CHAPTER III

RESEARCH METHOD

3.1. Problem Identification

The research was taken place in PT. Yoska Prima Inti, Gajah Tunggal Street, Pasir Jaya, Jatiuwung, Tanggerang. The company has been creating records about the machine card histories since 2016. The records contain the machine defect data that involve defect date, name of the problem, actions taken, and date end of the reparation. However, the research related to the machine defect has not been ever conducted yet. Based on the given machine defect data from the company, the actions taken were considered as short-term solutions. Hence, this research aims to know the real root causes of the problems and create the possible preventive solutions which will be able to reduce the machine defect recurring in the future upcoming period. Method used in finding the root causes is Apollo root cause analysis supported with reality charting software, while the possible solutions will be used to create mitigation analysis to be later used as input for the machine defect forecasting. The machine defect forecasting is being done using ARIMA method. The results of this research are the solutions to mitigate the defects, forecasted defect frequency for upcoming period before and after defect mitigation, and the effectiveness of the risk control implementation.

3.2. Problem Formulation

This research focuses on assessing the machine defect mitigation plan to prevent machine defect recurrence in PT. Yoska Prima Inti. The problem formulation is set as a basis to limit the research area and clearly define the issues that the researcher tries to address.

3.3. Literature Review

In literature review, the source for the references comes from previous studies and basic general theories. The previous studies can be found at the inductive study while the basic general theories can be found at deductive study. The basic general theories are mainly used to learn and find out about the method and formula used in the research. Meanwhile, the previous studies are used to know the difference of this research with the other previous researches and make sure that there is no plagiarism.

3.4. Data Collection

The data used for this research are derived from two major sources. Those are primary and secondary data. The primary data are divided into several sources which are interview, field observation, and database. The secondary data are obtained from literatures and books. In the data collection process, there is no software used due to the paper-based database system from the company. The data collected directly from PT. Yoska Prima Inti for 2 weeks long. The data collection started from April 16, 2018 until April 30, 2018.

The interview was conducted with the help of Mr. Arthur as the interviewee. Mr. Arthur is an expert in the production at PT. Yoska Prima Inti. The data gained from the interview were risk control expert rating and general view of the production process within the company. The other primary data sources are database and field observation. The data that gained from the company's database is machine defect historical data which consists of defect date, problem, actions taken, and treatment duration. The last data source of primary data is field observation. Field observation provided a general view of the production process within the company, general view of the usage of the machine, and general view of how the treatments were taken as responses of the defect occurrences.

The secondary data sources which derived from literatures and books were used to create research position to avoid plagiarism. The total literatures reviewed by the researchers were 15 journals and publications. The reviews stated about the research topic, methods used, and the finding of the researches.

3.5. Data Processing

The data processing is shown on the Figure 3.1. It is a figure of research flow. The research flow follows the method flow that is used by the researcher from the beginning until the end of the research.
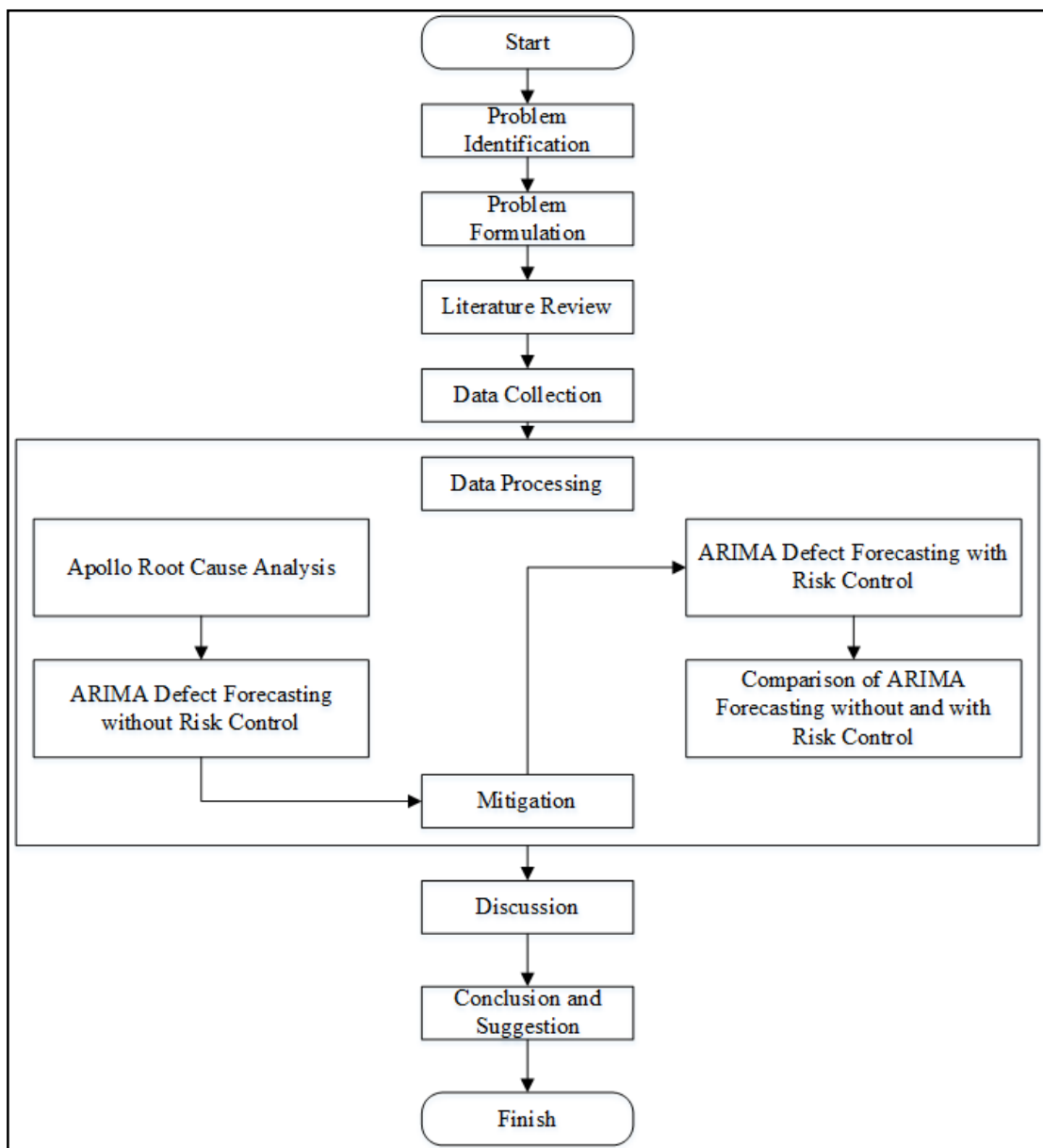

Figure 3.1 Research flow

The explanation for each step in the research flow will be explained below:

1. Problem Identification

The problem identification process is a process where the researcher defines the problem from the company so that the researcher will be able to set the overall purpose and objectives of the research and to help the researcher to determine the required data needed for the research. The identified problem for this research is that there were machine defects that keep on recurring even though the post defect actions were already taken. In addition to that, the company has not ever conducted any machine defect analysis and research yet.

2. Problem Formulation

Problem formulation was created in order to set a framework of the research. It is created to clear out matters related with the what research problem the researcher aims to address and to whom and where the research is relevant. The problem formulated of this research is that this research focuses on assessing the machine defect mitigation plan to prevent machine defect recurrence in PT. Yoska Prima Inti.

3. Literature Review

Literature review is an evaluative report of information found in previous researches related to the current research. The review should describe, summarize, evaluate, and clarify the literatures. The literature review was being divided into two parts which are inductive study and deductive study. The inductive study consists of the journal and publications reviews of the previous studies which consist of 15 journals and publications. In the inductive study the researcher also tried to do research positioning. The research positioning was being conducted by comparing the 15 previous studies with current research in order to avoid plagiarism and address the potential of the research in comparison with the previous researches. The deductive study consists of basic general theories related with the research topic to find out the suitable methods and formla to be used in the research.

4. Data Collection

Data collection is a process of gathering and measuring information on variables of interest, in established systematic process that enables one to answer stated research questions, conduct tests, and evaluate outcomes. The data collection here was being done at PT. Yoska Prima Inti for two weeks long, from April 16, 2018 until April 30, 2018. The process of data collection was divided into two processes which are primary data and secondary data. the primary data comes from interview with the expert from the company with risk control expert rating and general view of the production process as the outcomes, the next one is data obtained from company's database, the outcome for this process is machine defect historical data, and the last one is field observation which has outcomes such as general view of the production process within the company, general view of the usage of the machine, and general view of how the treatments were taken as responses of the defect occurrences.

5. Data Processing: Apollo Root Cause Analysis

Data processing is a series of actions performed on data to verify, organize, transform, integrate, and extract information in appropriate output. In this section of data processing, Apollo root cause analysis is being done. The Apollo root cause analysis is being done to find the real root causes that cause the machine defects problems to occur and keep on recurring. The analysis also provide evidence for each causes. Besides evidence, the analysis also helps the researcher to generate suitable and acceptable solutions based on the causes and evidences. In this Apollo root cause analysis, there is a software that is being used which called as reality charting software. The outputs for this process are root causes and solutions for the problems. The output of the processes will later be used in risk mitigation process as an input.

6. Data Processing: ARIMA Defect Forecasting without Risk Control

In this ARIMA defect forecasting without risk control process, the defect is simply forecasted for the next twelve months using ARIMA. The input for this process is

machine defect frequency from 2016 until 2018. The forecasting is being done without the influence of the previous step which is Apollo root cause analysis. The result of this step is forecasted defect frequency for the next twelve months. The output will be later used as input to do comparison with the forecasted defect frequency which has been influenced with risk control.

7. Risk Mitigation

Risk mitigation is a systematic reduction in the extend of exposure to a risk and / or likelihood of its occurrence. In this step, the solutions obtained from Apollo root cause analysis are being used as inputs and acted as risk controls. The mitigation is done by calculating the defect reduction value for each risk control and calculationg the defect residual. In calculation of defect reduction value, the risk control expert rating is being used also as an input to measure the current and expected conditions rating. The calculation of defect residual is being done after finishing the calculation of defect reduction value. The output of this step is monthly defect residuals which later be used as inputs for the ARIMA defect forecasting with risk control.

8. Data Processing: ARIMA Defect Forecasting with Risk Control

In this ARIMA defect forecasting with risk control process, the defect residual is simply forecasted for the next twelve months using ARIMA. The input for this process is machine defect residual from 2016 until 2018 which were obtained from the risk mitigation. The result of this step is forecasted defect frequency for the next twelve months with an influence from the risk control. The output will be later used as input to do comparison with the forecasted defect frequency which has not been influenced with risk control.

9. Comparison of ARIMA Forecasting without and with Risk Control

The comparison of ARIMA forecasting without and with risk control is conducted to measure the effectiveness of the solutions implementation. The calculations consist of the calculation of maximum possible defect and calculation of defect prevention

effectiveness on 75% level of effectiveness and 85% level of effectiveness. The determination of the effectiveness levels was done by using literature review due to the condition where the company does not have any historical defect prevention effectiveness value for the past projects. The input for the calculation itself is the forecasted defect frequency before and after risk mitigation. The output for this step is monthly defect frequencies.

10. Discussion

Discussion has an objective to interpret and describe the significances of the research findings and explain any new understanding or insight about the problem taken the findings into considerations. The discussion is being divided into three sections which are root cause analysis in machine defect, risk mitigation, and machine defect forecasting. In the discussion of each section, the researcher explains any factors that might influence the implementation of the research result which are ignored due to research limitation and which are taken into considerations for future research.

11. Conclusion and Suggestion

In this section, the conclusion is created to answer all of the problem formulated in the beginning of the research. The conclusion is derived from the research results. In addition to the conclusion, the suggestion is generally arising out of the research limitations that have been identified. The research limitation itself is discussed on the discussion chapter. This means that the suggestions are derived from the discussion chapter. The suggestions address matter or factors that may be beneficial for the company and to be used for future research.

3.6. Discussion

After all data processing were finished. The discussion then was being conducted to discuss the result of the data processing which are the ARIMA defect forecasting and the effectiveness of the risk control. In the discussion, also mentioned several factors that may relate to the research.

3.7.Conclusion and Suggestion

In conclusion and suggestion, the problem formulations which are formulated since the beginning of the research, are being answered. There are also several suggestions made for the company and future related researches.