Banking and Management Review

The Utilization of-Statistical Quality Control (SQC) Methods in Reducing Defective Muslim Clothing Products on CV. Mawaheejra

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ABSTRACT

Introduction/Main Objectives: This study determines the quality control of CV. Mawaheejra, determine the factors causing product defects and the application of Statistical Quality Control (SQC) methods. **Background Problems:** CV. Mawaheejra has carried out control but the quality control is not optimal because of poor quality and errors often occur in the production process which causes product defects that not comply with the quality standards. **Research Methods:** This study uses a quantitative method. It carried data collection techniques through observation, interviews, documentation, and literature studies. Data analysis using Statistical Quality Control (SQC) methods of flowcharts, check sheets, Pareto charts, control charts, and fishbone diagrams. **Finding/Results:** Based on the results of research with check sheet aids found four types of defects. In the Pareto chart found the highest number of product disability percentage of 38.47%. From the control chart result, it found deviations because of the U control chart there are three points that exceed UCL and two points that exceed LCL. From the fishbone diagram, there are five factors that are most prominently caused by human and machine factors. **Conclusion:** Based on the results of the analysis, the company must conduct supervision of employees and machine maintenance to reduce product defects.

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1. Introduction

At this time, Industrial development, which is supported by technological advances, is growing more rapidly, with the existence of e-commerce platforms making it easier for consumers to access from anywhere to get the products they want, causing the level of competition to become increasingly tight, especially in the industrial sector, both nationally and internationally. One type of industry that is currently developing is the ready-made clothing or garment industry. In general, Competition in the industrial sector is not only in the scale of the company and the quality of its human resources, but competition also occurs on the quality forms of the products/services produced by each company.

Quality issues are an important part and must receive attention so that companies can survive in the face of increasingly fierce competition. To produce good quality products, production quality is one of the main concerns carried out by companies, starting from raw materials, production processes and final products. Control and supervision are activities to ensure that production and operational activities run as planned and if deviations occur, they can be corrected.

CV. Mawaheejra is a company operating in the garment industry in Bandung, which produces various types of apparel, especially Muslim clothing. In carrying out the production, CV. Mawaheejra has carried out control but in fact, the quality control carried out is not optimal because there are still products produced that are of poor quality and errors often occur in the production process which cause product defects so that they do not comply with the quality standards set by the company.

2. Literature Review

2.1. Operation Management

Operations management is one of the business functions that plays a very important role in a company, which functions to plan the resources and facilities used to make a product, organize, namely form the composition of workers, whether for individuals, groups or departments, and control all activities by directing and ensuring All company activities run as planned. According to Heizer and Render (2017:3) Operations management is a series of activities that create value in the form of goods and services through the process of changing inputs into outputs.

2.2. Quality

Quality is a process in a product or service that will be felt directly by the customer or recipient of the service itself. According to Heizer and Render (2017:244) quality is the overall features and characteristics of products and services that rely on their ability to meet promised and implied needs. Meanwhile, according to Sukirno (2017: 152) Quality is one of the reasons that makes consumers want to buy goods from a company or want to use a company's services.

2.3. Quality Control

Quality control is a technique that has to be carried out before the production process starts, during the production process, until the production process ends. According to Hutabarat (2017: 43) Quality control is a very useful technique so that a company can know the quality of the product before marketing it to consumers.

It can be concluded that quality control is a technique that needs to be carried out to determine the quality of the product produce and improve or maintain product quality so that it meets product specifications that have been determined based on policy.

2.4. Statistical Quality Control

Statistical Quality Control (SQC) method or quality control statistics is a problem-solving method used to monitor, control, analyze, manage and repair products that experience failure/defects through data that has been collected using statistical methods and controlling the production process from the initial process to the finished product so that it reaches the quality standards determined by the company.

According to Haming and Mahfud (2017: 221), basically Statistical Quality Control (SQC) is a statistical method used to measure the performance of the production process and to improve the quality of production results.

3. Method, Data, and Analysis

In this research, researchers used qualitative data. The data obtained is data in the form of information regarding the raw materials used, the type of defect, the cause of the defect, and the production process.

According to Sugiyono (2019: 18), qualitative methods are used to obtain in-depth information, meaningful data. Qualitative methods are methods that focus on in-depth observation. The aim of qualitative research is to explain a phenomenon in depth by collecting data in as much depth and detail as possible. The following are the data collection technique:

a. Observation. Observation is a way to obtain data or information by making direct observations of the research object by recording documents and systems or ways of working of existing employees
b. Interview. Interviews are a form of direct communication using a one-way verbal question and answer method with leaders or employees in the company to obtain data or information.
c. Documentation. Documentation is a method used to obtain data and information directly from the research site which includes: reports, documents or notes, books and photos. This document is used by the author to obtain data in the form of notes stored in company documents.

d. Literature review. Literature study is a technique used to study and understand theories from books, journals or other sources that are relevant to this discussion and can be used as a theoretical basis related to the product quality design problem to be studied.

4. Result and Discussion

There are three things discussed by the author in accordance with the objectives, the first discussion is to explain quality control in the Muslim clothing production process at CV. Mawaheejra. Then the second discussion is what factors cause defective products on CVs. Mawaheejra. And the third discussion concerns the application of the Statistical Quality Control (SQC) method in reducing the number of defective products on CV. Mawaheejra.

4.1. Quality Control in Production Process

The first objective of this research is to determine quality control in the Muslim clothing production process at CV. Mawaheejra. The following is the flow of quality control carried out by CV. Mawaheejra:

Figure 1. Flowchart of Quality Control Stages at CV. Mawaheejra

Source: Observation Results on CV. Mawaheejra, 2022

CV. Mawaheejra carries out quality control activities in three stages of the Quality Control (QC) process, namely quality control, inspection of raw materials, quality control in the production process, and quality control of finished products.

The first stage of quality control is carried out starting with the transportation of raw materials, then the raw materials are stored in the warehouse, next is the preparation of the raw materials, and finally the inspection of the raw materials received by the company using a fabric inspection machine. After going through the raw material inspection stages, the raw materials then enter the production process stage. The Muslim fashion production process consists of cutting (spreading and marking), after cutting the raw material goes to the sewing section/department, then Quality Control and finally the finishing process. After the finishing process is complete, QC Finishing is the process of checking the finished product or ready-made clothing again and complete with accessories before proceeding to packaging. After the packaging process is complete, the product is stored in the warehouse and ready to be sent.

From the observation, it was identified factors that cause defective products as follows:

a. Man Factor (Human). Humans can cause failures in the production process. In carrying out production, sometimes employees lack concentration, are not careful, are tired, have dirty

hands, are not precise in threading the needle and thread and employees are in a hurry, which causes defects in Muslim clothing.

b. Raw Materials Factor. The raw material factors that will be used by the company must be considered, because raw materials will influence the smoothness of the production process and affect the products produced. The causes of defects in products are ineffective storage of raw materials where raw materials are placed in inappropriate places and the quality of raw materials is not good, such as dirty fabrics and holes in fabrics.
c. Method Factor. The work method functions to organize all parts of the production process. Less attention is paid to the work methods used by the company, namely regarding work methods and work rules during the production process, there are still workers who deviate, namely do not apply work methods.
d. Machine Factor. The machines or equipment used have an important role in the production process to produce quality products. Machines can be the most frequent factor causing defects in the production process. This is due to a lack of accuracy in setting up the machine before use, such as a loose bobbin, lack of machine maintenance which sometimes makes the fabric dirty, namely the sewing machine is dusty and the machine has oil on it, the machine is old, the sewing tools are damaged and errors occur in using the needle and thread
e. Environmental Factors. Environmental factors influence the smooth production process. The work environment in this company has problems, namely the workplace is not neatly arranged and the environment is not clean.

4.2. Implementation of Statistical Quality Control (SQC) Method

The Statistical Quality Control (SQC) method reduce the number of defective products at CV Mawaheejra. The first step taken to analyze the quality control of the production process statistically is by using a check sheet tool, making a control chart, making a Pareto chart and finally making a fishbone diagram.

4.2.1. Check Sheet

In carrying out statistical quality control, check sheets are useful to facilitate the process of data collection and data analysis. To find out more clearly, you can see the results of data collection through the check sheet that has been carried out in the following table:

Table 1. Data on Muslim Clothing Defect Products for the Period November 2021- October 2022

Month	Production Amount	Types of Product Defects				Total Defective Products	Percentage of Defective Product Rate %
		Gross Defect	Hole Defects	Skip Stitches	Floating Stitches		
November	4,436	26	14	13	17	70	1.57
December	815	6	4	9	7	26	3.19
January	602	5	2	4	3	14	2.32
February	902	10	4	6	3	23	2.54
March	2,980	25	9	10	10	54	1.81
April	2,624	34	14	22	7	77	2.93
May	1,791	26	8	16	5	55	3.07
June	1,313	30	4	15	6	55	4.18
July	3,168	19	6	10	13	48	1.51
August	1,928	25	22	14	29	90	4.66
September	853	10	6	6	3	25	2.93
October	748	16	30	9	11	66	3.77
Amount	**23,160**	**232**	**123**	**134**	**114**	**603**	**34.48**
Average	**1,930**	**19.3**	**10.25**	**11.17**	**9.5**	**50.25**	**2.87**

Source: Quality Control Inspection Report Document Cv. Mawaheejra, 2022

The total production from November to October was 23,160 with an average production of 1,930. It is known that the highest percentage of defective products was in August as 4.66% and the lowest was in July as 1.51%. From these results, the types of defective products are based on four types of defective products, such as dirty defects, hole defects, skipping stitches and floating stitches

4.2.2. Pareto Chart

Pareto chart is a bar chart that shows the number of product problems based on the number of incidents. The following is a table for calculating the percentage of number of defects and the percentage of cumulative defects to create a Pareto chart:

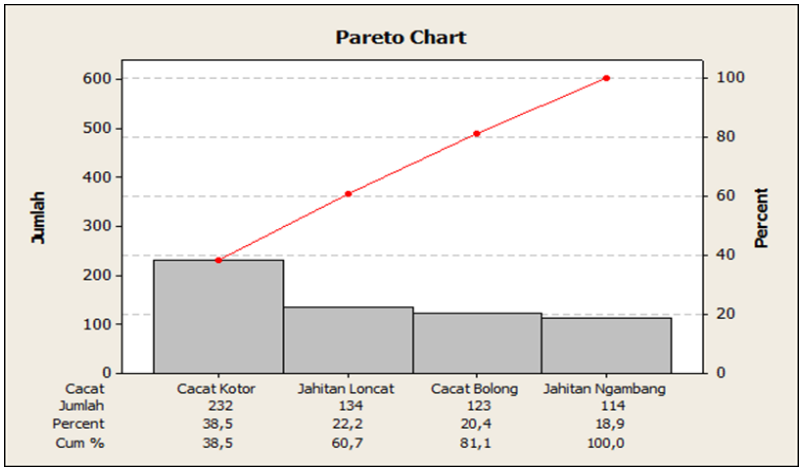
Table 2. Cumulative Defect Percentage

Disabled	Amount	Percentage	Cumulative Percentage
Gross Defect	232	38.47%	38.47%
Skip Stitches	134	22.22%	60.69%
Hole Defects	123	20.40%	81.09%
Floating Stitches	114	18.91%	100.00%
Amount	**603**		

Source: Data processed, 2023

From the table above, a Pareto chart is created as follows:

Figure 2. Pareto Chart of Muslim Clothing Defect Products on CV. Mawaheejra Period 2021-2022



Source: Data processed, 2023

Based on Figure 2, it can be seen that there are 4 categories of types of defects. The most common defects found were gross defects, totaling 232 products, where 38.47% of defective products were caused by gross defects, then the second highest level of defective products were skip stitches, 134 products, where 22.22% of defective products were caused by skipped stitches, then The defective products with the second highest level were 123 perforated defects, where 20.40% of defective products were caused by perforated defects, and the lowest defective products were 114 floating seams, where 18.91% of defective products were caused by floating seams.

4.2.3. U-Control Chart

U- chart is a control chart used to monitor the number of defects per unit, where the number observed does not have to be constant. The following is the data calculation to create a U- chart:

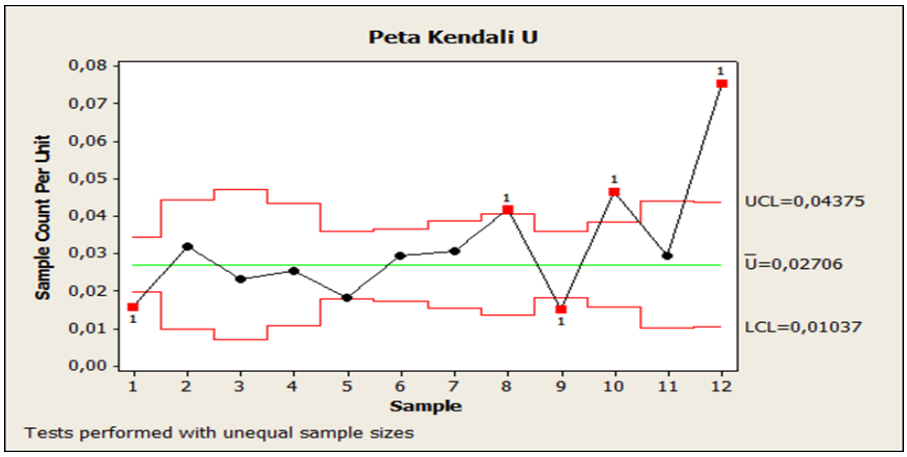
Table 3. UCL, CL and LCL calculation results

Month	Production Amount	Number of Defective Products	U	CL	UCL	LCL
November	4436	70	0.01577	0.027211	0.03464	0.01978
December	815	26	0.03190	0.027211	0.04454	0.00987
January	602	14	0.02325	0.027211	0.04738	0.00704
`February	902	23	0.02549	0.027211	0.04368	0.01073
March	2980	54	0.01812	0.027211	0.03627	0.01814
April	2624	77	0.02934	0.027211	0.03687	0.01755
May	1791	55	0.03070	0.027211	0.03890	0.01551
June	1313	55	0.04188	0.027211	0.04086	0.01355
July	3168	48	0.01515	0.027211	0.03600	0.01841
August	1928	90	0.04668	0.027211	0.03848	0.01594
September	853	25	0.02930	0.027211	0.04415	0.01026
October	748	66	0.08823	0.027211	0.04530	0.00911
Total	22,160	603				

Source: Data processed, 2023

U-chart can be created, which depicts defective products from the number of samples taken. It can be seen from the control chart whether the number of defective products is still within control limits or not. The following is a U- chart image:

Figure 3. U-chart of Clothing Defect Products in CV. Mawaheejra Period 2021-2022



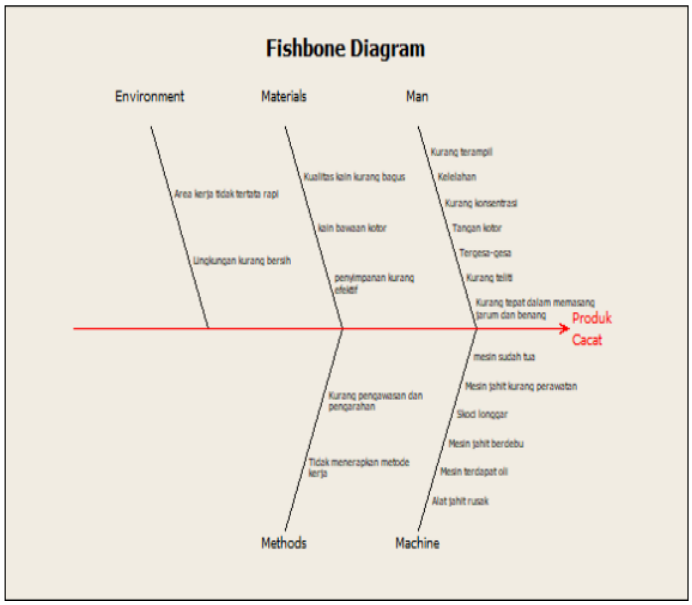
Source: Data processed, 2023

Based on Figure 3, it can be seen from the U- chart resulting from processing with Minitab 16 software that from the data obtained there are red dots that are outside the control limits (UCL and LCL). There are three points that are outside the upper control limit (UCL), namely in June, August and October and there are two points that are outside the lower control limit (LCL), namely in November and July. From Figure 4.9, the U- chart results show that there is still a lot of data that has deviations from the U bar line (center line) so we have to pay more attention to the production process in order to reduce the number of defective products.

4.2.4. Fishbone Diagram

Fishbone diagrams are used to determine the factors that cause defective products at CV. Mawaheejra. Here is a fishbone diagram. The following is a fishbone diagram of overall product defects in CV. Mawaheejra:

Figure 4. Fishbone Diagram



Source: Data processed, 2023

It can be seen the factors that cause product defects that often occur on CVs. Mawaheejra is the man factor and the machine factor. The man factor is that the workforce lacks concentration, dirty hands, inappropriate use of needle and thread, lack of skill, lack of accuracy, haste and fatigue. Apart from that, the machine factor is that the machine has oil, the sewing machine is dusty, the sewing machine lacks maintenance, the machine is damaged, the spool is loose, and the machine is old.

5. Conclusion and Suggestion

From the result, the following are the keys taken away in this research:

1. The company has implemented quality standards and has carried out quality control in the Muslim clothing production process. There are three stages of quality control carried out by CV. Mawaheejra. The first stage is quality control, checking raw materials by checking the raw materials first before entering the production process stage to see whether the raw materials are suitable and there are no defects. The second stage is quality control of the production process where quality control is carried out in the QC section, namely after the sewing process, is completed, the product is checked for stitching, size, stain color and so on. Meanwhile, the third stage is controlling the quality of the finished product by checking again that the finished product is complete with accessories.
2. Factors found that cause defective Muslim clothing products at the CV company. Mawaheejra. There are five factors that cause defects in Muslim fashion products, including human factors, raw material factors, method factors, machine factors and environmental factors. Of the five

factors, the most prominent ones are caused by machine and human factors. The machine factors are the sewing machine lacking maintenance, the sewing equipment is damaged, the machine is old, the sloop is loose, the machine has oil and the sewing machine is dusty. Meanwhile, human factors include lack of concentration, lack of skill, lack of accuracy, haste, lack of precision in threading the needle and thread, dirty hands and fatigue.

3. When applying the Statistical Quality Control (SQC) method, it shows that in the check sheet section there are four types of defects, namely dirty defects, hole defects, skipping stitches and floating stitches. Based on the results of the Pareto diagram analysis created, it can be seen that the highest percentage of product defects is gross defects for 232 products, amounting to 38.47%. Based on the results of the Control analysis, Chart U has three points that are outside upper control (UCL) and two points that are outside lower control (LCL) showing that CV. Mawaheejra in quality control there are still deviations. And based on the fishbone diagram, the factors causing defective products are caused by human factors, namely lack of concentration, dirty hands, inappropriate use of needle and thread, lack of skill, lack of accuracy, haste and fatigue. Factors caused by machines include damaged sewing equipment, oil on the machine, dusty sewing machine, lack of maintenance on the sewing machine, loose spool and old machine. Factors caused by raw materials are poor quality fabric, dirty fabric and less effective storage. Factors caused by methods include not implementing work methods and lack of supervision and direction. Lastly, factors caused by the environment are that the work area is not neatly arranged and the environment is not clean.

From the conclusion above, the following are some suggestions regarding this research:

1. In the control process, the company should carry out routine inspections and supervision as a way to avoid errors in the production process, starting from checking raw materials, the Muslim clothing production process and finished products so that they can run smoothly and operate optimally.
2. Based on the factors causing defects, companies need to take corrective action by inspecting raw materials more thoroughly, such as fabric that has been inspected with a fabric inspection machine, re-inspected manually, namely opening each roll of fabric, then visually inspecting the fabric to see any defects and providing marking defective parts, carrying out routine cleaning of the work environment, routine machine maintenance and replacing old machines, and disciplining workers. Apart from that, workers are given training to reduce errors.

3. To reduce defective products, CV companies should. Mawaheejra uses statistical tools or Statistical Quality Control (SQC) in quality control, namely check sheets to find out how many products are produced and how many defective products, Pareto diagrams to find out the main problems or defective products that are more dominant based on the cumulative percentage that must be repaired immediately. U control diagram to find out whether the defective product is still under control or not, so that it can help companies control defective Muslim clothing products. And using a fishbone diagram to find out what factors cause a product to be defective, making it easier for companies to find the root cause of the problem in order to find the right solution.

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