

CHAPTER 3 - RESEARCH METHODE

3.1 Research Framework

In general, this research methodology is divided into seven stages, namely the topic determination stage, the problem identification and formulation stage, the parallel literature study stage by conducting the field data studies stage, the problem formulation stage, the data collection stage, the data analysis and discussion stage, the verification stage and finally the conclusion stage. At the problem identification stage, this research conducted a study of relevant literature related to LCCA from previous studies. The LCCA project approach is carried out with the assumption of new heavy equipment used as a comparison parameter both in technical parameters and financial parameters. Field data as supporting and complementary in the LCCA analysis was conducted to sharpen the analysis. This research also uses an integration analysis approach using the PDCA (plan do check action) concept. Richard et al (1999) show the detailed activities of each stage of the PDCA cycle in Figure 3. 1 Plan Do Check Action below:

<u>Plan</u> • Create appropriate teams • Gather all available data • Understand customers' needs • Describe the process that surrounds the problem • Determine root cause(s) • Design action plan • Develop plan	<u>Do</u> • Implement improvement • Collect appropriate data • Measure progress • Document results
<u>Check</u> • Summarize and analyze data • Evaluate results relative to targets & see differences • Review any problems/errors • Record what was learned • Specify any remaining issues or unintended costs	<u>Act</u> • Standardize desired improvements • Formalize "current best approach" • Communicate results broadly • Identify next improvement

Figure 3. 1 Plan Do Check Action

3.2 PDCA (Plan, Do, Check, Action)

3.2.1 Plan

At the planning stage, the organization or team needs to set goals or objectives to be achieved. These goals should be specific, measurable, achievable, relevant and have a time limit. Analyze the situation and environment to identify problems that need to be addressed or opportunities that can be taken advantage of. This involves collecting data, analyzing trends, and understanding the factors that affect performance.

After setting goals and identifying problems or opportunities, the next step is to formulate an action plan. This plan should include concrete steps, resources needed, timelines for implementation, and criteria for measuring success. It is important to develop a clear communication plan so that all team members or relevant parties understand the objectives, action plan, and how their contributions are needed.

3.2.2 Do

At the execution stage, the next step is to implement the action plan that has been developed. This involves implementing the steps set out in the plan. Collecting data relevant to the research and measuring the progress of implementation in accordance with the plan.

3.2.3 Check

This stage involves monitoring and collecting data during implementation to evaluate whether the steps taken are in line with the plan. This evaluation may involve comparing the results achieved with the objectives set. If there are differences between the expected results and the results obtained, it is necessary to analyze them to understand the causes. This examination process helps to identify lessons learned and improvements that can be applied at a later stage.

3.2.4 Action

Based on the evaluation results at the screening stage, the organization or team can take necessary corrective or preventive actions. If the process is successful, successful principles

and practices can be adopted and applied more widely in the organization. Also, at this stage, the team needs to decide whether the action plan needs to be updated or improved based on the lessons learned during the PDCA cycle. PDCA is an iterative approach, which means that the cycle can be repeated to continuously improve processes and results. Each iteration brings the organization closer to achieving its goals and improving performance on an ongoing basis.

3.3 Flowchart

A flowchart is a visual representation of a series of steps or activities in a process or system. The symbols used in flowcharts represent various elements such as operations, decisions, and data flow. Flowcharts help in conveying ideas or processes in a way that is easy to understand. It can be used as an effective communication tool between various parties, especially when complex processes are involved. Flowcharts are used in system analysis and design. It helps to visualize the workflow of the system and identify areas that may require improvements or adjustments. Flowcharts can be used as a form of documentation to explain how a system or process functions. This documentation can be useful for training, system understanding, or future reference.

The main purpose of a flowchart is to provide a clear and structured description of the flow of a process or system. It helps to understand the sequence of steps involved. Flowcharts help in process analysis by separating out key steps and elements. This makes it possible to identify potential problems or areas of improvement. Flowcharts help in understanding how a system or process works. It can help users, stakeholders, or people involved in the system to understand the overall operation.

By visualizing steps and decisions in graphical form, flowcharts can aid in decision-making by providing a clear view of the implications and consequences of a decision. Flowcharts can be used to identify steps or processes that may require improvement or refinement to increase operational efficiency. By using flowcharts, understanding of the process or system can be improved, communication can be improved, and operational efficiency can be optimized.

A graphical representation of the flow of the process or system of this research is depicted on a flowchart. By arrangement, determining the topic, identifying problems by conducting literature studies in accordance with the context of LCCA, maintenance and overhaul,

elaborating field study data such as performance data, costs, maintenance programs and overhaul plans. Then proceed to formulate the problem by elaborating the data that has been collected by analyzing and discussing the phenomena that occur. Which is then followed by verification and conclusions. The flowchart of this research work can be described as follows.

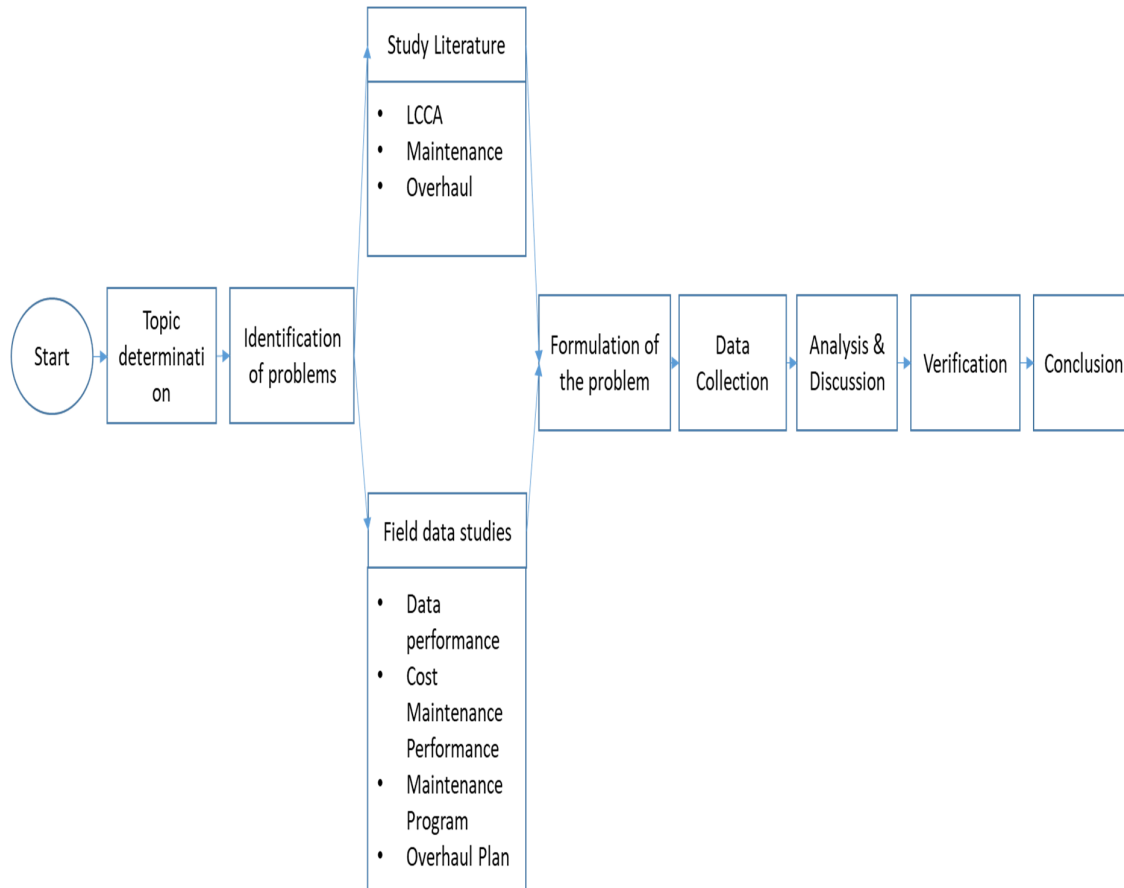


Figure 3. 2 Flowchart Research

3.4 Time Frame of Research

Refers to the time span or period of time set for conducting research. It is the time frame used by the researcher to design, execute, and complete a study. Setting a time frame is

very important because it helps in organizing work, setting priorities, and measuring research progress. The time frame of research conducted is as follows:

No	Activity	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	W15	W16	Target
1	Topic determination																	Thesis Proposal Approval
2	Identification of problems																	Breakdown all possible problems
3	Study Literature																	Elaborating research references
4	Field data studies																	Exploration actual condition & data
5	Formulation of the problem																	Formulating Problem
6	Data Collection																	Get all data needed
7	Analysis & Discussion																	Elaborating actual data
8	Verification																	Macthed the research problem
9	Conclusion & Next Improvement																	Summary Insight & be a scientific refrence Suggestion of the next improvement

Figure 3. 3 Time Frame of Research