted market rate of 10% (Bank of Indonesia, 2010), it is indicating a high rate return from the investment. Although the interest rate is assumed flat for the 30 years of Project lifetime, the high IRR value may still accommodate the possibility of increasing the interest rate. It is however unlikely that the interest rate may become greater than 15%, and the current trend shows a reduction in the interest rate (Bank of Indonesia, 2010). According to the general practice in oil and gas projects in Indonesia, the minimum IRR value is recommended at 15 % (Sinaga, 2009) due to the high risk factor associated in with the energy sector. As Considered as a 'Mega Project' with high risks, the 'Project' IRR value also meets the IRR value suggested above. According to Sinaga (2009), the 'Project' with a payback period of 5 years is considered adequate for investment.

The cost benefit analysis therefore suggests that this 'Project' is financially feasible to develop and operate for a period of 30 years 'Project' lifetime, and the presented high financial values are attractive for the Investor.

5. IMPACT TO BENGKULU GROSS DOMESTIC PRODUCT

Based on the econometrical analysis on regression and path analysis from the secondary data indicates the *following summary of direct Indirect and total influences between variables of Feasibility Study data as follows :*



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

Kurniawan, 2012

The data resultt shows that private output influence on the GDP indicates the significance of private output contributions to increase the GDP of Bengkulu Province.

One of the major 'Project' contributions to the Bengkulu Gross Domestic Product (GDP) is the income tax to the Bengkulu Local Government (PEMDA). Bengkulu and National Income taxes in 2011indicate a contribution rate of 3.4% and 70% from their GDP respectively (Indonesian Director General of Taxes). The Project income tax is rated 30 % based on the Indonesian Tax Regulation as shown in Figure 7.

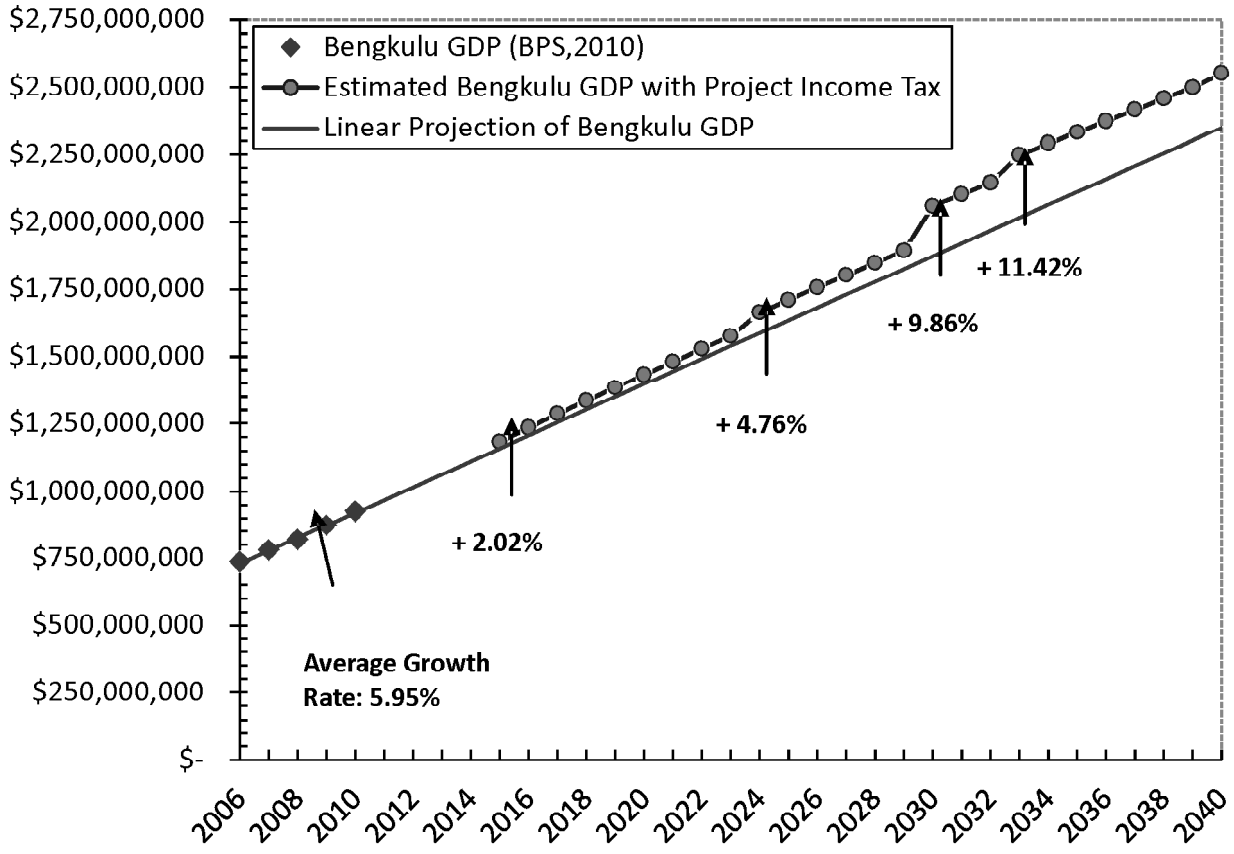


Figure 7: Project Income Tax Impact to the Bengkulu GDP Growth

Figure 7 presents the 'Project' income tax impact on the growth of Bengkulu GDP during the Project period. The Bengkulu GDP growth is optimistically projected and linearly 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 commencement of the Project operation, the Project income tax will increase the Bengkulu GDP by 2.02% in Year 2015. The Bengkulu GDP growth higher by 4.76% in 2024 due to an increase in the Project revenue (coal transportation unit rate increase in every 8 years), and 9.86% in 2030 due to diminishing project cost drivers such as settlement, interest and depreciation. With another increase in the coal transportation unit rate, the Bengkulu GDP growth is estimated to increase by 11.42% in year 2033. This income tax contribution especially after Year 2024 shows a comparable or higher value than the average GDP growth rate from year 2006 to 2010 (5.95%).

Further, it is estimated that the Project income tax may only contributes 1.98% of the total Bengkulu GDP at the beginning of the operation of the Project, but it will be a significant income for the Bengkulu GDP in Year 2033, providing 10.25% of the total Bengkulu GDP as shown in Figure 8.

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

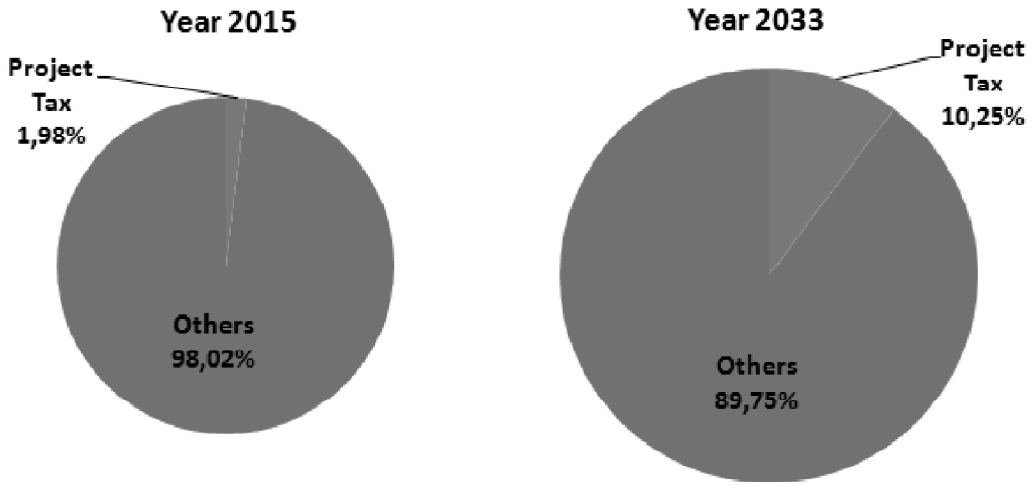


Figure 8: Project Income Tax Contribution to the Bengkulu GDP

Further studies can be conducted to analyze the impact of this Project development on other economy 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. CONCLUSION

A study is conducted to analyze the impact of the development of coal transportation on the railway from Muara Enim, Sumatra Selatan Province to new port at Pulau Baai, Bengkulu,and on the Gross Domestic Product (GDP) income for the Bengkulu economy. 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 presented in this paper shows that the 'Project' is financially feasible and is highly attractive for investors. The generated Project tax income promotes the Bengkulu GDP growth, and provides a major income contribution to the Bengkulu GDP. This study has shown the significant and important value of the Project to the Bengkulu Province economy. This model implementation can be applied to and is suitable for the similar natural resources and or other commodity conditions in another country.

7. ENDNOTES

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