



Quality Control Improvement Using Seven Tools And Six Sigma Methods At Pt. Xyz

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ABSTRACT

Quality is an important topic for debate in a company because the facts on the ground show that a successful and surviving company must have quality control. Based on observations made at PT. XYZ, which is located in the Medan Marelan area, North Sumatra, it can be seen that the problem being faced by this company is the number of defective products produced during the production process. Therefore, this study aims to provide suggestions and reviews of improving quality control by implementing it using the seven tools method. Control analysis using seven tools method, namely check sheet, histogram, Pareto diagram, cause and effect diagram, control chart. This study took a sample of 50 pcs in 25 takers with 109 defective products. There are 4 types of defects in this study, namely: torn packaging defects, crushed processing defects, inappropriate weight defects, mixed processing defects. In the analysis, it was found that the biggest defects were in the torn packaging (40%) and crushed processing (38%). The results of the study of cause and effect diagrams found that the influence of labor, machinery, materials was the main point that had to be improved. In making the control chart Clp does not cross the UCLp and LCLp lines so that statistically out of control process variations are not found. Because there are no process variations that are outside the control limits, no revision is needed. Thus the process is in control. This study also uses the six sigma method to calculate the DPMO value and see the sigma level of companies in the industrial world. The result of the calculation is that the DPMO value in the company is 21,800 with a defect value of around 27%. It can be stated that the company has an average level of 3, which is above the Indonesian industry average. This is included in a fairly good level.

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1. Introduction

The progress of the times has caused a company both in the service and manufacturing sector to enter a period of globalization, where it is necessary to improve the quality of services or products in order to compete with other companies. The emergence of industrial developments in both large and small companies, both private and state-run, will be an important moment for the state. Quality is an important topic for debate in a company because the facts on the ground show that a successful and surviving company must have quality control. Quality Control is a factor that can increase the competitiveness of a product. With



the increase in quality, the production costs will be smaller so as to reduce waste. The failure of a product occurs due to several factors in the production process, raw materials, machines, equipment, humans and the environment. Quality control is very important so that the company's market share remains stable or maybe grows. One way to control product quality is to improve the quality of the manufacturing process that must be carried out continuously and continuously, analyze the causes of product defects, carry out prevention and control,

Quality control is an engineering and management activity/activity, with which we measure product quality characteristics, compare them with specifications or requirements, and take appropriate health action if there is a difference between the actual appearance and the standard one (Rani and Setiawan 2016) . Quality control activities in general include control activities from the product being designed, then processed, to finishing to distribution to consumers, so that complete quality control activities include quality planning for the product to be made, quality planning for product material sources, supervision of the manufacturing process. products as well as analysis and corrective actions (accept and reject) on products that have been produced (Rofieq and Septiari 2021).

This research was conducted in a company called PT. XYZ which is located in Medan, North Sumatra. PT. XYZ is a company engaged in the processing of ready-to-use seafood such as shrimp and squid. PT. XYZ produces these ready-to-use marine catches to be circulated in the local market and exported to other cities, especially areas in North Sumatra. The largest production is 50 kg or 90% of the total production.

PT. XYZ strives to provide the highest quality and competitive prices, but there are still product defects caused by one of the packaging being damaged. This can cause losses for both companies and consumers. Quality control is very necessary in this case in order to reduce defects in the production process. One of them uses the seven tools method. Six sigma strives to achieve a quality level that is close to ideal (zero defects) or produces all outputs in accordance with customer needs (Santoso, 2006). Seven Tools is a quality control tool or procedure that is easy to apply in all types of organizations because of the methods, skill requirements, intentions, and mechanisms, all of which are very straightforward and easy to understand by employees from all educational backgrounds (Subali and Setyawan, In this report, we will discuss seven quality control tools or the so-called seven tools that are applied by a company to be able to improve or create good product quality or in accordance with consumer desires.

2. Research Method

The research method is a scientific approach to collecting data with a specific purpose and application. The information collected in this study is empirical (observable) and meets certain requirements. The degree of accuracy between the data that occurs on an object with the data obtained by the researcher is shown to be valid. (Sugiyono, 2018:2). The research method is essentially a scientific approach to obtaining data for a particular purpose and application. Based on this, four keywords should be considered, namely: scientific method, data, objectives, and application. (Sugiyono, 2013:2). According to Sugiyono (2018: 8), there are 2 types of methods in conducting research, namely:

- a. Qualitative method
Qualitative research methods are research methods based on the philosophy of positivism, used to examine the condition of natural objects (as opposed to experiments), where the researcher is the key instrument, triangulation (combined) data collection techniques, inductive/qualitative data analysis, and research results. Qualitative emphasizes meaning more than generalization
- b. Quantitative method
Quantitative research techniques are defined as research methods based on a positivist philosophy, used to analyze certain populations or samples, collect data using research equipment, process



quantitative/statistical data, and analyze data with the aim of testing the hypotheses that have been prepared.

2.1. Research Location and Time

The location for this research is at PT. XYZ is located in the Medan Marelan area, North Sumatra. This research was conducted from March 2022 to May 2022.

2.2. Data collection technique

According to Sugiyono (2018:137), there are 3 types of data collection based on the technique, namely:

a. Observation

Observation as a data collection technique has specific characteristics when compared to other techniques. If interviews and questionnaires always communicate with people, then observation is not limited to people, but also to other natural objects.

b. Questionnaire (Questionnaire)

Questionnaire is a data collection technique that is done by giving a set of questions or written statements to respondents to answer. Questionnaires are an efficient data collection technique if the researcher knows with certainty the variables to be measured and knows what to expect from the respondents. In addition, the questionnaire is also suitable for use when the number of respondents is quite large and spread over a wide area

c. Interviews are used as a data collection technique if the researcher wants to conduct a preliminary study to find problems that must be investigated, and also if the researcher wants to know things from respondents who are more in-depth and the number of respondents is small.

In this study, researchers used data collection techniques using interviews with one member of the company. Researchers also observed production data to determine the effect of quality control on product defects.

3. Results and Discussion

3.1 Company profile

PT. XYZ is a company that has been established since 1985. PT XYZ is located in the Medan Marelan area, North Sumatra. PT. XYZ is a company that produces seafood processing such as shrimp and squid. Mission of PT. XYZ is to maximize the quality of the production department, maximize customer satisfaction and trust, and maximize the company's product innovation. Vision of PT. XYZ is to be a trustworthy and quality company.

3.2 Creating a Check Sheet

The first action in the proposed improvement plan at PT XYZ is to collect sample data in the form of production quantities, number of product defects, and types of defects from the check sheet recording conducted by PT XYZ. The sample data that will be used are production data and processed product defect data for the period April 2022.



TABLE 1.
Check Sheet Result Data

Tanggal	Produksi (pcs) (1 pcs = 50 kg)	Jumlah Cacat	Jenis Cacat			
			Olahan Hancur	Kemasan Sobek	Berat Tidak Sesuai	Olahan Tercampur
01 April 2022	50	3	2	1	0	0
02 April 2022	50	5	0	4	1	0
04 April 2022	50	4	1	2	1	0
05 April 2022	50	4	3	0	1	0
06 April 2022	50	5	1	2	2	0
07 April 2022	50	5	2	1	2	0
08 April 2022	50	7	5	0	1	1
09 April 2022	50	4	4	0	0	0
11 April 2022	50	5	3	2	0	0
12 April 2022	50	4	2	1	1	0
13 April 2022	50	6	2	4	0	0
14 April 2022	50	6	1	4	0	1
15 April 2022	50	3	0	3	0	0
16 April 2022	50	2	0	2	0	0
18 April 2022	50	4	2	0	1	1
20 April 2022	50	4	1	3	0	0
21 April 2022	50	5	3	0	2	0
22 April 2022	50	2	2	0	0	0
23 April 2022	50	3	0	3	0	0
24 April 2022	50	5	0	2	2	1
25 April 2022	50	4	1	3	0	0
27 April 2022	50	3	2	0	1	0
28 April 2022	50	3	0	3	0	0
29 April 2022	50	8	3	2	1	2
30 April 2022	50	5	1	2	2	0
Total	1250	109	41	44	18	6
Persentase		8,72%				

The results of this study are the sample data and product defects are shown in Table 1. From the data on the type of non-conformance of defective products, a sample of 50 pcs was taken with 25 times of collection, so it can be counted the number of defective products as much as 109. During 25 times of collection, defects in products such as torn packaging defects, crushed processing defects, inappropriately severe defects, and mixed processing defects Table 1. The highest number of defective products was torn packaging defects (44 products) followed by damaged processing defects (41 products), severe defects not according to 18 products) and mixed processing defects (6 products).

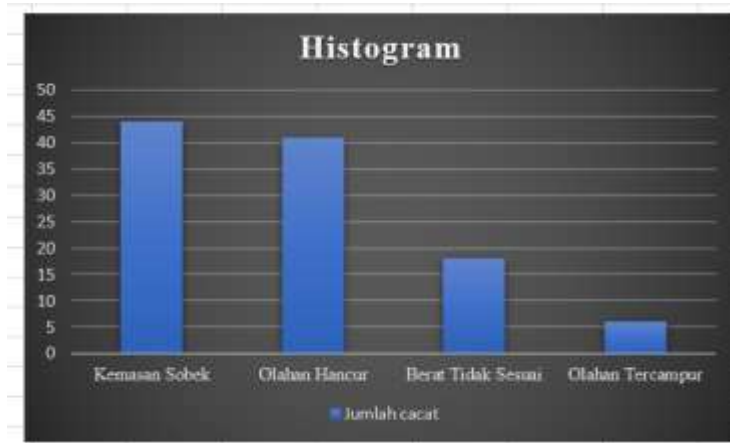
3.3 Creating a Histogram

The benefit of using Histograms is to provide information about variations in the process and assist management in making decisions in an effort to continuously improve processes (continuous process improvement). The data taken can be seen in Table 2 below:

TABLE 2.
Histogram Test Data

No.	Jenis Cacat	Jumlah cacat	Persentase (%)
1	Kemasan Sobek	44	40%
2	Olahan Hancur	41	38%
3	Berat Tidak Sesuai	18	17%
4	Olahan Tercampur	6	6%
	Total	109	100%

From this data, it can be compiled into a histogram chart which can be seen in Figure 1. below this



Based on the histogram data above, it can be concluded that:

- a. Defects produced by torn packaging are worth 40%.
- b. Defects produced by crushed processing are worth 38%.
- c. Defects resulting from the inappropriate weight are 17%.
- d. Defects produced by mixed processing are worth 6%.

The biggest defect is torn packaging. If this continues, 40% of products from 25% of the production process will fail. This can cause company losses.

3.4 Making Pareto Diagrams

Pareto diagram aims to determine the most dominant defects. The data taken are as follows:

TABLE 3.
Pareto Chart Test Data

Jenis Cacat	Jumlah Cacat	Persentase(%)	Kumulatif (%)
Kemasan Sobek	44	40%	40%
Olahan Hancur	41	38%	78%
Berat Tidak Sesuai	18	17%	94%
Olahan Tercampur	6	6%	100%
Total	109	100%	

From Table 3. above it can be seen that:

- a. Torn packaging defects have a percentage of 40% which is ranked first in quality control priorities.
- b. Crushed processing defects have a percentage of 38% which is ranked second in the quality control priority.
- c. Severe non-conforming defects have a percentage of 17% which is ranked third in the quality control priority.
- d. Mixed processing defects have a percentage of 6% which is ranked fourth in the quality control priority.

Then a Pareto diagram is drawn up as below:



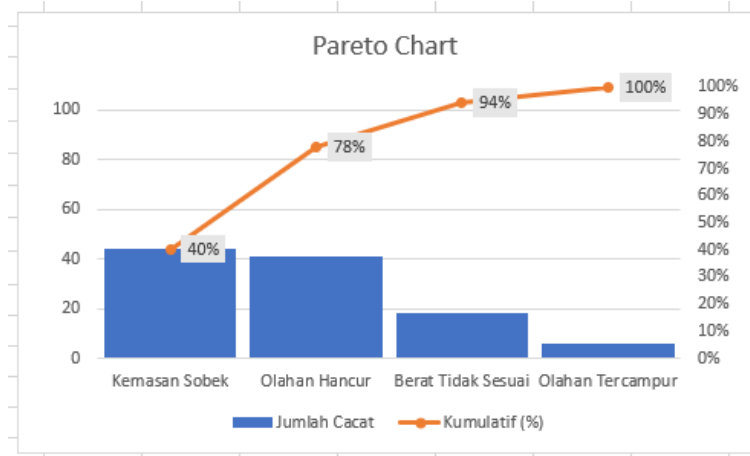


Figure 2. Pareto Chart Test Results

From the diagram data above, it can be concluded that there are 2 types of product defects that are prioritized for system analysis, namely the type of torn packaging defect and the type of crushed processing defect. Because by analyzing this type of defect, it is hoped that an improvement can be found to reduce the production of defective products for further production.

3.5 Creating Cause and Effect Diagrams

Cause and Effect Diagram is a QC tool that is used to identify and show the relationship between cause and effect in order to find the root cause of a problem. The Cause and Effect Diagrams studied are Torn Packaging Defects and Damaged Processed Defects: The Cause and Effect Diagram for torn packaging defects can be seen in Figure 3. below:

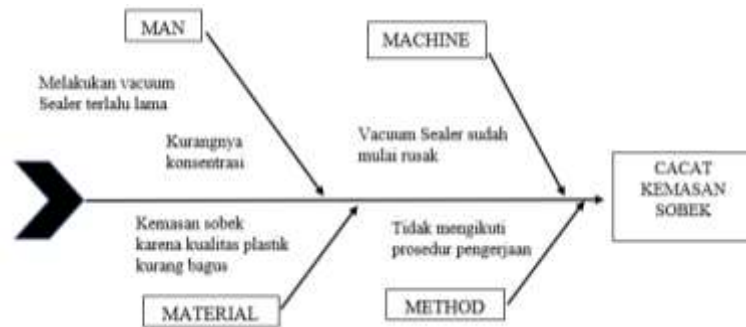


Figure 3. Cause and Effect Test Results Torn Packaging Diagram

From these data it can be concluded that:

- a. man

The workers carried out the vacuum sealer for too long which resulted in the packaging melting and eventually tearing. The lack of concentration of workers also makes the production of defective products increase.

- b. Machine
The vacuum sealer is starting to break. This causes the packaging process to be hampered and makes product defects increase.
- c. Material
The selection of packaging materials that are not good can make product defects increase.
- d. Method
The workers did not follow proper workmanship procedures. This can create additions to the defective product.

3.6 Creating a Control Chart/Control Map

A p-chart control chart which can be seen in Figure 4.4. below this.

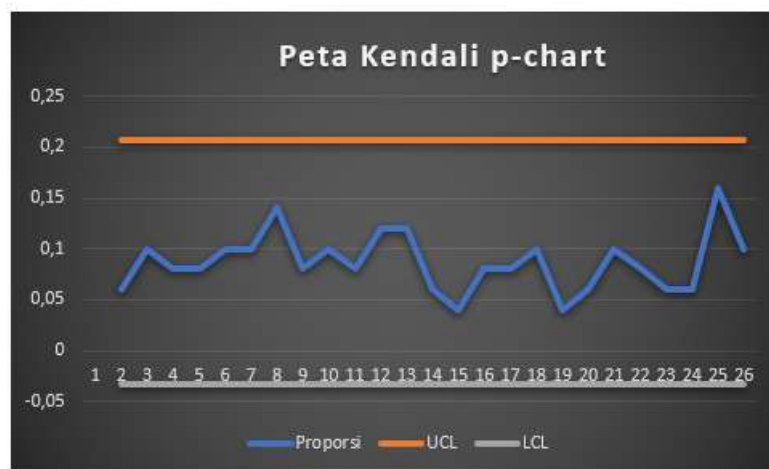


Figure 4.p-Chart . Control Map Test Results

Based on the data above, it can be analyzed that: If the Clp line crosses the UCLp and LCLp lines, the process variation is outside the control limit, so it must be revised. According to Figure... the Clp line does not cross the UCLp and LCLp lines so that statistically out of control process variations were not found. Because there are no process variations that are outside the control limits, no revision is needed. Thus the process is in control.

4. Conclusion

The research was conducted at PT. XYZ is located in the Medan Marelan area, North Sumatra, where the company is engaged in the processing of seafood such as shrimp and squid. This study uses 2 methods in analyzing it, namely the seven tools and six sigma methods. This study took a sample of 50 pcs in 25 takers with 109 defective products. There are 4 types of defects in this study, namely: torn packaging defects, crushed processing defects, inappropriate weight defects, mixed processing defects. In the analysis, it was found that the biggest defects were in the torn packaging (40%) and crushed processing (38%). The results of the study of cause and effect diagrams found that the influence of labor, machinery, materials was the main point that had to be improved. In making the control chart Clp does not cross the UCLp and LCLp lines so that statistically out of control process variations are not found. Because there are no process variations that

are outside the control limits, no revision is needed. Thus the process is in control. The DPMO value in the company is 21,800 with a defect value of around 27%. It can be stated that the company has an average level of 3, which is above the Indonesian industry average. This is included in the level that is quite good. The DPMO value in the company is 21,800 with a defect value of around 27%. It can be stated that the company has an average level of 3, which is above the Indonesian industry average. This is included in the level that is quite good. The DPMO value in the company is 21,800 with a defect value of around 27%. It can be stated that the company has an average level of 3, which is above the Indonesian industry average. This is included in the level that is quite good.

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