EVALUATION OF EXCAVATOR INVESTMENT COSTS IN BAUBAU PORT DEVELOPMENT PROJECT

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ABSTRACT

The government's program by increasing the capacity of the Baubau dock / port is in order to accelerate economic development and overcome the number of ships that are no longer able to accommodate loading and unloading of goods and passengers. Heavy equipment investment in port / dock development work certainly requires a large enough initial capital and a long time to return investment capital, so the research objective of this is to assess the feasibility of investment and the payback period. The decision to invest in heavy equipment in local government projects, in particular the work of constructing a new pier and upgrading the existing pier structure, requires in-depth analysis and studies using the Net Present Value (NPV) method and the Internal Rate of Return (IRR) and the Break Event Point (BEP) as a reference to determine whether a project is feasible or not and the payback period for investment. The conclusion from the results of this study is the excavator investment value of IDR. 1,450,000,000, - with a Net Present Value (NPV) of IDR. 4,282,331.62 is greater than zero (investment worthy) and the value of the Internal Rate of Return (IRR) is 7.07% greater than 7% (feasible for investment). Break event point (BEP) or the excavator investment payback period of 2,816 hours. The conclusion from the results of this study is the excavator investment value of IDR. 1,450,000,000, - with a Net Present Value (NPV) of IDR. 4,282,331.62 is greater than zero (investment worthy) and the value of the Internal Rate of Return (IRR) is 7.07% greater than 7% (feasible for investment). Break event point (BEP) or the excavator investment payback period of 2,816 hours. The conclusion from the results of this study is the excavator investment value of IDR. 1,450,000,000, - with a Net Present Value (NPV) of IDR. 4,282,331.62 is greater than zero (investment worthy) and the value of the Internal Rate of Return (IRR) is 7.07% greater than 7% (feasible for investment). Break event point (BEP) or the excavator investment payback period of 2,816 hours.

Keyword: *Net Present Value (NPV), Break event point (BEP)*

1. INTRODUCTION

The Baubau city port / pier development project has a material capacity of 30,000 m³ of stockpile with an area of 1.00 ha. The implementation of this work uses various types and types of heavy equipment, one of which is the CAT-320D excavator, the use of this tool is more dominant or almost all of the work is done by excavators. The cost of developing the pier or the Batu port in the city of Baubau is 7,240,700,000 IDR, with an implementation time of 180 calendar days or 6 months consisting of several types of work including mobilization work, traffic safety management, quality management, excavation for landfills, masonry with mortar, ordinary earthfill and masonry for talud

The decision to invest in heavy equipment in local government projects, especially in the development work of the Batu Port of Baubau city requires in-depth analysis and studies. Heavy equipment investment certainly requires a large enough initial capital and requires a long time to return investment capital (Wilopo, 2011; Wigroho, 2012), so that the heavy equipment investment analysis will provide a good and rational consideration in decision making.

1.1. Formulation of the problem

Based on the description above, it is formulated to provide guidance on the direction of research to be carried out. The problem formulations to be presented in this study are:

1. The investment feasibility of the excavator is viewed from the technical and financial and economic aspects of the stone port hoarding work of the city of Baubau using the Net Present Value (NPV) and Internal Rate of Return (IRR) methods?
2. What is the payback period for the excavator's investment (break event point) in the stone port landfill job in Baubau City?

1.2. Research purposes

This research aims to :

1. Knowing the feasibility of an excavator investment in terms of technical, financial and economic aspects of the stone port hoarding work of the city of Baubau using the Net Present Value (NPV) and Internal Rate of Return (IRR)?.
2. Knowing the time of return on investment capital (break event point) of excavators in the rock port landfill job in Baubau City.

1.3. Scope of problem

Considering that the scope of this research is very broad, it is necessary to have restrictions so that it is more focused without reducing the clarity of the research presented. These restrictions include:

1. The investment period for heavy equipment is 10 years.
2. The bank interest rate is 20% per annum.
3. The discount factor is an average of 7% per year.
4. The condition of the heavy equipment used is new.
5. The form of heavy equipment investment is by buying new with loan capital from a bank with a normal economy.

1.4. Benefits of Research

The benefits of this research are

1. As a reference material for construction service entrepreneurs in investing in heavy equipment in road works.
2. As information material for local governments in investing in heavy equipment in road infrastructure development work.
3. As a study material for theoretical development and practical purposes in heavy equipment investment in road works.

2. LITERATURE REVIEW

2.1. Investment Feasibility Study

According to Suharto (1997), the purpose of a feasibility study is to answer whether or not an idea or proposal is made into reality, this is related to the level of success that is to be achieved. As a decision making material, the feasibility study must cover several related aspects and pay attention to the quality and scope of the assessment and the aspects to be studied depending on the scope of the business and its objectives. The aspects of a project or investment that are studied generally include marketing aspects, technical aspects, management and organization, financial aspects, economic aspects, and environmental aspects.

Soetari (2014) states that the meaning of feasibility in the assessment of a project feasibility study is related to the possibility of the idea that the business to be carried out provides benefits, both in terms of financial benefits and social benefits / economic benefits, while the objectives to be achieved in a project feasibility study are to avoid too large an increase in capital for activities that turned out to be unprofitable.

2.2. Net Present Value (NPV)

Net Present Value (NPV) is the net present value which is the result of the sum of the value of benefits (benefits) and costs in a certain period (Donny, 2012). According to Husen (2010), Net Present Value (NPV) is a way to determine the feasibility of a project so that careful financial analysis is needed so that future projections in determining the benefits can be predicted in the future in determining the benefits can be predicted with a small degree of deviation so that the desired goal achieved can be fulfilled.

2.3. Internal Rate of Return (IRR)

IRR is also called discounted cash flow because the rate of return (IRR) is related to the NPV value, where IRR is calculated based on the amount of NPV which is equal to zero, Donny M. Mangintung (2012). To determine the amount of IRR, the NPV value must be calculated$_1$ and the NPV2 value by trial and error.

2.4. Break Event Point (BEP)

Break Event Point(BEP) is an analysis that aims to find a point, in units or rupiah, which shows the costs incurred by the company are the same as the company's revenues, (Soepeno, 2012). According to Suharto (1997), the Break Event Point (BEP) is the point where the total cost of production is equal to income. Break Event Point (BEP) is the costs incurred exactly the same as the income earned (Pujawan: 1995).

3. RESEARCH DESIGN

The research design is described in a schema in the form of a flow chart as follows (Suryabrata, 1983):
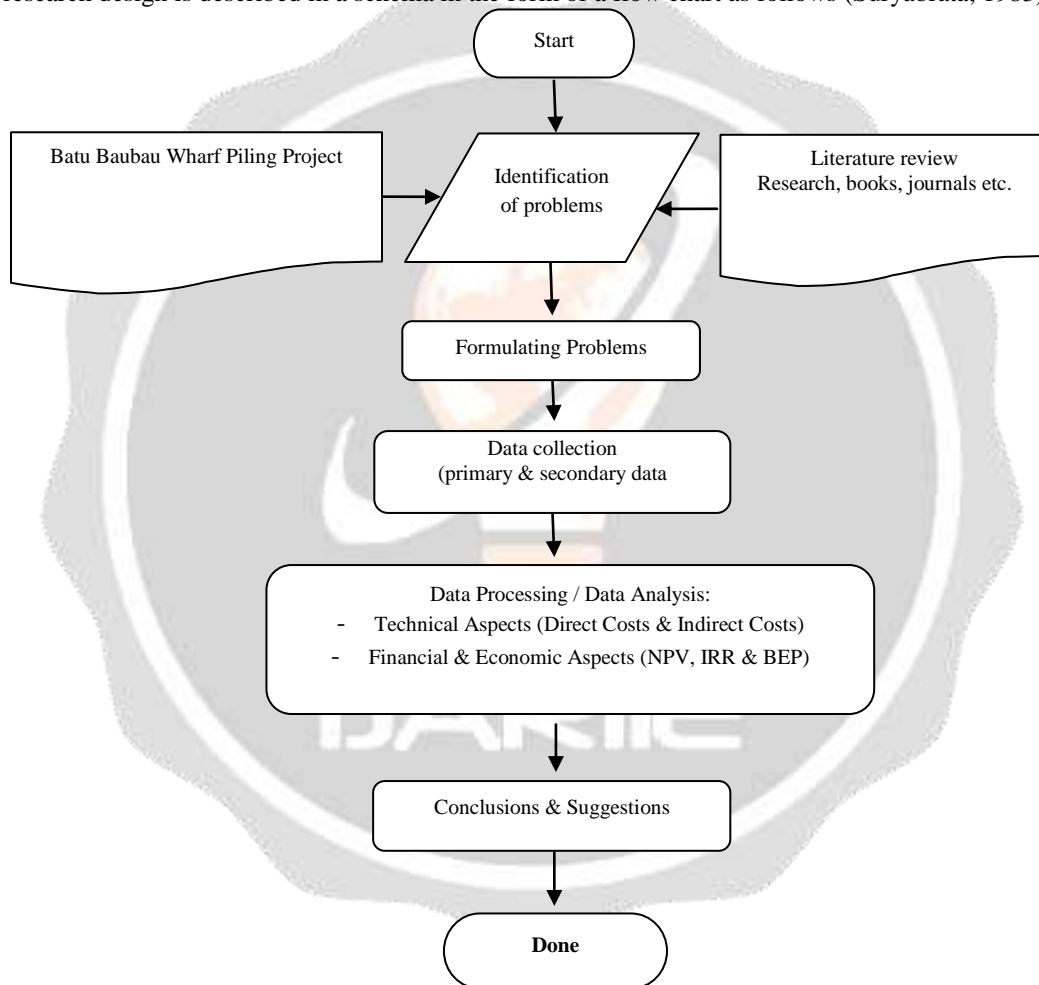

Figure 1. Research Design

4. DATA ANALYSIS

4.1. Technical Aspects

➢ Direct Cost Analysis (owning cost and operation cost):

Power   (Pw)   = 120 HP
Capacity   (Cp)   = 0.90 M3

New Tools:
- Economic age (A) = 5 Years
- Working Hours Within 1 Year (W) = 2,000 Hours
- Tool Prices (B) = Rp. 1,450,000,000, -

a. Ownership Fee for Hourly Equipment:
- The value of equipment remaining = 10% x Rp. 1,450,000,000, - = Rp. 145,000,000, -
- Capital installment factor $= \left(\dfrac{20\% \ x \ (1+20\%)^5}{(1+20\%)^5 - 1} \right)$ = 0.334
- Cost of return on capital $= \dfrac{(Rp.1.450.000.000 - Rp. 145.000.000) \ x \ 0,334}{2.000}$
  = Rp. 218,182.76
- Insurance etc. $= \dfrac{0,2\% \ x \ Rp. \ 1.450.000.000}{2.000}$ = Rp. 1,450, -
- Ownership cost per hour = Rp. 218,182.76+ Rp. 1,450, -
  = Rp. 219,632.76

b. Hourly Operating Costs:
- Fuel cost = 0.125 x 120 HP x Rp. 12,500, - = Rp. 187,500, -
- Lubricating oil cost = 0.010 x 120 HPx Rp. 40,000, - = Rp. 48,000, -
- Maintenance fee / repair = = Rp. 90,625, - $\dfrac{(12,5\% \ x \ Rp. \ 1.450.000.000)}{2.000}$
- Operator Fee = 1 person x Rp. 14,285.71 = Rp. 14,285.71
- Pemb Fee. Operator = 1 person x Rp. 12,142.86 = Rp. 12,142.86
  Total Operating Costs for Hourly Equipment = Rp. 352,553.57

c. Hourly direct cost = Rp. 219,632.76 + Rp. 352,553.57
  = Rp. 572,186.33

➢ Indirect Cost Analysis:
Indirect Costs = 0.10 x Rp. 572,186.33 = Rp. 57,218.63 / Hour
Total hourly equipment rental fee = Rp. 572,186.33 + Rp. 57,218.63
  = Rp. 629,404.96

4.2. Analysis of Economic and Financial Aspects
➢ Net Present Value (NPV) & Internal Rate of Return (IRR) analysis:
Cash flow or cash flow as long as the tool works, namely
Cash Out for purchasing equipment of = Rp. 1,450,000,000, -

Cash In in the first year after the tool starts working = 7 hours x 47 days x Rp. 629.404.96 = Rp. 207,074,232.04 / year. Below is a table of the results of the analysis of the excavator's NPV & IRR values for 10 years as follows:

Table 1. NPV and IRR analysis

Yrs	Component	Cash Flow		Cash Flow (Net)	Disc.Factor	Present Value	F (P | F, ipi, n)	Present Value
		Cash Out (IDR)	Cash In (IDR)	(IDR)	F (P | F, 7,10)	(IDR)	F (P | F, 10.10)	(IDR)
a	b	c	d	e	f	g = exf	h	i = exh
0	Excavator	1,450,000,000	-	- 1,450,000,000	1,000	- 1,450,000,000	1,000	- 1,450,000,000
1	Rent for 47 Days	-	207,074,232.04	207,074,232.04	0.935	193,614,406.96	0.909	188,230,476.92
2		-	207,074,232.04	207,074,232.04	0.873	180,775,804.57	0.826	171,043,315.66
3		-	207,074,232.04	207,074,232.04	0.816	168,972,573.34	0.751	155,512,748.26
4		-	207,074,232.04	207,074,232.04	0.763	157,997,639.05	0.683	141,431,700.48
5		-	207,074,232.04	207,074,232.04	0.713	147,643,927.44	0.621	128,593,098.10
6		-	207,074,232.04	207,074,232.04	0.666	137,911,438.54	0.564	116,789,866.87
7		-	207,074,232.04	207,074,232.04	0.623	129,007,246,56	0.513	106,229,081.04
8		-	207,074,232.04	207,074,232.04	0.582	120,517,203.05	0.467	96,703,666.36
9		-	207,074,232.04	207,074,232.04	0.544	112,648,382.23	0.424	87,799,474.38
10		-	207,074,232.04	207,074,232.04	0.508	105,193,709.88	0.386	79,930,653.57

	NPV	4,282,331.62		NPV2	- 177,735,918.35

- NPV = (193,614,406.96 + 180,775,804.57 + 168,972,573.34 + 157,997,639.05 + 147,643,927.44 + 137,911,438.54 + 129,007,246.56 + 120,517,203.05 + 112,648 .382.23 + 105,193,709.88)

  = Rp. 1,454,282,331.62 - Rp. 1,450,000,000.00

  = Rp. 4,282,331.62   > 0 (worth investment)

- IRR = $7\% + \dfrac{Rp.\ 4.282.331,62}{(Rp.\ 4.282.331,62 - (Rp. -177.735.918,35))}$ (10% - 7%)   = 7.07% > 7% (feasible investment)

➢ Break Event Point (BEP) Analysis

Table 2. Break event point analysis (BEP)

N o	Type of Equipment	Volume	Tool Hours of Operation (Hour)	Fixed cost (Fixed Cost) (IDR)	Equipment Rental Price / Hour (IDR)	Variable Cost / Hour (IDR)	BEP (Hou r)	Rental Costs (IDR)
a	b	c	d	e	f	g	h	h
1	Excavator	Uni t 1	329	1,450,000, 000	572,186.33	57,218.63	2,81 6	1,611,111,11 1.11

BEP = $\dfrac{Rp.\ 1.450.000.000,00}{(Rp.\ 572.186,33 - Rp.\ 57.218,63)}$ = 2,816 Hours

Profit = Rp. 1,611,111,111.11 - (Rp. 57,218.63 x 2,816 + Rp. 1,450,000,000.00) = 0

5. CONCLUSION

Based on the results of data analysis and discussion, the following conclusions were obtained:

1. The excavator's investment value is IDR. 1,450,000,000, - with a Net Present Value (NPV) of IDR. 4,282,331.62 is greater than zero (investment worthy) and the value of the Internal Rate of Return (IRR) is 7.07% greater than 7% (feasible for investment).

2. Break event point (BEP) or the excavator investment payback period of 2,816 hours.

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