



## Quality Improvement Plan for Leather Sandal Products to Reduce Defects

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### Abstract

CV. Rama Raiders was a home industry engaged in the fashion sector. The business had seven main stages of the production process: selecting materials, making patterns, cutting techniques, sewing processes, gluing processes, finishing/quality control, and packaging in carrying out production activities to achieve the desired quality CV. Rama Raiders still faces several obstacles, one of which is the presence of defective products produced, which causes product quality to decline. This research aims to identify the factors that cause sandals defects in CV. Rama Raiders. The methodology used the Seven tools and FMEA methods to determine the process of controlling leather sandal product defects using qualitative data. Corrective action plans used the 5W+1H concept to address each root cause of the problems. The results were that the most dominant type of defect in leather sandals was a type of glue defect that was not neat. The appearance was because of human and machine factors that didn't work optimally, tools that didn't support it, materials that didn't fit, inadequate environment, and no standard operating procedures. The improvements made by changing the glue, adding a brush, and making SOP improved the quality. From this research, the methods help reduce the problem of product defects experienced by the company.

*Keywords:* FMEA, Seven tools, SOP, 5W+1H

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### 1. Introduction

In the era of the ASEAN Economic Community (AEC), the industry is required to be able and ready to have high competitiveness. What is expected is that the small and medium industries are able to make products based on what the community needs with the good quality considering low prices. High competitiveness is very necessary for every industry to remain superior in order to increase the competitiveness of companies that are required to make better use of their abilities as much as possible so that they excel in competition (Subriadi & Najwa, 2020). Intense business competition provides great opportunities for consumers to seek quality products at competitive prices. One of the things that can affect the competitiveness of an industry is the industry structure, performance, and behavior of the industry itself (Anjalee et al., 2021). One of the products of a company currently experiencing business competition is the footwear industry. Each of these footwear industries competes to show the advantages of each product and take advantage of the opportunities that exist today, and this requires companies to be more creative in the face of competition (Qin et al., 2020). The footwear industry is showing an increase, and this can be seen in the development of its production value which is contained in the data from the Central Statistics Agency (BPS). The Central Statistics Agency (BPS) reports that the gross domestic product (GDP) of the leather, leather goods, and footwear industries at current prices (ADHB) will reach IDR 42.51 trillion in 2021. If measured by GDP at constant prices (ADHK), this industry grew by 7.75%. Using footwear such as shoes or sandals is one of the necessities for supporting a decent life. This reveals that the 2015-2035 National Industrial Development Master Plan (RIPIN) includes the footwear industry as one of the industry priorities to be developed, one of which is shoes and sandals (Kemenperin, 2019).

Sandals are one type of footwear that is often used by humans, from small children to adults, in various events and at certain times. Sandals provide benefits ranging from protecting footwear to supporting one's appearance. Currently, there are so many models of sandals offered to consumers. One of the companies engaged in this field is CV Rama Raiders, a home industry company engaged in fashion footwear, shoes, and sandals. The company's production consists of various shoes and sandals, including loafers, sandals, flat shoes, and wedges. The sales system of this company is made to order and is done both online and offline. This home industry is located on Jl Karangpawitan No. 13 Wates, Kec. Garut city district. Arrowroot For marketing results, it is only carried out in Garut, Bandung, Tasik, and other cities. Rama Raiders is a home industry in the fashion sector that has been established since 2016. This business has seven main stages of the production process, namely the process of selecting materials, making patterns, cutting processes, sewing processes, gluing processes, finishing/quality control, and packaging. Quality itself is a relative term that depends on the situation. From a consumer point of view, subjectively, people say that quality is

something that suits their tastes (fitness for use). The product is said to be of high quality if the product has a suitability for its use.

Another view says quality is goods or services that can raise the user's status. The description above shows that the definition of quality can vary for each person at a particular time, where its availability, performance, reliability, maintainability, and characteristics can be measured (Attaqwa et al., 2021).

A company is said to be qualified if the company has a good production system with controlled processes (Siswanto et al., 2022). Companies must observe, research, and evaluate existing systems to increase productivity. To improve product quality, companies can evaluate factors that influence success, such as human resources, machines, work equipment, and raw materials, and consider other factors. Defective products can impact company image, customer satisfaction, and income. Quality control measures utilizing analysis and prevention must be carried out to reduce the products' non-conformity. This can detect the possibility of quality discrepancies that have become company standards so that product defects can be reduced, reduced, or avoided. Customers will be satisfied if they get product quality as they expect. To achieve customer satisfaction, the company must have a controlled process system so that the resulting product has good quality.

In the production process, Rama Raiders always tries to give the best to consumers in terms of price and quality. This is also faced with increasing market demand and demanding the best quality. In carrying out production activities to achieve the desired quality, Rama Raiders still needs several problems, one of which is the presence of defective products that are produced, which causes a decrease in the quality of the product itself. Defects that exist in sandal production activities are a form of production that has no added value and requires rework on the product (Al-Shamkhani, 2013).

**Table 1:** Defects in Rama's Company

No	Month	Production Amount	Deffect Amount	Presentase (%)
1	November	150	10	6 %
2	Desember	160	11	7 %
3	Januari	100	4	4 %
4	Februari	180	4	2,2 %
5	Maret	120	8	6%
6	April	368	42	11%

It can be seen that the highest percentage of defects occurred in April 2022 with the number of products produced 368 pcs out of a total of 42 defects with a defect percentage of 11%. To analyze the record factor in the field, therefore it is necessary to conduct research to find out the 11% disability. In order to be able to find out the source of these defects, in the research being carried out, an analysis will be carried out regarding product quality by utilizing the Seventools and FMEA methods. The two methods are combined to analyze related defect problems that occur in the company and further analysis related to improvement plans. This helps to overcome the problem of product defects experienced by the company in order to improve product quality. One of the controls uses the concept of Five W and One H (5W+1H) in order to facilitate the identification process of product defects and find out the quality improvement proposals for leather sandal products in CV. Rama Raiders.

## 2. Literature Review

The research using analysis is based on research by (Yang et al., 2020) with the Six Sigma method which goes through five stages, define, measure, analyze, improve, and control, entitled Quality Control of Paving Block Products to Minimize Defects Using Six Sigma at UD. Meurah Mulia the results of analysis through processing show that the current control process is ineffective, as evidenced by the occurrence of various defects in the manufacture of paving blocks. This study uses Statistical Quality Control (SQC) using six stages, including check sheets, stratification, histograms, Pareto, and operational process maps. And fishbones. Based on the research results, several factors affect the defects in the foam filtering process: machines, materials, people, and methods. Fault Mode and Effect Analysis (FMEA) was conducted to provide suggestions for improvement and focus on evaluating the foam screening process at PTPN VIII Mira Mare plantation. This study entitled Quality Control of Roma Sandwich Production Using Statistical Quality Control (SQC) Methods to Reduce Rejects in the Packing Section (Siswanto et al., 2022). The results of the analysis using check sheets show that in the production process there is still a high fortune for biscuits, namely 19.28%, factors causing rejects that come from human factors, methods, and materials (Nugraha, 2022). Conducted a study entitled Control of Piece Pivot Defect Products at PT. Trijaya Teknik Karawang Using Seven Tools and Kaizen Analysis. From the results of the Kaizen Five M Checklist analysis, several suggestions for improvements can be made, namely increasing supervision of the implementation of SOPs and updating production methods so that they can be more structured (Yu et al., 2011).

Analysis (FMEA) which is a priority for improvement is in the packing process (Hasib, 2006). Control the quality of the starter clutch to reduce product defects using the DMAIC method. Information was obtained that the factors causing the occurrence of defects were buried in the machine, machine trouble, material placement on the machine not fit, plate size too large, employee inaccuracy, and dropped parts due to handling errors and damaged boxes.

Meanwhile, improvement efforts that can be made include checking and cleaning the machine before starting production, updating the replacement schedule for spare parts that are worn out during production, conducting training on production process procedures, conducting inspections of plate sizes received from suppliers, monitoring regarding working hours of starter clutch production operators, providing tools to carry parts in small quantities, as well as checking box materials. Before filling the material and filling the material according to the specified amount (Hidayat et al., 2021). This observation aims to analyze the causes of failure in wafer production. The Failure Mode and Effect Analysis (FMEA) method is a method used to identify the causes of defects in the production process and uses the Kaizen approach, namely the 5W+1H concept. The observation results obtained were that the most dominant type of defect in the production process was a non-standard dimension of 49.75% which was mostly caused by an HE error liquid pipe, therefore a suggestion was given for improvement by installing an inverter on the HE liquid pipe, giving a warning related to operational standards so that the mixture meets specifications, provides supporting facilities in the form of chairs for operators, regulates the pressure of liquid flow through liquid pipes and compiles and implements preventive maintenance processes consistently.

### **3. Materials and Methods**

#### **3.1. Material**

##### **3.1.1 Research Locations**

The location chosen was Rama Raiders, a leather sandal product industry in the leather sandal sector. This home industry produces various kinds of sandals and leather shoes at affordable prices for all levels of society, and the following is information on the Rama Raider's home industry.

Name: Rama Raiders

Location: Jl Raya Karangpawitan (Wates), Kec. Karangpawitan, Garut Regency, West Java Opening Hours: 08.00 – 16.00

##### **3.1.2 Types of Research**

This research is classified as descriptive research using, namely research that seeks to describe problem solving for an existing problem systematically and factually based on data in the field. This research includes the process of data collection, presentation and processing

##### **3.1.3 Research Object**

The research object under study is a product of leather sandals that do not meet quality standards. In this interview the researcher collected data by conducting question and answer communication with data sources or in this study the home industry Cv. Rama Raiders. The author conducted interviews with the aim of obtaining data about the company and the issues raised. In this study, the authors used unstructured interviews. The respondents used were the owners of the home industry. and the human resources production division includes sandal sole production operators, sandal material cutting production operators and sandal assembly operators. Interviews in this study were used to obtain information regarding FMEA analysis, company overview, problems/problems in the production process etc.

The definition of observation according to (Belfi et al., 2022). Observation is carried out by direct observation of the object of research to collect the required information. In this observation, the researcher made direct observations at CV. Rama Raiders which aims to obtain data and understand the sandal production process at Rama Raiders. In this study, observations were made frankly because the author in collecting the data stated frankly to Cv. Rama Raiders that he is currently doing his thesis research. Observations were made on all production processes from raw materials to finished goods, quality control processes, packing processes, and other activities that can provide information for research. The following are the steps of data processing.

##### **3.1.4 Research Approach**

The research approach using mix method there are quantitative methods for certification, check sheet, and pareto methods and qualitative methods for analysis using FMEA and 5W IH methods for this problem.

##### **3.1.5 Collection of Primary Data**

In this study, data and information were obtained directly from observations at CV. Rama Raiders. After the data is obtained, then the results will be presented and analyzed.

Primary data was obtained by direct observation of the company's employees in the field to collect data regarding product quality control by Rama Raiders, including:

- a. Data on Total Production in November to April 2022

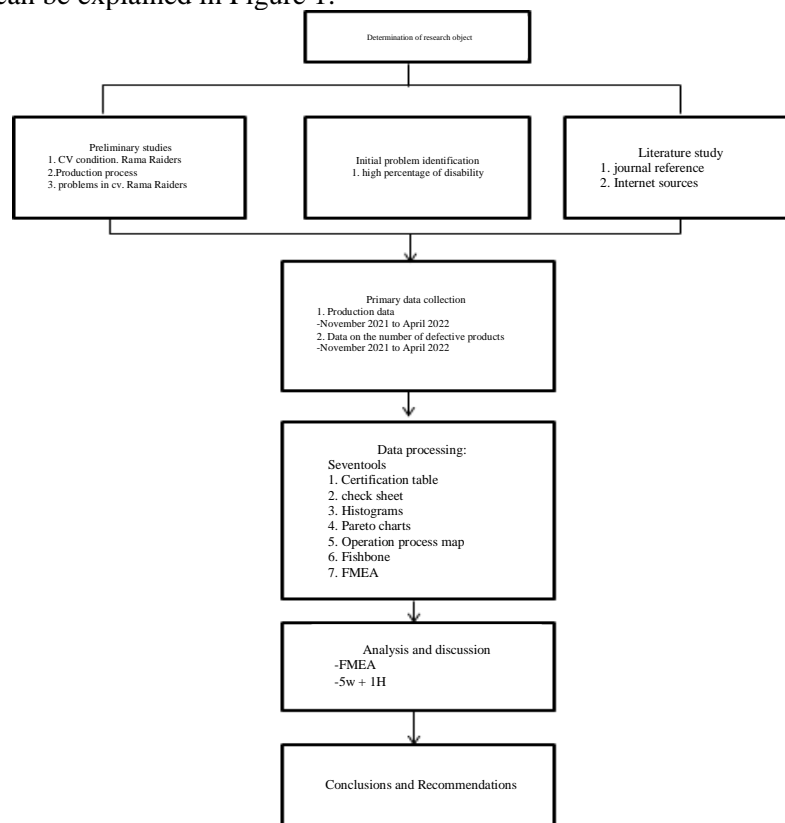
b. Data on the Number of Defective Products in November to April 2022

**Table 2:** Data Total Production and Defect in November to April 2022

No	Month	Total production	Total defect	Presentase (%)
1	November	150	10	6 %
2	Desember	160	11	7 %
3	Januari	100	4	4 %
4	Februari	180	4	2.2 %
5	Maret	120	8	6%
6	April	368	42	11%

### 3.2. Methods

The research method can be explained in Figure 1.



**Figure 1:** Methodology

#### 3.2.1. Make Stratification

To be able to identify which categories have the most influence on the problem we are discussing, we need to use other quality analysis tools such as Stratification, Check Sheets, Histograms, Pareto Diagrams, Process Diagrams, Fishbone Diagrams.

The following are the steps for stratification:

- Determine the purpose of implementing Stratification
- Determine the variables or criteria to be reduced
- Create groups and subgroups (if needed)
- Assign factors to appropriate groups or subgroups
- In order to make the data easier to see, it is better to stratify the data in the form of a Pareto chart.

#### 3.2.2. Make a Check Sheet

The data in the check sheet, both in the form of quantitative and qualitative data, can be analyzed quickly (directly) or used as input data for other quality tools, for example for Pareto chart data input.

- Step 1

The first step in making a check sheet is to clarify the measurement objectives. To help clarify our measurement goals, we can answer questions such as what is the problem? Why must data be collected? Who will use the information collected and what information do they really want? Who collects data?

b) Step 2

The second step is to identify what will be measured and the measurement time, for example Title: Product defects, Category: Untidy stitches, careless sewing operators, poor machine application process, etc.

c) Step 3

The next step is to determine the time or place to be measured. This is intended to be able to identify when and where the data was obtained.

d) Step 4

This fourth step is the implementation step of data collection.

Data is collected by recording each event directly on the check sheet. What needs to be considered is not to delay recording information until the end of the day or until you rest, for fear of forgetting.

e) Step 5

The final step is to sum up the data or recapitulate the data (for example, how many productions this month, how many defective products this month, etc.)

The following is a check sheet format that will be used as research in CV. Rama Raiders:

### 3.2.3. Create a Histogram

The benefit of using a Histogram is to provide information about variations in processes and assist management in making decisions in an effort to continuously improve processes.

### 3.2.4. Create Pareto Charts

Bar charts show data classifications and values, while line charts represent cumulative data totals. The data classification is sorted from left to right according to the order of highest to lowest ranking. The highest ranking is a priority problem or the most important problem to be resolved immediately, while the lowest ranking is a problem that does not have to be resolved immediately.

Here's how to make a Pareto chart:

- a) Identify the problem to be studied and the causes of the incident.
- b) Specify the Time period required for analysis (e.g. Monthly, Weekly or daily)
- c) Make a record of the frequency of occurrence on the check sheet (check sheet)
- d) Make a list of problems in order of frequency of occurrence (from highest to lowest).
- e) Calculating Cumulative Frequency and Cumulative Percentage
- f) Represent Frequency in the form of a bar graph
- g) Represent the cumulative Percentage in line graph form
- h) Interpret (translate) the Pareto Chart
- i) Take action based on the priority of events / problems
- j) Repeat the steps above implementing improvement actions to compare results.

### 3.2.5. Create Process Diagrams

Process diagrams to break down the process into its discrete components and diagram them as a series of small rectangles (processes), arrows (information and material flows), and inverted triangles (goods storage). Process Diagram for this research using operational process Chart.

### 3.2.6. Identify Causes and Effects of Defective Products

Cause and Effect Diagrams are used to find out which products are dominantly defective and are used to identify and show the relationship between cause and effect in order to find the root cause of a problem. This Fishbone Diagram is also known as a Cause and Effect Diagram

### 3.2.7. Analysis of Factors Causing Leather Sandal Product Failure Using the Failure Mode and Effects Analysis (FMEA) Method

The steps that must be carried out in this method are as follows:

- a) Determine the components of the system / tool to be analyzed
- b) Identify the failure mode of the observed process
- c) Identifying the consequences / (potential effects) caused by potential failures
- d) Identify the cause (potential cause) of the failure modes that occur in the ongoing process
- e) Establishing values (by means of field observations and brainstorming)

## 4. Results and Discussion

### 4.1. Stratification

Based on the data collection obtained, the criteria for defects in sandal products are irregular sewing defects, asymmetrical footwear, inappropriate footwear accessories and untidy glue. Identification of the type of disability can be known as Table 3:

**Table 3: Identification of Types of Product Defects**

No	Defect tipe	Identification of the Type of Disability	Total
1	Accessories not installed	The glue is not neat and has to be re-glued again	15
2	Untidy stitches	The cutting of the skin is not neat, it does not match the mold design	9
3	The footwear is not symmetrical	The stitches are not neat according to the pattern	7
4	The sole does not fit	Accessories are not installed according to design	6
5	The glue is not neat	The sole doesn't match the number	5
Total			42

### 4.2. Check Sheet

Check Sheet is a tool for recording the results of data collection that can be presented in the form of communicative data so that it can be converted into information—the Product defect data CV. Rama raiders taken in April 2022 can be known Table 4 below:

**Table 4: Total Number of Defect in Leather Sandals in April 2022**

**CHECK SHEET DEFECT**

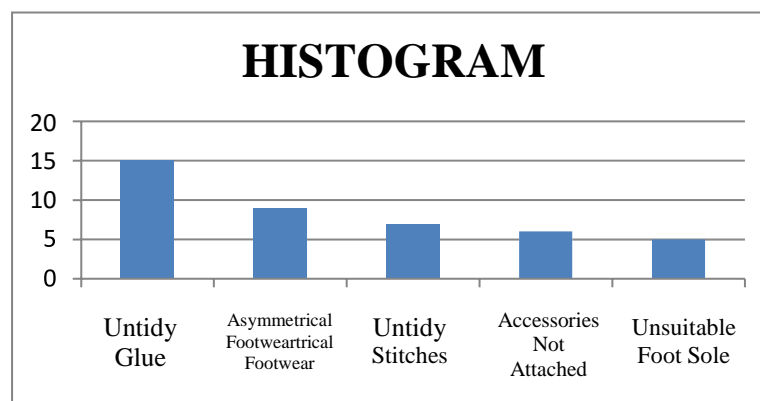
PRODUCT : LEATHER SANDALS

LOCATION : CV. RAMA RAIDERS PERIODE/MOUNT : April 2022

No	Defect Type	Frekuensi	Amount
1	Accessories not installed	IIIIII	6
2	Untidy stitches	IIIIII	7
3	The footwear is not symmetrical	IIIIIIII	9
4	The sole does not fit	IIII	5
5	The glue is not neat	IIIIIIIIIIII	15
<b>Total kerusakan</b>			<b>42</b>

### 4.3. Histogram

To produce a histogram of the types of defects in the leather sandal product, it can be identified by looking at the most dominant type of defect to the least type of defect. The histogram of the types of defects in sandals can be seen as Figure 2.



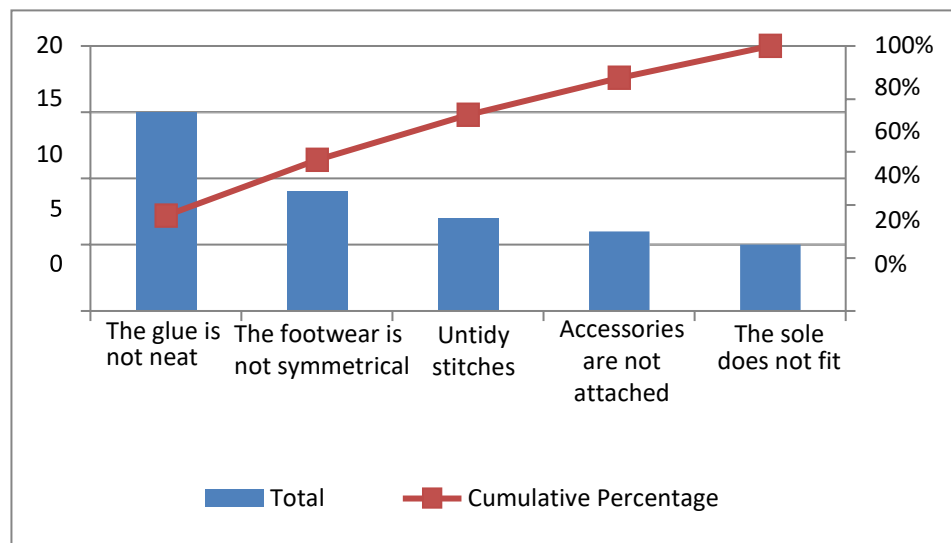
**Figure 2: Product Defect Histogram Type of leather sandals**

#### 4.4. Pareto Charts

This Pareto chart shows the most dominant problems and which need to be addressed immediately. The first step in working on the Pareto chart is to sort each type of disability from the largest to the smallest. After that, calculating the percentage of disability and the cumulative percentage of each type of disability. Sorting on the type of disability sandals on Cv. Rama raiders can be known as Table 5 and Figure 3:

**Table 5:** Types of Defect leather sandals

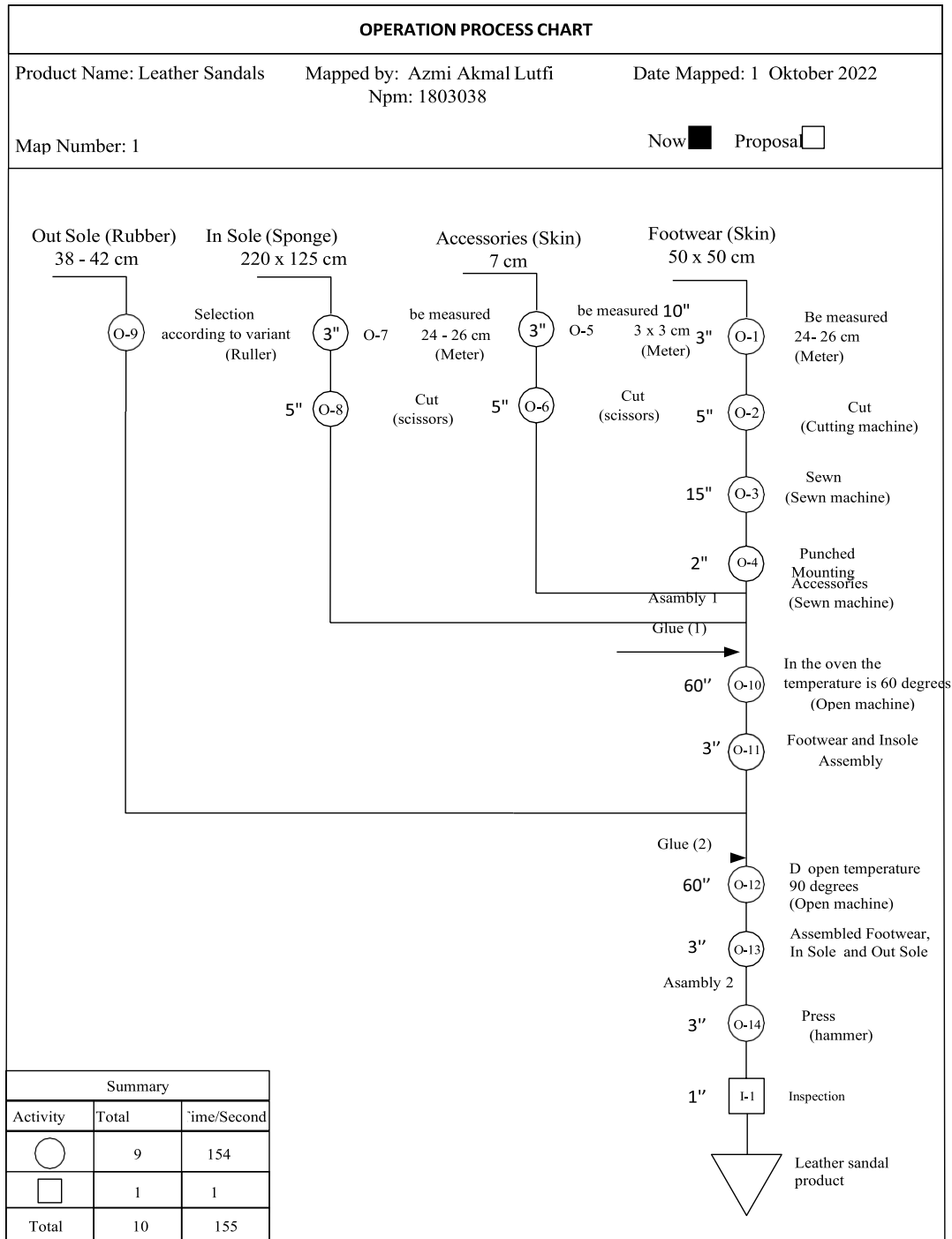
Type of Defect	Countu	Persentase (%)	Persentase Kumulatif (%)
The glue is not neat	15	36%	36%
The footwear is not symmetrical	9	21%	57%
The stitches are not neat	7	17%	74%
Accessories not installed	6	14%	88%
The sole does not fit	5	12%	100%



**Figure 3:** Pareto chart of leather sandal products

Based on the Pareto diagram above, it can be seen that the biggest cause of product defects in CV leather sandals. Rama raiders, namely glue defects are not neat 36%, footwear is not symmetrical 21%, stitches are not neat 17%, and accessories are not attached 14%, then the value of the four types of defects has reached 88% and is in accordance with the value of the 80-20 grouping rules, meaning that 80% of the problems that arise come from 20% of the types of product defects produced.

#### 4.5. Operation Process Chart



**Figure 4:** PPO Diagram Product Manufacturing CV. Rama Raiders

**4.6. Causes and Effects of Defective Diagram (Diagram Fishbone)**

The fishbone diagram serves to analyze and identify which factors can have a significant influence in determining quality characteristics. The causal diagram for leather sandal products can be seen Figure 5 below.



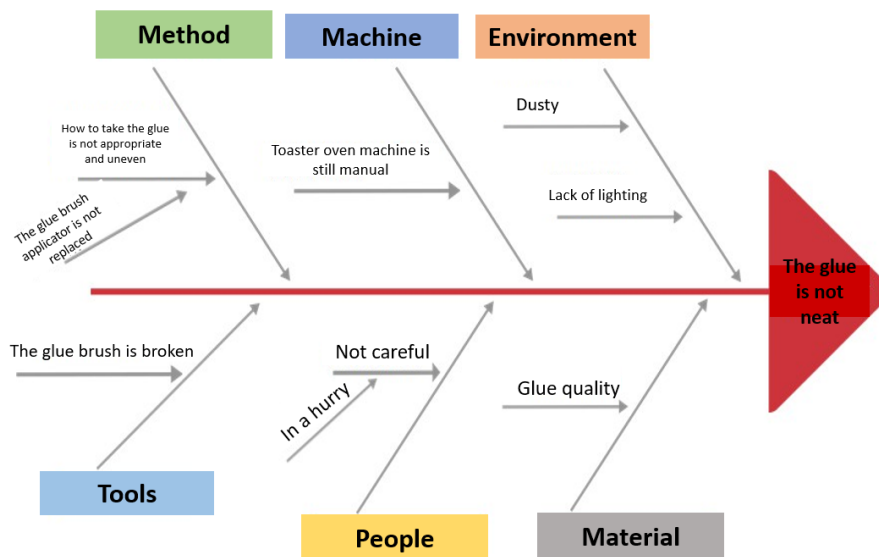


Figure 5: Cause and Effect Diagram Untidy Glue

4.7. Failure Mode and Effect Analysis (FMEA)

The FMEA calculation is carried out by determining the severity (S), Occurrence (O), Detection (D) values for various factors that can cause discrepancies in the leather sandal products produced, these values are obtained based on the results of questionnaires to employees.

The goal of implementing FMEA is to prevent problems from occurring in products and processes. FMEA for leather sandal products CV. Rama raiders can be seen in Table 6 and Table 7:

Table 6: FMEA Sandal CV. Rama Raiders

Potential Failure Mode	Potential failure effect	Potential causes	Score				
			S	O	D	RPN	RANK
The glue is not neat	Rework	Glue quality is not good	7	6	5	210	1
	Process gluing is not optimal	Operators are not scrupulous	7	6	4	168	2
		The brush applicator is not replaced	7	5	4	140	2
	Reduced product aesthetics	No checking	7	3	5	105	4

Table 7: Matriks 5W 1H

Faktor	5W 1H	Description	Action
Material	What	There is a defect in CV leather sandals. Rama raiders which has a percentage of 36% in April 2022	Carry out corrective action plans related to the selection of glue that must be in accordance with the specifications. working methods in the gluing process and baking leathersandals according to the appropriate time careful, in a hurry, plus the method of applying glue and also at the stage of the baking process.
	Why	Improper gluing can occur as a result of choosing the wrong glue material, the operator is not	

What	There is a defect in CV leather sandals. Rama raiders which has a percentage of 36% in April 2022	Carry out corrective action plans related to work methods in the process of gluing and baking leather sandals CV. Rama Raiders
Why	Improper gluing can occur as a result of the operator being careless, in a hurry, added to the method of applying glue and also at the stage of the baking process.	Replace the applicator for taking glue regularly, and also determine the length of the sandal baking process in order to obtain the same and appropriate quality level..
Where	In the application of glue and oven	Changing the tool applicator regularly and also determining the length of time for the shoe baking process.
When	When selecting the main materials, you have to choose glue according to the specifications, glue application and also during the baking process and sandal assembly.	Choose glue according to the characteristics of the material to be produced. Replacing the glue brush applicator and determining the length of the baking process must be used during the baking process so that it is suitable and even
who	Will work on the repair activity design plan Repairs are carried out by the leader or head of production to determine which glue to use.	Then replace the applicator periodically and also tell the standard baking time that has been set.
How	To implement and overcome problems based on the action plan that will be carried out. Implementation of the improvement plan that will be carried out to overcome the problem of defects in leather sandals cv.	Rama raiders is by choosing and using a good glue material according to its function and characteristics. As well as establishing work operational standards and ensuring a long time for the baking process for sure and also providing recommendations for replacing the glue brush applicator periodically

Based on these results, in the Impaired Stitching defect there are 5 factors that cause defects, namely humans, machines, materials, methods and the environment.

a) Human

Factors caused by the operator himself, because the operator is less thorough and too hasty in gluing. The operator lacks concentration due to insufficient lighting which causes errors in the process of taking glue.

b) Machine

The process at the assembly stage of the sole and sandals does not stick optimally due to the lack of temperature at the assembly stage, then the baking process does not match

c) Ingredients

The glue material does not comply with the specifications, causing the result of the gluing process to be not optimal, because there are many types of glue and its uses.

d) Method

The working method is not in accordance with what it should be which results in frequent rework.

e) Environment

An environment that is not clean and tidy is a factor that causes errors in the production process because dirt and dust can be a factor that causes imperfect processes and assembly. And also the lighting factor that causes uneven glue application.

**Table 8** Cost Of Rework Sandals CV. Rama Raiders in April 2022

No	Activity	Material	Material Cost	Defect Amount	Total Material Cost
1	<i>Foam in sole</i>	0.35 M	IDR 9,000	15	IDR 42,250
2	<i>Glue</i>	0.30 L	IDR 590,000	15	IDR 315,000
3	<i>Cleansing primer</i>	0.20 L	IDR 50,000	15	IDR 150,000
<b>TOTAL</b>					<b>IDR 512,250</b>

Based on the results of rework calculations and identification in the field of product defects CV leather sandals. Rama raiders and also an analysis of the type of glue that is commonly used and what is proposed. By using the type of glue that is commonly used, there are a number of defects that must be considered because it does not match the type of glue used in the product which results in defects in imperfect gluing. There is a rework fee of IDR 512,250. whereas in the proposed selection of glue that is in accordance with the characteristics and standardization, this is quite expensive in terms of price compared to the previous glue, but the process is only one application and there is no

need to add other materials. So, from this comparative analysis in terms of cost it is not far adrift but in the selection of the proposed glue there are many advantages including a fast process and also has standardization according to the characteristics of the material that has been tested.

#### 4.8. Proposed improvements

According to the National Standardization Agency, guided by Government Regulation no. 102 of 2000 concerning National Standardization. This agency establishes the Indonesian National Standards which are used as technical standards in Indonesia. Japanese Industrial Standards (JIS) are standards used in industrial activities in Japan. Japanese Industrial Standards are formulated by the Japanese Standards Agency and published by the Japanese Standards Association. On JIS and SNI. The type of adhesive used is made from polypropylene latex, naniomic and anionic emulsifiers, resulting in glue with an adhesive strength of 1.9N/MM. Therefore, the proposed selection of adhesives for leather sandals, CV. Rama raiders are good and fit the characteristics and are standardized. Based on a literature study on production process information books (Jurnal Geliga Sains 2019), the process of roasting (oven) leather sandals/shoes at a temperature range of 50 55°C with a duration of sole roasting (oven) for 1 2 minutes to be able to obtain surface level and dryness and indentations leather shoes/sandals are better based on that. And also determining the glue with its standardization is also very important. CV. Rama raiders must be able to choose the type of glue according to the character of the material and its specifications and also be able to determine the temperature and length of time for roasting or baking leather sandals so that they can get the same quality level evenly across all of their products. And also conduct periodic checking of production support equipment including glue brush applicators so that they are replaced regularly.

Based on the analysis of the highest RPN calculation, namely the error in selecting glue that did not match the material and specifications, the operator who was not careful and also the work method which resulted in the absence of standard operating procedures and also the absence of periodic checking of work support tools. because of that the proposed improvements that have been made with the 5W + 1H concept approach, then an evaluation is carried out regarding the results of the proposed improvements that have been designed

#### 5. Conclusion

Based on the research results that the leather sandals production process was done at CV. The conclusion of Rama Raiders is the process of controlling the quality of leather sandal products at CV. This Rama raider includes a certification table in the observation stage, and the results of 5 defects are obtained. The footwear section is not symmetrical, the stitches are not neat, Accessories are not installed, the foot sole does not fit, and Glue is not neat. Then through calculations described through a Pareto diagram, the most dominant type of defect in leather sandals is the type of glue defect that is not neat, and also the results of the causes of the defect that are not neat. Glue can be seen from human factors, work methods, machines, materials, and the environment. This type of glue defect needs to be neater. The human factor does not work optimally because it was influenced by machines that do not work optimally, tools that do not support, materials that are not suitable, inadequate environment, and standard operating procedures that do not exist.

The proposed improvement plan to reduce defects in CV leather sandal products. Rama is as follows. For Glue, the solution to maintain maximum quality is to ensure that the Glue is appropriately selected according to the specifications and material used. The owner must choose Glue with its character and specifications. Operators are Operators must be careful in using Glue and must also be wise in using production aids, such as using and changing applicators periodically to facilitate the work process, tidying up the condition of the production area to make it cleaner to support optimal performance processes, and produce sandals with better quality. Tools are the use of production tools, and also machines must be by function. Operators are required to check any supporting equipment that must be maintained regularly or must be replaced regularly. On the other hand, the owner must also be able to meet the operator's needs and provide the supporting tools to both try to produce quality sandals. Standard operating procedures (SOP) on the baking process (evening), periodic tool changes, and appropriate production processes carried out by CV. Rama riders based on the results of an analysis of the design improvements that have been made

#### References

- Al-Shamkhani, M. T. (2013). *Managing, Controlling and Improving the Treatment of Produced Water Using the Six Sigma Methodology for the Iraqi Oil Fields*.
- Anjalee, J. A. L., Rutter, V., & Samaranayake, N. R. (2021). Application Of Failure Mode And Effect Analysis (Fmea) To Improve Medication Safety: A Systematic Review. *Postgraduate Medical Journal*, 97(1145), 168–174. <https://doi.org/10.1136/Postgradmedj-2019-137484>
- Attaqwa, Y., Hamidiyah, A., & Ekoanindyo, F. A. (2021). Product Quality Control Analysis with Statistical Process Control

(SPC) Method in Weaving Section (Case Study PT. I). *International Journal of Computer and Information System (IJCIS)*, 2(3), 86-92.

Belfi, L. M., Dean, K. E., Sailer, D. S., Kesler, T., & Jordan, S. G. (2022). Virtual journal club beyond the pandemic: an enduring and fluid educational forum. *Current Problems in Diagnostic Radiology*, 51(4), 450-453.

Hasib, M. (2006). Six Sigma methodology in automobile industry.

Hidayat, A. A., Kholil, M., Haekal, J., Ayuni, N. A., & Widodo, T. (2021). Lean Manufacturing Integration in Reducing the Number of Defects in the Finish Grinding Disk Brake with DMAIC and FMEA Methods in the Automotive Sub Industry Company. *International Journal of Scientific Advances ISSN: 2708, 7972*(2), 5.

Kemenperin. (2019). *Footwear Industry Prospects*. 9(2).

Nugraha, I. (2022). Quality Control Analysis of Steel Plates Products at PT. ABC Using Seven Tools and Kaizen Method. *Nusantara Science and Technology Proceedings*, 206-213.

Qin, J., Xi, Y., & Pedrycz, W. (2020). Failure Mode And Effects Analysis (Fmea) For Risk Assessment Based On Interval Type-2 Fuzzy Evidential Reasoning Method. *Applied Soft Computing Journal*, 89, 106134. <https://doi.org/10.1016/j.asoc.2020.106134>

Siswanto, D. J., Nuroktavia, D. A., Wahyudi, I., & Syah, T. Y. R. (2022). The Effect of Production Planning and Quality Control on The Final Product. *Journal of Social Science*, 3(6), 2128-2136.

Subriadi, A. P., & Najwa, N. F. (2020). The Consistency Analysis Of Failure Mode And Effect Analysis (Fmea) In Information Technology Risk Assessment. *Heliyon*, 6(1), E03161. <https://doi.org/10.1016/j.heliyon.2020.E03161>

Yang, H., Rao, P., Simpson, T., Lu, Y., Witherell, P., Nassar, A. R., ... & Kumara, S. (2020). Six-sigma quality management of additive manufacturing. *Proceedings of the IEEE*, 109(4), 347-376.

Yu, S., Liu, J., Yang, Q., & Pan, M. (2011). A comparison of fmea, afmea and fta. In *The Proceedings of 2011 9th International Conference on Reliability, Maintainability and Safety* (pp. 954-960). IEEE.