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To cite this article: A Z Rahardja *et al* 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **528** 012031

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# Feasibility Analysis on the Development of Steel Sheet Zinc Plated and Galvalum Production Factory PT. S Steel

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**Abstract.** PT. S Steel is a company producing zinc coated steel sheet (BJLS). The company runs from 1969 and is a joint venture company with Japan. The current production plant is located in an urban area, and the government of Makassar issued a government regulation in which the factory should not exist in the city area. So that PT. S Steel will build its new production plant in the industrial estate. In this feasibility study will be discussed about the construction of production plant PT. S Steel is reviewed in terms of market, technical aspects, legal and environmental aspects, as well as financial aspects. Market aspect analysis is done by using interview and historical data as reference. In the market aspect it is known that the amount of demand from zinc continues to decline while the galvalume rises as a new trend. Technical aspects analysis resulted in the output of facility layout and financial aspect analysis calculated based on calculation of NPV, BCR, and PBP with projection for 5 years period. financial analysis was assessed from several eligibility criteria, namely NPV with value Rp 487,404,605,133 and said to be feasible because  $NPV > 0$ , IRR 48.703% and said to be feasible because  $IRR > MARR$  11%, and PBP worth 2.34. This feasibility study shows that the implementation of the construction of PT. S Steel is feasible to operate.

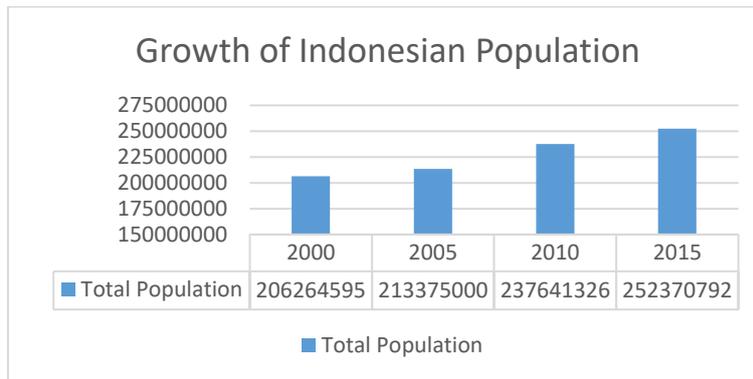
**Key Word:** Galvalume, Steel Zinc Plated Sheet, Feasibility Analysis, NPV, BCR, PBP

## 1. Introduction

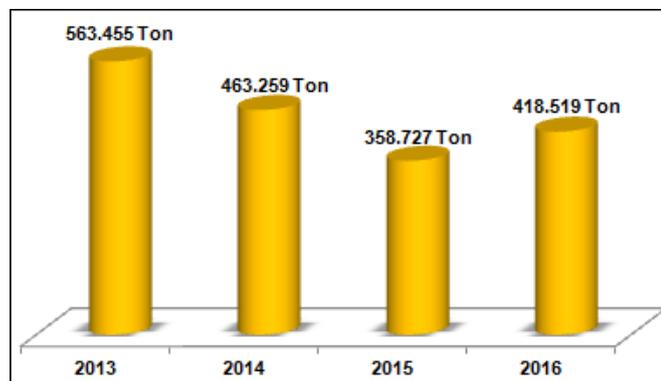
The total population of Indonesia based on the 2010 Population Census reached 237,641,326 inhabitants, an increase of 15.21% compared to the population in 2000 which recorded 206,264,595 inhabitants. By 2015 the number of people based on the temporary census has reached 252,370,792 inhabitants.

The increasing number of residents, among others, led to an increase in the needs of homes caused by the number of young couples who married and need a new home. Besides, the housing demand is also driven by the large number of houses damaged due to natural disasters and natural conditions, the Ministry of Public Housing in 2010 estimated the needs of a simple and healthy national house on average reached 800,000 units per year. The demand for comfortable and cheap roofs is growing and the zinc coated steel sheet is one of the most promising options. Because in addition to the cheap price, durability of zinc coated steel sheet is also quite capable. In addition to the zinc coated steel roofing roof, the galvalume roof is also an inevitable choice. Galvalume roof made of mild steel, the public interest. Market demand for the roof of this galvalume continues to increase.





**Figure 1.** The Growth of Indonesia Population (2000-2015)  
(source : BPS, 2017)



**Figure 2.** Indonesia Number of Galvalume Requests  
(source : BPS, IZASI, KPPI, 2017)

**Table 1.** Sulawesi Number of Zinc Plated Request (ton)

No	City	Request	No	City	Request
1	LUWU	11978	13	BARRU	5877
2	MAKALE	1113	14	SELAYAR	4441
3	RANTEPEO	888	15	WATAMPONE	25486
4	MAMUJU	16260	16	PANGKEP	11053
5	MAJENE	5209	17	MAROS	11581
6	POLMAN	13674	18	SINJAI	8161
7	ENREKANG	6840	19	MAKASSAR	49321
8	SIDRAP	9890	20	GOWA	24481
9	PINRANG	12565	21	TAKALAR	9794
10	PARE2	4724	22	JENEPONTO	12192
11	WAJO	13528	23	BANTAENG	6291
12	SOPPENG	7789	24	BULUKUMBA	14073

(source : Interview with Distributor, 2017)

Based on Figure 2 and Table 1, There are high demand of sheet zinc plated in Indonesia especially in eastern part of Indonesia. So, it's required producers that capable of supporting these needs, PT. S Steel is a company engaged in the manufacture or production of zinc coated steel sheet located in Makassar. With the new prospect of galvalume roof, then PT. S Steel will also expand its production by adding

this galvalume roof as one of its production. The addition of this galvalume roof product to meet the needs of galvalume roof is increasing, and also to increase sales are declining because the demand for zinc roof has begun to be less desirable. Due to factory location and warehouse PT. S Steel located in Tello Baru, Makassar City violated Mayor Regulation No. 20 of 2010 concerning prohibition of warehouses and factories in the city as well as Local Regulation No.13 of 2009 regarding integrated warehouse and industrial area. Thus, the management section decided to build a new factory in the warehouse and integrated industrial area of KIMA. This needs to be re-examined because it is not at least the cost of removing the plant. Because if not moved by building new facilities will be subject to sanctions in the form of revocation of permits and the closure of facilities by force. However, if it is closed it will result in layoffs on all employees resulting in a lack of employment. In addition, if it is closed then the producers of zinc in the region of Sulawesi will experience shortages because zinc originating from Java cannot meet the amount of demand in Sulawesi and surrounding areas. The lost that can be borne can reach the number of billions rupiah, so the closure and revocation it's avoided by this company.

The purpose of this feasibility study is to assess the feasibility and business capability of PT. S Steel. And examine the aspects that affect the construction of this factory, such as market, technical, and financial aspects. If not feasible, then what needs to be done by the company in order to remain able to run its business. Sensitivity analysis is also conducted to determine the sensitivity of both raw material prices and selling prices later and anything that can affect in terms of price. This is done to assist corporate executives in making decisions as one of the material considerations.

## 2. Literature Review

### 2.1 Feasibility Study

The feasibility study is the study of business plans that not only analyse built business, but also when they are operated regularly to achieve maximum profit for an indefinite period [1]. In general, the aspects of the object in the feasibility analysis include [1]:

#### A. Market Aspects

The valuation of the market aspect is important because no successful business project without demand for goods or services generated by the project. Market aspect aims to determine the extent of market area, demand growth and market share [2]. Marketing includes all systems related to business activities aimed at planning, pricing, promoting and distributing goods or services that will satisfy the needs of the buyer or customer whether actual or potential [3].

#### B. Technical Aspects

Technical aspects are aspects related to the technical project development process and its operation after the project is completed. Based on this analysis can also be obtained preliminary assessment of investment cost plans including exploitation costs [4].

#### C. Financial Aspects

The financial aspect analysis aims to determine the investment plan through the calculation of expected costs and benefits, the ratio of expenditures and revenues, such as the availability of funds, the cost of capital, the ability of the project to repay the funds within a predetermined time and assess whether the project will be able to grow steadily [5]. This feasibility will be calculated by 4 factors, namely:

1. Net Present Value (NPV)

NPV is a method for calculating the difference between the present value of the investment and the present value of the net cash income (cash flows of operations or cash flows of terminals) in the future.

2. Payback Period (PBP)

The Payback Period method is the period required to cover the investment expense (core cash investment) using cash flow, in other words, the payback period is the ratio between

the initial cost of the investment and the cash inflows that result in units to time. The formula for calculating Payback Period is as follows:

$$\text{Payback Period} = \frac{\text{Investment Value (outlay)}}{\text{Net Cash Inflow (Proceed)}} \times 1 \text{ year}$$

### 3. Internal Rate of Return (IRR)

IRR is a method that calculates the interest rate equalizing the present value investment with the present value of future net cash receipts. The investment requirement can be said feasible if  $IRR > MARR$ . The formula for calculating IRR is as follows:

$$I_o = \sum_{t=1}^n \frac{CF_t}{(1 + IRR)^t}$$

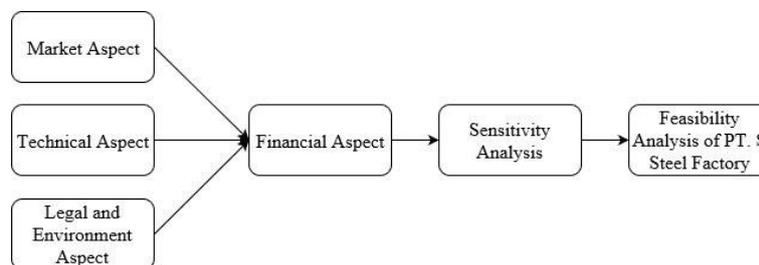
### 4. Benefit Cost Ratio (BCR)

Benefit Cost Ratio (BCR) is defined as a ratio value equivalent to the benefit for an equivalent cost. The applicable equivalent size may be present value, annual value, or future value.

## 2.2 Sensitivity Analysis

Sensitivity analysis is an analysis carried out when calculating estimated future cash flows that are often faced with uncertainty. When we analyze estimates of future cash flows, we face uncertainty. As a consequence, the results of calculations can deviate from reality. Uncertainty can lead to reduced ability of a business project to operate to generate profits for the company [1].

## 3. Method



**Figure 3.** Conceptual Model

The feasibility analysis carried out in this study includes market aspects, technical aspects, financial aspects, legal and environmental aspects, as well as sensitivity and level of risk. These aspects have relevance to one another. So that results can be obtained that can produce a conclusion whether the establishment of a new production plant PT. S Steel is feasible or not.

Market aspect analysis is carried out at an early stage with the aim of knowing market opportunities related to consumer behavior regarding the use of prices and market competition for zinc and galvalum roofs in Indonesia. Technical aspect analysis is done to find out the location of the business, the layout of the building, labor and operational equipment at the new production plant of PT. S Steel. Legal aspect analysis aims to identify established business entities. Environmental aspects are useful for identifying environmental impacts that occur during the production process of the plant and how to process the waste. The results of the analysis of market aspects, technical aspects, legal and environmental aspects, will produce estimated costs of each aspect. These cost estimates will then be analyzed in financial aspects.

The results of the financial aspects will represent the projected feasibility of the implementation of the establishment of a new production plant of PT. S Steel using financial tools such as NPV (Net Present Value), Payback Period, IRR (Internal Rate of Return) and BCR (Benefit Cost Ratio). After conducting a number of market, technical and financial analyzes, decision making is an important part of the

feasibility analysis process. The decision will be taken in accordance with the criteria for processing and analyzing data from this aspect. The end result is the feasibility of establishing a production plant of PT. S Steel.

#### 4. Result and Discussion

Time series method is used to forecast the market. This is important to know the market aspect and know what technical aspect that suitable for the factory. The historical data pattern of sheet plated zinc is in the form of cyclical data pattern. Double moving average and Double exponential smoothing are used because this method is considered suitable for medium and long-term intersection as in this case. Double Moving Average Method 2 x 2 has the smallest MSE value, so the method is chosen to forecast. The query data of galvalum was obtained by conducting interviews to obtain available, potential, and targeted markets. In forecasting it is assumed there is an increase of 5% in line with the value of economic. In Table 2 can be see there is improvement total demand and that is market aspect for this company. Company only targeted eastern part of Indonesia because to reach western part of Indonesia still too hard as can be known big industry it's mostly in western part of Indonesia.

**Table 2.** Market Demands Forecast

Tahun	2018	2019	2020	2021	2022
Seng	7552,60	6994,02	6435,44	5876,85	5318,27
Galvalum	44.226	46.437	48.759	51.197	53.757

(Source: data processing 2018)

In technical aspect, the location of new production facility PT. S Steel is located in Takalar district, Patene industrial district and it's located 20 km from the previous production facilities of PT. S Steel. Owner of PT. S Steel already has land to build new facilities. The ground has a total length 300 m and width of 200 m. And to perform steel coating then it's required a Continuous Hot Dip Metal Coating Line machine. This machine is a composite of several basic engines for coating steel sheets. The Hot Dip Continuous Metal Coating Line machine that be use has a maximum capacity of 100,000 metric tons per year, with a maximum speed of 180 MPM. This is required because the demand and market aspect keep growth in the past 5 years, and this expected to fulfil all the demands. The weight of coil used it's 25 tons maximum, with a thickness of steel 0.6 mm and a maximum width of 1250 mm. Production capacity will only use at most 80% of engine capacity, so the engine capacity will be used real by PT. S Steel is 8,000 tons per month (accumulated from galvalum and zinc).

**Table 3.** Financial Aspect

Interest Rate	11,00%
NPV	Rp 487.404.605.133
PBP	2,34
IRR	48,703%
BCR	1,189

(Source: data processing 2018)

From the table 3 can be seen that the value of NPV is Rp 487.404.605.133. The IRR result is 48.703% which means the amount is greater than the MARR which is worth 11%, this indicates that the implementation of the construction of this new facility benefits the company. Based on the calculation of PBP, it can be seen that the time of return from the construction of facilities PT. S Steel is 2.34 ie the

capital may return for 2.34 years (28 months). And the value of BCR is 1.189 (greater than 1) which indicates a greater profit than the required cost.

Sensitivity analysis is done on variable of raw material price increase, decrease of selling price, and increase of dollar price. The sensitivity of the increase of raw materials obtained by 17.56% indicates that raw material prices may rise and not cause losses during the percentage increase of not more than 17.56%. While the sensitivity to the selling price decrease is 49.82%, it indicates that the selling price can be lowered and will not cause loss during the percentage decrease not more than 49,82%. The increase in dollar price can affect the performance of the company when the dollar price reaches Rp 16,000 per US \$ 1 it can be seen from the NPV value becomes negative when the dollar price is Rp 16,000.

## 5. Conclusion

Based on the result of feasibility analysis of construction of steel production factory of zinc coated sheet and galvalume of PT. S Steel, can be summarized as follows:

1. Target market used to know how big sales target of PT. S Steel in the next few years. To know the target market then done 2 ways that is using historical data and interview. The total market target of PT S Steel in 2018 amounted to 51,778 tons and continues to increase by 3% annually. This is because the decline in demand for zinc by 6% and galvalum rose by 5%.
2. Sales plan of PT. S Steel for a 5-year projection, the company does marketing by hiring booths on property-related events 6 times a year, and the company will strengthen relationships with existing distributors.
3. Technical aspects include technical requirements related to the manufacture and processing of sheet steel in PT. S Steel. The selection of machines and layout of PT S Steel can be said to be feasible because it can meet operational needs. The needs of raw materials and labor directly or indirectly have been able to meet the needs and can adjust to the production capacity. The total fund needed to build this production plant is Rp 339,862,680,000.
4. In this study, the financial aspects consist of investment costs, income, profit and loss, cash flow, and balance sheet. The components will be used to calculate the eligibility criteria such as NPV of Rp 487,404,605,133 and this is said to be feasible because of  $NPV > 0$ , IRR value of 48.703% and said to be feasible because  $IRR > MARR$  11%, and PBP for 2.34 years.
5. Sensitivity analysis is done on variable of raw material price increase, decrease of selling price, and increase of dollar price. The sensitivity of the increase of raw materials obtained by 17.56%. While the sensitivity to the decrease selling price is 49.82%. The increase in dollar price can affect the performance of the company when the dollar price reaches Rp 16,000 per US \$ 1 it can be seen from the NPV value becomes negative when the dollar price is Rp 16,000.
6. Suggestions for further research are Analyzing risk aspects that can occur both internally and externally.

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