Analysis Of Investment Feasibility Of Batching Plant Development In Tanjung Redeb – Talisayan Highway (Km 102) In Biatan District, Berau Regency

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Abstract: This research is a feasibility study of Batching Plant development on Tanjung Redeb - Talisayan Highway (Km 102) Biatan District, Berau Regency, which aims to know whether the development project can be built in terms of technical and economic aspects, and to analyze the sensitivity with 3 types of economic situation. The data from this field study are analyzed using Present Value, Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR) and Payback Periods (PBP). The results of the analysis show that Batching Plant Development on Tanjung Redeb – Talisayan Highway (Km 102) in Biatan District, Berau Regency is quite feasible to be implemented with the assumption of 10 years investment period. Based on the calculation of Net Present Value (NPV) of IDR 11.499.703.942; (positive) Internal Rate of Return (17,27 % > 12%), Benefit Cost Ratio (2,309 > 1) with Payback Period is 5 years 7 months, from the sensitivity analysis results, the condition of the initial investment cost rate run up reaches to 127%, the state of interest rates rose to < 14,54% due to uncertainty in the national and international economies, and the circumstances when cash flows fell as a result of the decrease in revenues to < 16,84%, where the circumstances state that the project which is about to be affected is not feasible or break event.

Index Terms: analysis technique, batching plant, investment, sensitivity.

1 INTRODUCTION

BERAU Regency has an area of 34.127,47 km2 consisting of 21.951,71 km2 of land and 11.962,42 km2 of sea area, and consisting of 52 large and small islands with 13 Districts, 10 Sub-districts, 100 villages. In terms of the area of East Kalimantan, the area of Berau Regency is 13,92% of the total area of East Kalimantan, with a percentage of 28,74% of waters area, Berau Regency which is a land and coastal area with very large natural resources and has a marine park namely Derawan Island as the second marine park after Raja Ampat Islands make the visit of local and foreign tourists increase, so that it makes the population growth rate of Berau Regency in 2013 has a considerable increase of 1,06%. From these geographical conditions, the government must balance the growth rate of the city with infrastructure facilities in order to support the economic development of each region located in Berau Regency.

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In the division of development areas, the Government of Berau Regency has 3 (three) areas, namely coastal areas, urban areas, and rural areas where Districts of Biduk-Biduk, Talisayan, Derawan, Maratua, and Biatan are in coastal areas. Coastal areas are a variety of marine tourism objects that if it is developed, it can increase local government revenue. From the condition of the region divided into 3 (three) regions, it becomes a challenge for local government to make a development of each region, where the distance between regions takes about 5-6 hours of land journey with ± 180 km of distance, because of the limited facilities and transportation infrastructure in coastal areas, making development in area of under-developed beach in inland areas as agricultural and livestock centers as well as from urban areas that are the center of government at present time. As an effort to overcome these problems, the idea is there to build a Batching Plant in the coastal area itself, but it is still doubtful about how much the cost of investment and how much the benefit of investment is worth, therefore there is a need for a specific study to examine the feasibility of investing Batching Plant development in coastal areas. In this case, the reference area is Biatan District with the consideration that it is located on the highway of Tanjung Redeb - Talisayan Km.102. The factors that need to be examined in preparing business feasibility studies are related to several aspects such as marketing aspect, technical production aspect, management aspect, environmental aspect, and financial aspect [1]. Investment is essentially a placement of funds in the expectation of making a profit in the future [2]. In its activities, according to Sharpe (2005) in Fahmi [3], investment is generally known in two forms: first, real investment generally involves tangible assets, such as land, machinery, or factories. Second, financial investment involves written contracts, such as common stock and bonds. Furthermore, American economists, Paul L. Krugman and Maurice Obstfeld (1999) in Fahmi [3], state that the share of output used by private companies to generate output in the future may be called investment. On the other hand, Batching Plant is a place or factory built specifically for

the process of stirring the basic materials of concrete, such as: cement, sand, water, split (rocks) with large dose volume, based on the function of each type of quality that has been set to become wet mix and dry mix concrete or cast ready-made bulk concrete (instant) which then poured into the mixer truck (molten truck) to be sent to the foundry site. A concrete plant or batching plant can serve a large area with no more than 4 hours of travel; generally Batching Plant consists of two stirring systems [4] which are wet mix and dry mix.

2 RESEARCH METHOD

The research location is at Km.102 in the highway of Tanjung Redeb-Talisayan, Biatan District, Berau Regency, East Kalimantan Province. The location in Biatan District is chosen based on several strategic locations which becomes the center of development in the coastal area where the distance between sub-districts is no more than 2 hours, the available electricity and water facilities, and how close to the coastline where the harbor supports the material import from outside of the island. Moreover, road construction is the center of attention of Berau Regency government to improve coastal economy.

2.1 Data Analysis

The data has been collected and then moved into the work table to make the classification and data code as well as the stages of data analysis easier. Data analysis includes the activity of presenting data into tables, graphs, and figures, then calculation is done to describe the data obtained. In addition, the steps of realization are as follows.

a. Present Value Method (Current Value)

The Present value shows how much money is worth nowadays for a certain value in the future.

b. Net Present Value (NPV) Method

This method calculates the difference between the present value of the investment and the present value of net cash receipts (operating and cash flow terminals) in the future. If the present value of future net cash receipts is greater than the present value of the investment, the project will be profitable, therefore it is accepted.

c. Internal Rate of Return (IRR) Method

This method is to rank the investment proposals by using the rate of return on investment calculated by looking for a discount rate that equates the present value of the expected project cash inflows to the present value of the project cost or equal to the discount rate that makes the NPV equal to zero. IRR is an indicator of the efficiency level of an investment.

d. Benefit Cost Ratio (BCR)

The B / C Ratio result is obtained from the calculation by the formula that determines the feasibility of the project.

e. Payback Periods (PBP) Method

This method measures how quickly the investment can return. The unit is the unit of time (month, year, and so on). If this payback period is shorter than required, then the project is considered being profitable.

2.2 Data Collection Method

This research is conducted in order to find answers to the problems explained in the first chapter of this research, which is to conduct a feasibility study on Batching Plant development in Biatan District, Berau Regency covering the following stages.

a. Identifying objects supported by primary and secondary data sourced from data from institutional survey results, field surveys, and literature surveys. Data sources include data from the Regional Development Planning Board [5] and the Public Works Department of Berau Regency [6].
b. Reviewing object research planning from feasibility aspects of the project.
c. Acquiring the formula related to the investment feasibility study of Batching Plant development in Biatan District, Berau Regency, which then in the next stage, financial analysis is done.

2.3 Research Instruments

The steps taken in conducting the research include the following:

a. Formulate problems and research objectives.
b. Refer to the literature review.
c. Conduct field studies.
d. Collect data
e. Analyze data and discussion.
f. Interpret data processing results.
g. Make conclusions and give suggestions.

Each of the above stages is interrelated as the results of the previous stage will determine the process and the results in the next stage. The first step determines the formulation of the problem which then determines the objectives as well. It is furthermore supported by a literature review to obtain input from existing theories and used as a reference in conducting feasibility of the data collected. The next step is to conduct a field study related to direct observation at the location of Batching Plant development in Biatan District, Berau Regency, with the expectation of an approach of feasibility aspects. In order to support data obtained in the field, data from the Regency Government, such as product demand data, regional data, economic development data, regional development and others are considered necessary. The next step is data processing with clear feasibility restrictions. The results of the analysis are interpreted to obtain conclusions and suggestions.

a. Present Value

Present value is the now value of the amount of cash flows in the future by discounting the future cash flows at the expected interest rate, during a certain period of value [7]. The formula used is as in (1).

$$PV = FV_n / (1+i)^n \qquad (1)$$

b. Net Present Value (NPV) Method

Single amount is used to calculate the future value of a single cash flow. In a single calculation, the value of future value is found by applying compounding interest during a certain period of time. The particular time period may be per year, per six months, or per four months [8]. The formula used is as in (2).

$$FV_n = PVx\ (1+i)^n. \qquad (2)$$

c. Net Present Value

This method calculates the difference between the present value of the investment and the present value of net cash receipts (operating and cash flow terminals) in the future. If the present value of future net cash receipts is greater than the present value of the investment, then the project is profitable,

so it is accepted [9] (NPV = *Present cash inflow - Present value of investment*), then if net result present value is greater than 0 (zero), it is considered that business/project is feasible (go) to be implemented and if less than 0 (zero), it is not feasible to be implemented. The calculation result of net present value equal to 0 (zero) means that the project is in a state of break event point (BEP), meaning that the investment does not result in the company profit or loss, thus if the project is implemented or is not implemented, it does not give effects on company finance, the decision should be made by using other criteria such as the impact of investment on company positioning [10].

d. Internal Rate of Return

This method is to rank the investment proposals by using the rate of return on investment calculated by looking for a discount rate that equates the present value of the expected project cash inflows to the present value of the project cost or equal to the discount rate that makes the NPV equal to zero. IRR is the indicator of the efficiency level of an investment. A project or an investment can be done if the rate of return is greater than the rate of return when investing elsewhere (interest on bank deposits, mutual funds, and others). IRR is used to determine whether the investment is implemented or not, therefore it is usually used as the reference that the investment must be higher than the **Minimum Acceptable Rate of Return or Minimum Attractive Rate of Return (MARR)**. MARR is the minimum rate of return on an investment undertaken by an investor [10].

e. Net Present Value

In the simplest view, it is that if all income is subtracted by total expenditure (by a specific economic ratio), the positive number is obtained, then the activity is profitable. The zero indicates the break event point and the negative number indicates that the activity inflicts a financial loss. One of the most common ways is the benefit-cost analysis [11].

3 Results and Discussion

3.1 Financial Aspect

Funds needed in the construction of the *Batching Plant* project amounted to IDR . 29.564.469.094,85. For more details, see Table 1.

TABLE 1: *Distribution of Respondents by Demographic Variables*

No.	Investment Type	Unit	Vol.	Unit price (IDR)	Price (IDR)
1	Land	M2	10.000	225.000,00	2.250.000.000,00
2	Grounding	M2	10.000	38.000,00	380.000.000,00
3	Road Construction	M2	1.000	215.000,00	215.000.000,00
4	*Batching Plant* Equipment	Set	1	1.250.000.000,00	1.250.000.000,00
5	*Concrete Mixer Truck* 5m3	Set	4	700.000.000,00	2.800.000.000,00
6.	Barracks Building Work	Room	6	25.000.000,00	150.000.000,00
7.	*Whell Loader* (1-1.6 m3)	Set	1	850.000.000,00	850.000.000,00
8	*Dump Truck* (3-4 m3)	Pc	2	380.000.000,00	760.000.000,00
9.	Car (Daihatsu Xenia)	Pc	2	180.000.000,00	360.000.000,00
10	Generator Set (50 PK)	Set	2	125.000.000,00	250.000.000,00
11	Motorcycle (Kawasaki KLX150)	Pc	2	22.000.000,00	44.000.000,00
12	Laboratory & Office	Set	1	750.000.000,00	750.000.000,00
13	Operational Tool	-		758.425.000,00	758.425.000,00
14	Employee salary	-		-	1.331.220.000,00
15	Raw materials	-		-	14.620.520.086,23
16	Operational Set Up Cost	-		-	107.625.000,00
17	Other Costs 10%	-		-	2.687.679.008,62
	TOTAL				**29.564.469.094,85**

a. Batch Plant Operation

The annual operational cost is calculated by several approaches, such as:

1) Maintenance and spare parts costs include Dump truck, wheel loader, concrete mixer truck, deer car, motorcycle, generator and laboratory.
2) Operational cost of batching plant, including fuel cost of IDR 149.360.000,00/month and the cost of raw materials in the process of making wet mix of IDR 2.924.104.017,25/month.
3) Personnel costs, including personnel costs are burdened by employee salaries of IDR 44.750.000,00/month and for Batching Plant's core salary of IDR 66.185.000,00/month. Besides, some components related to employee activities are assumed as follows:
   a) Employee overtime of 2.5% from the employee's salary.
   b) The holiday allowance of 1 month from the employee's salary.
   c) Employee bonus of 1.5% from the employee's salary.
   d) Welfare and other employee expenses amounting to 1% respectively from the employee's salary.
4) Maintenance costs on Batching Plant project operations consisting of maintenance of batching plant equipment, office installations and building maintenance. For the maintenance of Batching Plant building, fund is provided amounting IDR 12.000.000,00/year calculated from the assumption that the annual maintenance cost of 0,1% from the cost of building a batching plant project.
5) General administrative costs, including in office stationery, office household needs, photocopy and printed matter, correspondence and telephone amounting IDR 2.400.000,00.
6) From the above details, the operational cost of the project in 2017 is IDR 16.248.958.000,00/year.
7) Cost of Investment + Operational Cost + Bank Loan (Principal Loan+ Interest of Bank) Year of 2026 is IDR 21.403.284.000 + IDR 4.671.823.974,62 + IDR

560.618.876,95 = IDR 25.868.276.851,58 (Appendix.Table.10)

8) Total Cost of Investment + Operational Cost + Bank Loan (Principal Loans+ Bank Interest) from 2016 to 2026 is IDR 170.448.097.298,66.

b. Revenue

The revenue estimation is from ready mix concrete sales which is estimated by consumer demand. Estimated price of ready mix concrete in 2016 is IDR 1.788.099,50 /m³ and in the following years, it is assumed that there is a variation in the price increase of ready mix concrete adjusted to the needs and road construction in Biatan District, so that the income obtained in 2017 is IDR 21.924.968.730,65 from the sale of ready mix concrete and Benefit of Selling Price + residual value of Year of 2026 is IDR 55.708.050.511,86.

3.2 Analysis of Investment Assessment Criteria

a. Net Present Value

The investment assessment analysis of the Batching Plant project development uses the Net Present Value (NPV) method to calculate the difference between the present value of the investment and the present value of net cash receipts in the future, the following is Net Present Value (NPV) calculation analysis:

Present cash inflow1 = IDR 41.064.173.036;
Present value of investment = IDR 29.564.469.095;

Condition:

NPV > 0 = feasible
NPV < 0 = not feasible

So:

NPV 1 = IDR 41.064.173.036;–IDR 29.564.469.095;
NPV 1 = IDR 11.499.703.942;
Discount rate used Present cash inflow = 12%

With NPV1 result of IDR 11.499.703.942 > 0, meaning that the Batching Plant project development investment is feasible to be implemented.

b. Internal Rate of Return

This method is to rank the investment proposals by using the rate of return on investment calculated by looking for a discount rate that equates the present value of the expected project cash inflows to the present value of the project cost or equal to the discount rate that makes the NPV equal to zero. The following is the calculation analysis of Internal Rate of Return.

TABLE 2: *VALUE TRIAL CALCULATION (I)*

No.	Year	*Net Benefit* (IDR)	DR 12%	*PV 12%* (IDR)	DR 17,27%	*17,27%* (IDR)
1	2	3	4	5 = 3 x 4	6	7 = 3 x 6
0	2016	- 29.564.469.095	1,0000	-29.564.469.095	1,0000	- 29.564.469.095
1	2017	443.567.879	0,8929	396.042.749	0,8528	378.255.554
2	2018	1.552.183.659	0,7972	1.237.391.310	0,7272	1.128.739.064
3	2019	2.680.670.206	0,7118	1.908.048.104	0,6201	1.662.336.958
4	2020	4.029.856.708	0,6355	2.561.046.792	0,5288	2.131.034.602
5	2021	6.278.116.278	0,5674	3.562.371.780	0,4509	2.831.101.741
6	2022	8.689.517.446	0,5066	4.402.379.966	0,3845	3.341.542.627
7	2023	11.561.390.622	0,4523	5.229.785.976	0,3279	3.791.286.857
8	2024	14.642.354.268	0,4039	5.913.801.307	0,2796	4.094.611.531
9	2025	18.005.031.640	0,3606	6.492.794.910	0,2385	4.293.593.335
10	2026	29.072.323.660	0,3220	9.360.510.144	0,2034	5.911.966.827
			NPV1:	11.499.703.942	NPV.2:	0

Or Calculate the trial value (i) by the formula as in (3)

$$IRR = 17.27\% + \frac{IDR\ 0}{IDR\ 12.017.708.534}(17,27\%-12\%) \quad (3)$$

IRR = 17.27%

Condition of IRR > i1 so that IRR > 12%

The interest rate is obtained of 17,27% > 12%. From these results, it is known that the interest rate is relevant, which means that the Batching Plant development is feasible to be realized.

c. Benefit Cost Ratio

To know the comparison between the present value of future net cash receipts and the present value of investments, the calculation of Benefit Cost Ratio is calculated as in (4).

PV (Benefit) = ΣBenefit x DF^n - Operational cost x D^n (4)
= IDR 170.544.230.926 – IDR 102.278.140.795
= IDR 68.266.090.131

PV (Cost) = Σi^n
= IDR 29.564.469.095

So:

$$BCR = \frac{IDR\ 68.266.090.131}{IDR\ 29.564.469.095}$$

BCR = 2,309

Condition of BCR > 1, then the project is feasible
With *BCR of 2,309 > 1,* then the *Batching Plant* development is feasible to be implemented.

d. Pay Back Period

This method is used to measure how quickly the investment can return. The calculation payback period is as in (5).

It is known:
T_{P-1} = 2021 – 2016 = 5 Years
I_i = IDR 10.318.443.451
B_{icp-1} = IDR 16.849.843.826
B_p = (cost - net. benefit of year.PB Period) (5)
= IDR 29.564.469.095 – 28.526.686.205
= IDR 1.037.782.889

$$PBP = 5\ \frac{Rp.6.531.400.375}{Rp.1.037.782.889}$$

PBP = 5 years, 7 months

The calculation of Pay Back Period is 5 years 7 months. From the results of the above analysis, it can be made a decision that the Batching Plant project development is feasible to be implemented in terms of financial aspect.

e. Sensitivity Analysis

Sensitivity analysis is done on by changing the value of a parameter at a time to further see how its effect on the acceptability of an alternative investment. The factors that usually change and its change can affect decisions in the study of technical economics are the cost of investment, cash flow, residual value, interest rate, tax rate, and investment age.

TABLE 3: *RESULTS OF BATCHING PLANT DEVELOPMENTAL SENSITIVITY ANALYSIS*

No.	Condition	S	EIRR	BCR	NPV (IDR)
1.	Initial investment increases and fixed interest rate of 12%	Increase 127%	12,01%	1,868	28.072.716;
2.	The interest rate increases economic uncertainty	Increase 14,54%	11,00%	1,913	3.600.053;
3.	Cash flows decrease due to the decrease of *Batching Plant* income	Decrease 16,84%	12,00%	1,920	3.694.364;

4 CONCLUSIONS AND SUGGESTIONS

4.1 Conclusions

a. The cost value of Batching Plant development in Biatan District, Berau Regency is:
   1) Funds needed in the construction of the Batching Plant project amounted to IDR 29.564.469.095. Batching Plant project development is realized within 1 year ie in 2016.
   2) Total Cost of Investment + Operational Cost + Credit Bank (Principal Loans + Bank Interest) to 2026 is IDR 170.448.097.298,-

b. The benefit value of Batching Plant development in Biatan District, Berau Regency is:
   1) Estimated price of ready mix concrete in 2016 is IDR 1.788.099,50/m^3 and in the following years, it is assumed that there is a variation of price increase of ready mix concrete adjusted to requirement and road construction in Biatan District, Berau Regency, so that the income in year of 2017 equal to IDR 21.924.968.730,65 from the sale of ready mix concrete.
   2) Benefit from Selling Price + residual value to 2026 is IDR 55.708.050.511,87

c. The development of the Batching Plant project is economically feasible to build, with the following economic analysis:
   1) Value of Net Present Value > 0 is IDR 11.499.703.942;
   2) Value of Internal Rate of Return > 12% ie 17,27%
   3) Value of Benefit Cost Ratio > 1 is 2,309

d. The value of sensitivity analysis in the Batching Plant study is reviewed in 3 (three) conditions, the analysis presented in Table 4.12, the condition of the initial investment cost increases of 127%, the condition of the interest rate increased due to the uncertain conditions of national and international economy reach to < 14,54%, and the condition when cash flows decrease as a result of the decrease of income with a decrease limit of < 16,84%. Where the conditions state that the project started to be affected becomes unfeasible or break event.

4.2 Suggestions

a. If the investor will realize the Batching Plant development in Biatan District, Berau Regency, the first step is to do in-depth study about the impact to the local community, in terms of environment, social economy, environment and others.
b. From the results of sensitivity analysis, it is expected to be a benchmark of investor to run the Batching Plant operation, so that the production can still gain the expected benefits.
c. Production marketing should be expanded, not only limited to Biatan District, and not only within Berau Regency Public Works Department, it is necessary to prepare a long-term schedule for the addition of supporting infrastructure such as transportation mode to transport wet mix and other infrastructure.

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