CHAPTER VI

CONCLUSION AND RECOMMENDATION

Based on the result of the discussion and referring to the objectives of the research, there are several results which can be concluded as follows:

6.1 Conclusion

1. Maintenance project of wind turbine 1 KW is consist of three processes which is, preparation, mechanical work, and electrical work. From the results of network diagram analysis with PERT method, the completion of the project (te) is 81,4 hours or 10,17 days.. Moreover, by using PERT Method the duration for maintenance project are determined by critical path of network diagram which occurs on activity 1 – 2 – 3 – 7 – 9 – 10 – 12 – 18 – 19 – 20 – 23 – 24 – 25 – 26 – 27 – 31. Which mean any kind of trouble that occurs in those 16 activities will give effect to the whole maintenance process. From network diagram analysis, the lack of technician are found in activity 18 and 20 which made the predecessor of those activity has long duration because the activity is delayed. Therefore, the optimum labor for activity 18 and 20 which need 9 technician is replaced by 2 technician and 7 helpers for activity 18. Also, for activity 20 are replaced by 2 technician and 4 helper. The labor allocation are available to conduct because in activity 18 and 20 are in the critical path and based on the recommendation from the technician the optimum number of labor allocation in those activity are available as long as 2 technicians are standby in the system. Labor allocation has done not only to decrease the number of slack before those activity, but also give an impact to the duration of completion maintenance project became 65,1 hours or 8,13 days.
2. To make the activity maintenance have the optimum duration those activities need to be accelerated (crashing) by decrease 1 hour on each activity in critical path. The result from crashing on the critical path of normal maintenance caused changes in the critical path after crashing which occurs on activity 1 – 2 – 3 – 7 – 9 – 10 – 13 – 25 –

26 – 27 – 31. It means that this activity can be finished in 54,1 hours or equals 6,76 days. The duration is improved from the previous normal maintenance duration that is 65,1 hours or 8,013 days. By used crashing on the critical path, the optimum duration of maintenance are obtained which are 54,1 hours or equals 6,76 days. By using PERT method, the probability to finish project at 54,1 hours are already found by using Z table. From the calculation of Z value, the result is -3,43 or in z table is 0,03%. It means that the maintenance project are has 0,03% probability to improve the performance by crashing in the critical path activity.

3. The total cost of maintenance wind turbine unit 1 KW are obtained from the calculation of cost labor and cost material. The initial cost labor is Rp1.709.077,38. After labor allocation in activity 18 and 20 the cost labor is increased became Rp1.874.077,38. It occurs because of the cost to hire helpers to replace the technician. Not only in the labor allocation that made the changes in the number of cost but also the crash method is made a change in the number of maintenance cost. From the crash method, the information about cost to accelerate the completion time are obtained from the crash cost and cost slope. From crash cost, PLTH Bayu Baru requires to add Rp911.592,26 in order to add the overtime cost of accelerating duration. Therefore, the cost slope that arised from the crash method is Rp108.105,68. Based from these result, PLTH Bayu Baru required to provide additional cost for labor allocation Rp 165.000,00 and for the crash time Rp1.019.697,94. The initial maintenance cost is Rp3.629.277,38, after labor allocation and crashing the duration is increased into Rp4.648.975,33. Therefore, the total maintenance cost for this project has a gap Rp1.184.697,94 to complete the maintenance project of wind turbine 1 kw with duration 54,1 hours or 6,76 days.

6.2 Recommendation

Based on the whole processes that have been conducted, the conclusion already stated. As consideration for the company, there are some recommendations as follows:

1. Finding the critical path on activity is important to determine the long or short of time that need to be taken from maintenance process itself. Not only the company can find the most efficient time to completing the project but also can anticipate the expenditure that is not necessary. Therefore, It would be the further research to input the data about energy that produced by Wind Turbine 1 KW in order to analyze more specific regarding the maintenance issued in PLTH Bayu Baru.
2. The crashing on critical path is the most reasonable solution to face the maintenance process of wind turbine unit 1 KW at PLTH Bayu Baru. Based on the conclusion of cost maintenance of wind turbine 1 KW, PLTH Bayu Baru got bigger chance to make a wind turbine maintenance project success from cost section for example cost in each activity become more specific. Therefore, it would need further research to make it perfect.