

CHAPTER VI

CONCLUSIONS AND SUGGESTIONS

This chapter contains conclusions of investment projects that have been planned for retrofitting production machinery at Indarung IV Plant PT Semen Padang and suggestion for the next researcher with related research.

6.1 Conclusions

Based on the research that has been made, several conclusions can be drawn from investment projects that have been planned for retrofitting production machinery at Indarung IV Plant PT Semen Padang, which are:

1. Decreasing clay quality affects the Raw Mix's quality and leads to cement quality problems. PT Semen Padang has determined three quality achievements from cement production, namely Lime Saturation Factor (LSF), Silica Modulus (SIM), and Alumina Modulus (ALM). Clay is the material that plays the most crucial role in the level of Al_2O_3 it contains in clay to achieve the expected ALM standard. Previously, PT Semen Padang used clay with a standard quality level of 23% Al_2O_3 in 2021 and required 967.088 tons per year at the Indarung IV Plant. However, there are indications of a decrease in clay quality which forces the addition of tonnage clay to be used so that each quality parameter can be achieved. The adjustment of the tonnage clay used when dealing with this problem is to use the interpolation of the level of Al_2O_3 and the tonnage clay used previously with the current and future level of Al_2O_3 so that the required adjustment capacity is 1,257,719 tons per year.
2. Technical evaluation of machines related to clay material at Indarung IV Plant by comparing the existing capacity of each machine with the previously determined clay adjustment capacity. Based on the capacity

comparison, 16 machines could not cover the tonnage clay requirements after adjusting to current conditions. Furthermore, to ensure which machines require retrofitting, a mechanical availability calculation is carried out for each machine by considering each machine's operating hours and breakdown. Based on the mechanical availability analysis of each machine, a percentage limit is determined for the feasibility of the machine being unusable. It requires retrofitting, namely machines with mechanical availability below 70% so that with replacement or retrofitting, they can again operate effectively and efficiently. Based on the analysis, it is known that 17 machines have mechanical availability below 70% and require immediate retrofitting. Then, a utility analysis was also carried out for each existing machine by considering the current capacity of each machine with historical operating hours for each machine. So, it can be seen the capacity that could be achieved and giving the result that there were 17 machines whose utility was very poor and unable to cover the needs, so they needed retrofitting.

3. The determination of the opportunity loss of the Indarung IV Plant is seen from the recapitulation of the breakdown of each Raw Mill 4R1 and 4R2 caused by the clay quality degradation problem and capacity shortage of each machine involved with clay material. Based on the classification and calculation of the breakdown conversion in the form of time to be in tons. Due to this problem, the total breakdown of the Indarung IV Plant is 61,658.99 tons/year. This result will be the basis for calculating the savings from the planned investment project.
4. Determination of the budget required for the procurement of machines that require retrofit based on the results of the previous technical evaluation. The initial investment is divided into mechanical procurement, electrical and instrument procurement, budget design for required civil works, and engineering services for implementing planned investment projects. Based on the results of the previous technical evaluation and after designing costs based on owner estimation from the Capital Expenditure Officer of PT

Semen Padang, it is known that the total funds needed as the initial investment are Rp. 28,556,784,462.84.

5. Operational costs at PT Semen Padang, especially at the Indarung IV Plant on retrofitting machines, require an additional budget. The operational budget includes maintenance costs based on calculations obtained in the first year of Rp.285,567,845. Energy consumption is also budgeted at Rp.962,136,000 in the first year after retrofitting. The last part of the operational cost is the depreciation cost of each retrofitted machine, where the calculation uses the straight-line method, which results in a depreciation requirement of Rp. 839,630,112 per year.
6. Based on the previous investment design, they were followed by a feasibility analysis based on several feasibility parameters: Net Present Value, which in this planned investment project shows a value of Rp.252,784,069,179.53 which means the NPV value > 0 or positive. The second parameter is the Internal Rate of Return which shows a value of 74.46% by using a MARR value of 17.01%, which means the IRR $>$ MARR value. Next is the Payback period, which shows 2.02 years or two years two days as the break-even point of the planned investment project, which is smaller than the horizon of the planned investment project, which is ten years. The last is the Profitability Index of the planned investment project, which shows a value of 8.85, meaning PI $>$ 1. Based on the calculation of each of these feasibility parameters, it can be concluded that investment projects planned for retrofitting production machinery at Indarung IV Plant PT Semen Padang are feasible to run.

6.2 Suggestions

Based on the research that has been done and analyzed, several suggestions can be given for the next researcher to continue research as the development of this research is:

1. Adding objects to be considered in evaluating capacity building caused by quality problems, such as the composition of quality fulfilment among other raw materials.
2. In technical evaluation, comparing capacity, mechanical availability, utility, and reliability analysis can be used.
3. Adding the analysis of objects considered in other financial feasibility analyses, such as tax costs, AMDAL management and other legal provisions, and unexpected needs for administration, procurement, and additional procuring.

