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Analysis of Quality Control of Brownies Home Business Products Using Statistical Quality Control

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Abstract

Brownies Home Business is one of the home-scale industries that produce brownies. This business began in 2011 and still active today. Brownies Home Business has conducted quality control over the products produced, but there are still failing products produced by the business. Even though the product failed to affect the benefits obtained because the costs incurred increased. For this reason, it is necessary to have quality control so that the products obtained experience less product failure. The analysis conducted in this study uses the Statistical Quality Control (SQC) approach. Statistical Quality Control (SQC) is a problem solving technique that used to control, analyze, and improve products so that they are expected to contribute to improving the quality of a production. The analysis showed that out of 2100 brownies examined during the fourteen days of observation, 7,71% of the production was damaged with a total of 162 brownies failed. The type of damage that can occur in brownies products produced include immature defect, swift defects, and burns defects. The most common type of damage was defective immature by 56,79% with a total product of 92 brownies. From the analysis results obtained that the quality control in Brownies Home Business is well controlled.

INTRODUCTION

The industrial world is inseparable from the quality or quality of goods which is a major factor for consumers in making decisions to consume products or services. As explained by the American Society for Quality is "the overall features and characteristics of products or services that are able to satisfy the needs that appear or vague". Therefore companies always try to maintain the quality of their products so that they always produce good products so that they can maintain customer satisfaction (Heizer and Render, 2011). Some quality experts provide definitions of quality in different languages. Renowned quality expert W. Edwards Deming states that quality does not mean the best but gives customers what they want with a predictable level of similarity and dependence on the price they pay. While other quality experts, Philip P. Crosby defines quality as meeting the requirements by minimizing damage that might arise or known as the zero defect standard. This quality definition is a principle in statistical analysis to fulfill quality requirements in accordance with the standards desired by customers (Irwan and Haryono, 2015). According to Kotler (2005), "Product quality is the overall characteristic of a product or service in the ability to satisfy expressed or implied needs". Meanwhile, according to Lupiyoadi (2001), states that "Consumers will feel satisfied if the results of their evaluation indicate that the products they use are quality".

The high consumption of bread makes the bread sales sector the most important part of the food industry. Changing quality prevents the development of these industries and often leads to consumer dissatisfaction. Consumer demand is one of the most important factors in production progress and development. Therefore, the technology development of the bread industry is carried out for the purpose of improving quality. In addition, the quality of bread and reducing bread waste is very important (Gocmen, 2001).

Brownies Home Business is one of the home-scale industries that produce brownies. This business began in 2011 and is still active today. Brownies Home Business has conducted quality control over the products produced, but there are still failing products produced by the home-based business. Even though the product failed to affect the benefits obtained because the costs incurred increased. For this reason, there is a need for quality control using the Statistical Quality Control (SQC) method so that the production results obtained experience a few failed products.

One of the actions that can be taken to control the quality of a product by seeing whether the damaged product is within the tolerance limits set by the company, is to use statistical tools, namely SQC (Statistical Quality Control). Statistical Quality Control is a problem solving technique that is used to monitor, control, analyze, manage and improve products using statistical methods so that it is expected to contribute to improving production quality (Rully and Nurrohman, 2013).Quality control using the control map can be used as a quality improvement tool, so as to improve the quality of the products produced and provide benefits because the products produced have good quality (Idris, 2016).

Research on Statistical Quality Control has been widely carried out, for example Heni Nastiti in 2014 used Statistical Quality Control for Analysis of Product Quality Control at PT "X" Depok. Another study, namely Inah Prihatiningtias in 2014 used Statistical Quality Control for Paving Block Product Quality Control Analysis in the CV. Multi Gedung Jember. Thus, the authors are interested in conducting research under the title "Analysis of Quality Control of Brownies Home Business Products Using Statistical Quality Control". The problem raised from this research is whether the quality control of brownies is well controlled or not.

MATERIALS AND METHODS

The data used in this study are primary data obtained from observations and interviews directly with owners of Brownies Home Business. The data used in this study are data on the number of production and the number of defective products from April 13, 2020 to April 26, 2020.

Table 1. Check Sheet

Observation	Number of Production	Number of Defects	Percentage (%)
1	150	12	8,00
2	150	13	8,67
3	150	5	3.33
4	150	4	2,67
5	150	15	10,00
6	150	15	10,00
7	150	13	8,67
8	150	16	10,67
9	150	13	8,67
10	150	13	8,67
11	150	10	6,67
12	150	12	8,00
13	150	12	8,00
14	150	9	6,00
Total	**2100**	**162**	**108,02**
Average	**150**	**11,57**	**7,71**

The method used in this research is Statistical Quality Control. The stages of analysis that will be used in this study are as follows:

1. Describe data on products that are inspected and damaged products using the Check Sheet.
2. Determine priority improvements using the Pareto Diagram.
3. Make a Control P Map (Control Chart)
   a. Calculate the average product damage.
   b. Calculate the center line or Central Line (CL)
   c. Calculating the upper control limit (Upper Control Limit (UCL)
   d. Calculate the lower control limit or Lower Control Limit (LCL)
4. Interpretation.

RESULT AND DISCUSSION

The following is the process of analyzing the quality control of brownies using Statistical Quality Control. Based on observations that have been made it can be seen the amount of damage to brownies by using the check sheet aids which can be seen in Table 1. Based on observations made can be known the types of failures that occur in brownies are defective, immature defects, and defective burns. The average number of defects produced is 7,71%.

Table 2. Analysis Table

Type of Defects	Number of Defects	Percentage (%)	Cumulative Percent (%)
Undercooked	92	56,79	56,79
Oversized	46	28,40	85,19
Burnt	24	14,81	100
Total	**162**	**100**	

Table 3. Control Chart

Observation	Number of Production	Number of Defects	P	CL	UCL	LCL
1	150	12	0.08	0.07714	0.13431	0.01996
2	150	13	0.08667	0.07714	0.13431	0.01996
3	150	5	0.03333	0.07714	0.13431	0.01996
4	150	4	0.02667	0.07714	0.13431	0.01996
5	150	15	0.1	0.07714	0.13431	0.01996
6	150	15	0.1	0.07714	0.13431	0.01996
7	150	13	0.08667	0.07714	0.13431	0.01996
8	150	16	0.10667	0.07714	0.13431	0.01996
9	150	13	0.08667	0.07714	0.13431	0.01996
10	150	13	0.08667	0.07714	0.13431	0.01996
11	150	10	0.06667	0.07714	0.13431	0.01996
12	150	12	0.08	0.07714	0.13431	0.01996
13	150	12	0.08	0.07714	0.13431	0.01996
14	150	9	0.06	0.07714	0.13431	0.01996
Total	**2100**	**162**				

Pareto diagram

Pareto diagrams are used to identify or select the main problems for quality improvement from the largest to the smallest. Analysis using the Pareto diagram begins with the data entered into the analysis table as in Table 2.

Based on Table 2 it can be seen that the most common type of defect is defective defects that is as much as 92 brownies or as much as 56,79%. After analyzing using a table, the next step is to conduct analysis using a Pareto diagram. Pareto diagram analysis can be seen in Figure 1.

Based on Figure 1, it can be seen that the biggest potential problems to the smallest sequentially are defective immaturity that is as much as 56,79%, hardness defect is 28,40%, and burnt defect is 14.81%. To find out the extent of the damage, the next analysis is to create a control chart. Control chart is a tool that graphically is used to monitor and evaluate whether an activity or process is in quality control statistically or not so that it can solve problems and produce quality improvements. Creating a control chart requires several values, namely the proportion of damage (p), center line (CL), upper control limit (UCL) and lower control limit (LCL). The results of the analysis using the control chart can be seen in Figure 2.

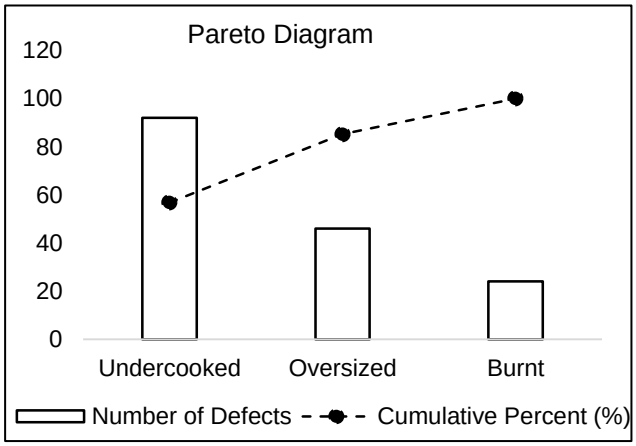

Fig 1. Pareto Diagram

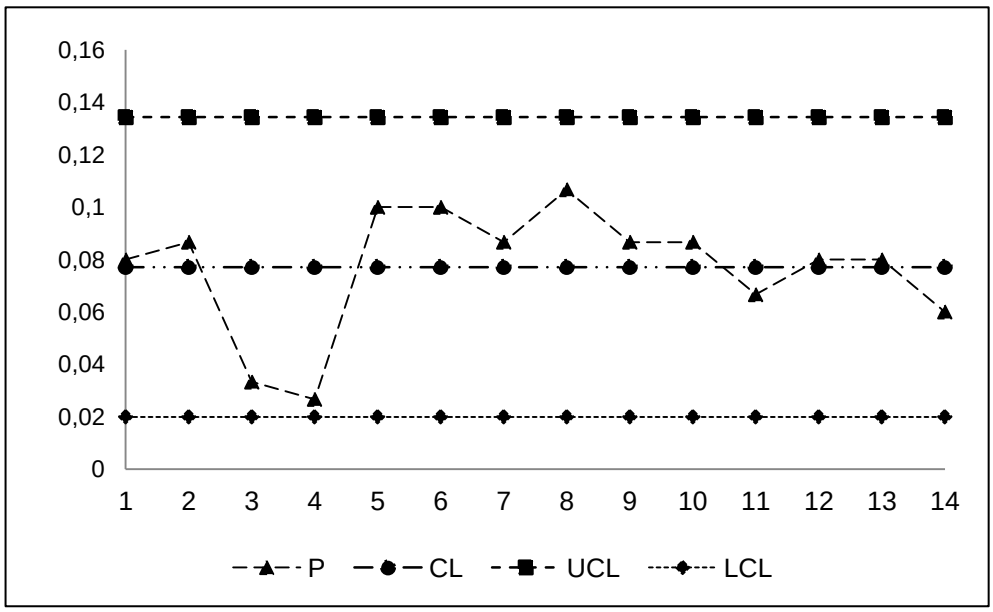

Fig 2. Control Chart

Based on Figure 2 it can be seen that all points are in the control boundary map. This shows that quality control in Brownies Home Based Business is well controlled.

CONCLUSION

Types of Damages that occur in brownies products produced by the Brownies Home Business include defective immature, defective, and charred defects. From the analysis obtained the most defects that occur are less mature defects with an average of 56,79% with a total product of 92 brownies. The average production of damaged products during fourteen days of observation was 7,71% with a total of failed products produced by the Brownies Home Business of 162 brownies. Based on the *P* control chart, it can be seen that the quality control in Brownies Home Businesses is well controlled.

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