

CHAPTER 3

RESEARCH METHODOLOGY

3.1. Research Object

The researcher focuses on solving a problem in an accurate way by involving the involved manager and workers to provide the available alternative solutions to an existed problem. This research will conduct excel as the domain tool and direct interview as media to find the causes of a problem and facilitate optional solutions.

3.2. Literature Review

A literature review is categorized into 2 parts in this research which are deductive and inductive study. The deductive study is the part where it explains the fundamental theory regarding the research topic. It aims to bestow the basic comprehending for the readers about this research. Meanwhile, the inductive study is the procedure literature which is arranged properly, thus it will bestow the advanced knowledge to readers and show the distinctive differences between this research and another.

3.3. Data Collection

This research applies for primer data in conducting the research. Primer data are defined as any forms of a record or written scientific research that are taken by direct measurement or an instrument, so that later it will be able to represent the condition of the focused area. In this research, data were collected data from the manufacturing company, namely PT Sport Glove Indonesia. It manufactures sport gloves and the author focuses on the area of the sewing process. However this research also includes several kinds of literature in order to support the validity and method used, thus it is hoped that the outcome will be greatly as good as expected.

3.4. Data Processing

Data processing is the representation of the process work on how the company should decide from the available alternatives as the means of mitigating targeted risk and it will then continue to the step of comparing the action between mitigating its risk and not to do so by using the approach of cost-benefit assessment. Several tools used in this research are Excel, Draw I.O, and direct interview.

3.5. Discussion

The author will conduct a design project and after it is created, then the discussion will take part to solve the problem. The discussion will begin from identifying the problem using Excel until conducting the Cost-Benefit Assessment method to compare the two scenarios.

3.6. Conclusion and Recommendation

The conclusion will be about answering the proposed questions in the problem formulation part, in Chapter I. This part will also give a few recommendations that may be used to improve or to elevate further research.

3.7. Research Flowchart

This research flowchart is to show how this research is conducted. These steps are important to display, due to it portrays the concept of how the author moves from the beginning until the conclusion of the research, so that the readers may easily understand. 3.1 below:

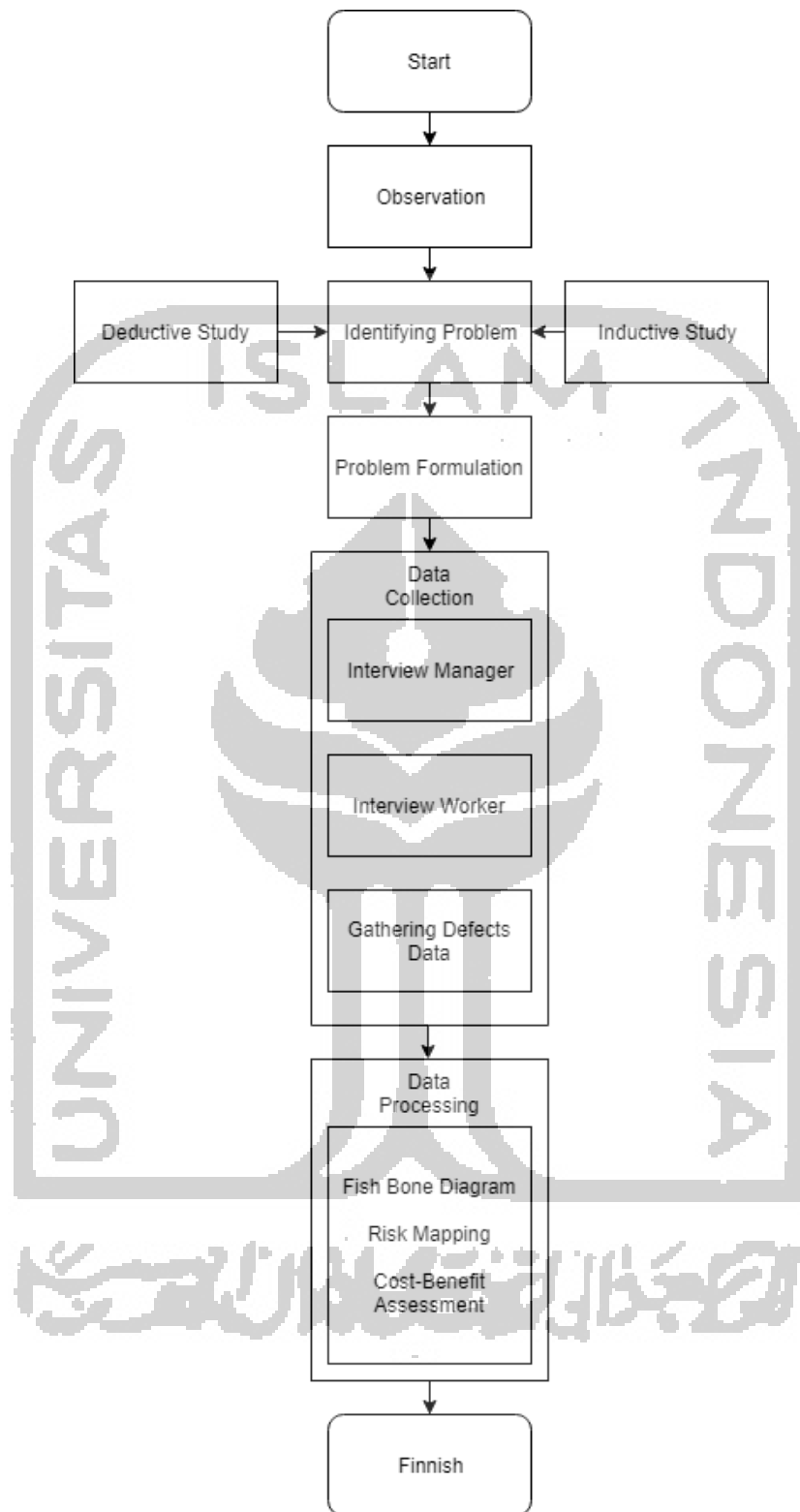


Figure 3. 1 Research Flowchart

CHAPTER 4

DATA COLLECTION AND PROCESSING

4.1. Data Collection

This research collects data from the company which manufactures types of glove. This company applies the system manufacture of the make to order policy. It has received several kinds of goods, namely from sport, military, and regular style of glove. The material used is also divided into three categories, such as leather, fabric and hard fabric.

4.1.1. PT Sport Glove Indonesia Profile

Sport Glove Indonesia, PT, is located on Krandon, Sleman, Daerah Istimewa Yogyakarta. This company manufactures gloves which are based on the material of leather, fabric, and hard fabric. This company was founded and established in 1992 and still actively run until the present day.

The manufacturing system used by this company is the make to order policy, so therefore this company contracts many labors in its processing sub area. Aside from servicing local demand, it has also serviced shipping goods into the United States, Canada, United Kingdom, Netherland, Maryland, Australia, and Japan.

PT Sport Glove Indonesia is the producer of the glove with varied functions. The types of goods start from sport, working, military, and casual function. This variety of kinds make the company run actively in terms of manufacturing goods annually.

The process in factory includes several activities, such as cutting, printing, laminating thermo-plastic Rubber, sonic welding, embossing, sewing and packing. This company has conducted vertical integration along with the department of cutting, printing, laminating, sonic welding, embossing, and packing. This vertical integration leads to a higher number of efficiency in the manufacturing process.

4.1.2. PT SGI Vision and Mission

Vision and mission from PT Sport Glove Indonesia are that:

1. Vision

“To be a leading glove manufacturer in the world”

2. Mission

Develop and produce the glove with a plan and good work for our customer that seeks for quality, brand, and performance as appreciation for their trust.

4.1.3. Data Defect of Product Z

Defect of a product Z is defined as a reject product off specific order from the customers that cannot be reworked or recycled in the sewing process-making. The defect signifies that there is something wrong during the working time which can include the variables, like human, material, machine, method and policy from the company.

The product, namely product Z, is from three data of order that comes from the same buyer. This order has a different size of capacity, yet it comes with the same standard. It gets collected from three different posts. When the order undergoing, the company starts to establish a deadline which gets established based on the quantity of order, workforce, and a number of available machines. Later, the circumstance in the field will affect the policy of a manager, encompassing the target pressure, the material used, and a number of workers needed.

Table 4. 1 Data of Latest Defect of Product Z

996#	PT SGI Project on Product Z		Production	Defect	Actual
Production Schedule	Product	Production Target			Production
Day 1	Z	166		22	144
Day 2	Z	166		15	151
Day 3	Z	166		10	156
Day 4	Z	166		17	149
Day 5	Z	166		44	122
Day 6	Z	166		42	124
Total		996		150	846
Average		100%		15%	85%

4.1.4 Data of Participatory

Participatory intends to invite people who can understand the work field, namely experts. This attitude encompasses the related manager from production and the workers from the sewing area. The goal is to have the target output that is close to what really occurs in the field. The way it gets conducted is by interviewing the managers and workers about the root cause of the defect's problem. The goal of the first interview is to get all the factors of problem from the boundless consideration of the experts while working the project. The result of the first interview can be seen below:

Table 4. 2 List of Interview's Answer

No	Effective Factors
1	New Complex Design (Involve difficult material ; sub process ; many variation)
2	Unsuitable arrangement of working environment
3	Unprepared material
4	Wrongly re check dies
5	Error in the previous coloring process
6	Teamwork
7	Rusty wire side-connector (sliding part machine)
8	Rough pedal (foot pedal on the machine)
9	Dull Needle
10	Type of Material used
11	Pattern of sewing
12	Communication with other division
13	Lack of supervision
14	Pressure target
15	Working with a sharp tool
16	Lack of training

Next activity, the researcher conducts the second interview session with the workers. It takes eleven workers to vote these available opinions. The goal of this second interview session is to scope and to narrow the available opinions to be the most intrusive factors that are thought by the workers. The rule is that each of eleven workers need to checklist five of the available options that they consider as the most intrusive ones. Thus, the total amount will be fifty five and the five highest number, the most intrusive factors according to workers, will get integrated into the next two methods namely fishbone and risk assessment.

4.1.4 Fishbone Diagram

Fishbone diagram aims to systemize the thinking on tackling the root cause of a problem by placing the related reason of the problem in line with the branch or the bone. This attitude divides between the head and the bones which it intends to confirm that the head should be the one of where all of the branches' commentary coming from. The head of this fishbone is the outline of the problem. Meanwhile the branches are root causes of its outline problem.

In the sewing process area for product Z, we come to know that the outline of the problem is an occurrence of defect for product Z. The researcher connects the result from the attitude of participatory to be the branches of the fishbone. As the result emerged from participatory, the branches in the used fishbone are methods, man, material, equipment, and policy. This information is meaningful for the next applicability, which is risk assessment.

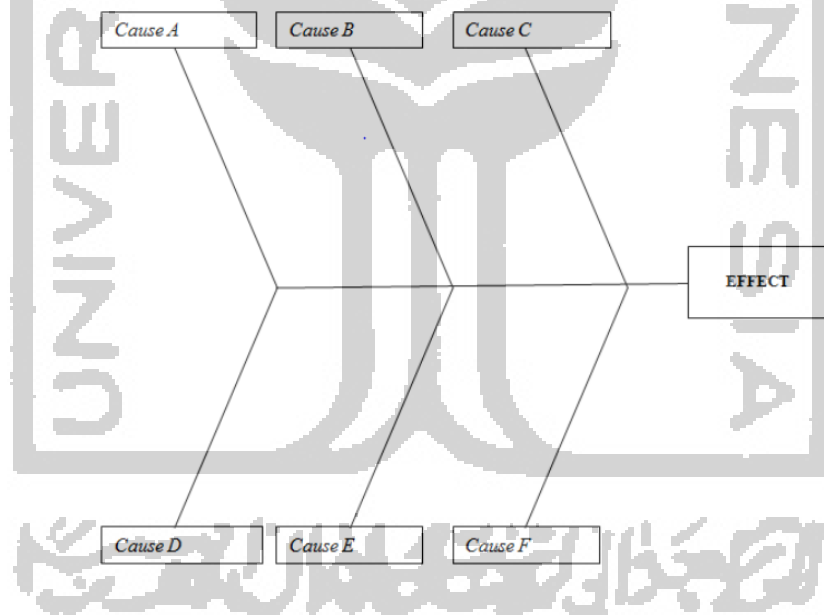


Figure 4. 1 Fishbone Diagram

4.1.5 Risk Analysis

Risk assessment aims to assess potential hazards found in the selected area of research. This method provides two kinds of assessment, such as quantitative and semi quantitative. The one that gets applied in this research is the semi-quantitative attitude. The focus loss on this assessment depends on the participants' request.

The likelihood is a measurement for the occurrence of an event. This format follows the company's policy. The company policy focuses on how many the occurrence of an event happens in a single project. The format of questions to identify number of defects is shown below:

Table 4. 1 Likelihood Questions

Likelihood Formula
How many defects are there due to new design?
How many defects are there due to lack of training?
How many defects are there due to rough pedal machine?
How many defects are there due to used material?
How many defects are there due to pressure target?

The parameter on determining likelihood level is to see the authorization given by the manager. Having this as parameter, the researcher categorizes each of defects in accordance with the type of its failure, either it is from layout changing or human error or so forth. The established parameter can be seen below:

Table 4. 2 Likelihood Level

Parameter of Likelihood		Definition
Improbable	1	So unlikely, it can be assumed occurrence may not be experienced
Remote	2	Unlikely, but possible to occur
Occasional	3	Likely to occur sometime in the life of an item
Probable	4	Will occur several times in the life of an item
Frequent	5	Likely to occur frequently

The severity is a measurement for the loss of an event. This format follows the company's policy. The company policy focuses on how much is the loss from of an event happens in a single project. The parameter taken is in dollar that lateri will get converted to Indonesia Rupiah which at the time \$1 equals to Rp 14.114,-. The set up level to identify number of defects is shown below:

Table 4. 3 Severity Level

Parameter of Severity	
\$0 - \$ 50 (Rp 0 - Rp 705.700)	1
> = \$51 - \$100 (> Rp 719.814 - Rp 1.411.400)	2
\$101 - \$200 (> Rp 1.425.514 - Rp 2.822.800)	3
> = 201 - \$ 400 (> Rp 2.836.914 - Rp 5.645.600)	4
> = \$ 401 (> = Rp 5,659,714)	5

The number of likelihood and severity will get combined and get assessed by the risk assessment. The formula of risk assessment is by multiplying likelihood and severity. The result of this multiplying will get converted into the risk level standard. The risk level can be seen below:

Table 4. 4 Risk Level

Risk Level	
< 25 Million Rupiah	Low
< 50 Million Rupiah	Medium
< 75 Million Rupiah	High
> 75 Million Rupiah	Extreme

The result of risk level will get inserted in risk map. The risk map aims to visualize information in easier way to manager which will later require manager's action. This risk map is greatly important, so that the manager can see the priority of a problem being taken. The established risk map can be seen below:

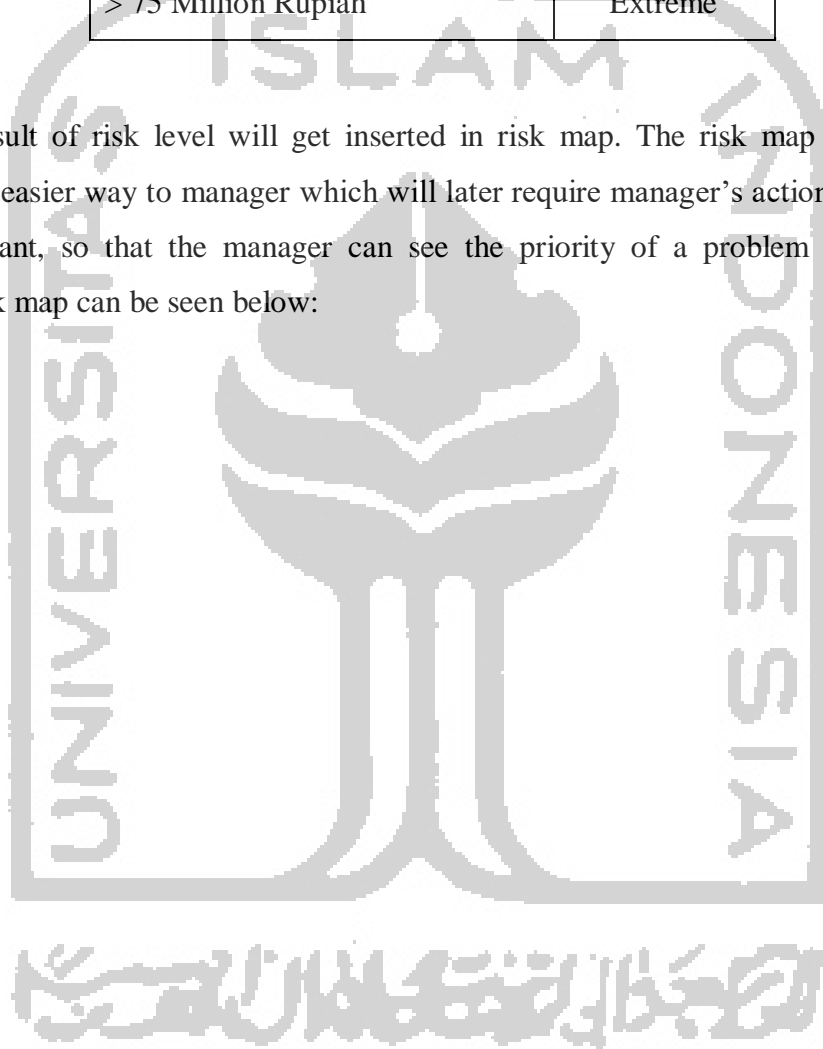
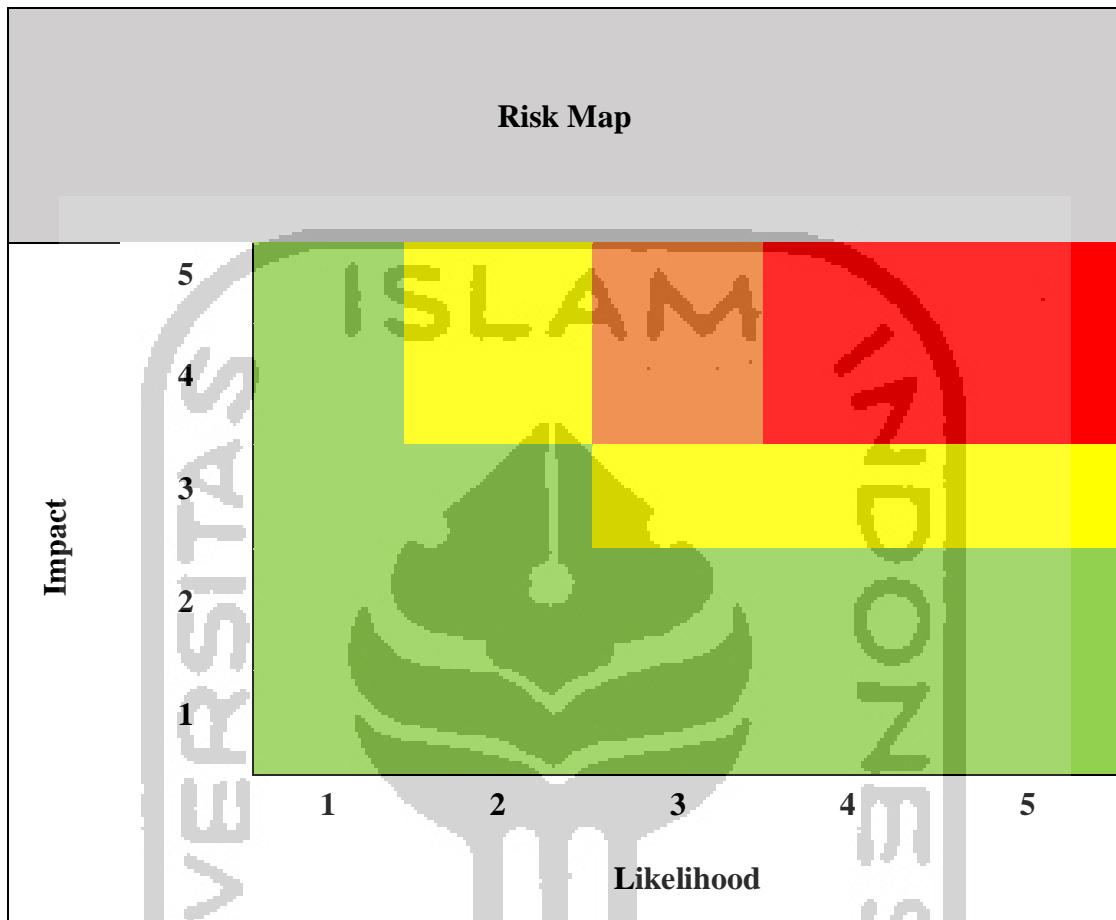


Table 4. 5 Risk Map



4.1.6 Cost Analysis

Cost analysis is the approach to measure the financial expense in the sewing process area for product Z. This attitude justifies the loss and profit from the current and suggested replacement or mitigation given by the manager. In this capacity, this method allows the manager to know if the mitigation will value up the profit or create a more loss in the expense of production activity only.

The variables used in this method can encompass defect, overtime, replacement of goods' cost. These three variables represent the production activity. There is also cost that does not require financial expense, such as changing standard operational procedure and leaving out the option. On hand means that it depends on the mitigation taken by the manager.

The mitigation that will get processed by this method is the most intrusive factors suggested by the experts. These five factors will be analyzed by cost approach. This aims to show the manager the trade-off from the action being taken from a problem. However, this is only from the context of production expense.

