ANALYSIS OF QUALITY CONTROL OF TAPIOCA FLOUR PRODUCTS AT PT GUNUNG SUGIH

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Abstract: PT Gunung Sugih is one of the industry players that produces tapioca flour in the form of 50 kg. Researchers conducted research on tapioca flour production in the input, process and output sections. The production process at PT Gunung Sugih has problems with raw materials, humans, machines, methods and the environment, causing damage to the product. The purpose of this study was to identify whether the level of damage that occurs in PT Gunung Sugih tapioca flour products is still within tolerance limits or not and to identify the factors that cause the most dominant damage. The method used in this study is the Statistical Process Control (SPC) method, with Check Sheet analysis tools, histograms, control charts and causal diagrams so that product damage that occurs can be indicated. The data sources used in this study are primary data and secondary data from PT Gunung Sugih in April 2023. Based on the existing data, statistical process control (SPC) analysis has been carried out, it is known that the damage that occurred in PT Gunung Sugih's tapioca flour production still within tolerance limits, and it is known that the main factors of product damage come from raw materials, people, machines and methods. The most dominant damage is damage to the water content that comes from the human factor, tapioca flour agglomerates from the machine and human factors, while the color damage is from the raw material and human factors, thus it is hoped that PT Gunung Sugih will improve operator supervision on raw materials, production processes and production results, work instructions can be given in writing and explained verbally at the beginning of each production and the end of work, hold regular and periodic meetings with employees, carry out periodic machine maintenance and provide safety equipment and silencers on the machine. this is to maintain product quality to remain good.

Keywords: *quality control, statistical process control*

INTRODUCTION

Progress and development of the times change the perspective of consumers in choosing the desired product. Quality is an important factor in choosing a product, in addition to the price factor. Therefore, companies must maintain the quality of the products they produce so that they are accepted by consumers and can compete in the market. Overall quality improvement must be done if the company wants to produce a quality product. Therefore, quality control in companies, both service companies and manufacturing companies, is very necessary. Quality control that is implemented properly will have a positive impact on the quality of the product produced. The quality of the products produced by a company is determined based on certain dimensions and characteristics (Siregar, 2019). A company is said to be qualified if it has a good production system and controlled processes (Windarti, 2014). Through quality control, it is hoped that the

company can increase its effectiveness in preventing defects (defect prevention) so that waste can be reduced in terms of material and labor, which can increase productivity.

According to Assauri in Supriyadi (2018), the notion of quality control is an activity carried out to ensure that a production and operation go according to what was planned, and if deviation occur, these deviations can be resolved immediately. Meanwhile, according to Assauri in Windarti (2014), quality control is an effort to maintain the quality of the goods produced so that they comply with product standards set by the company. According to Assauri (2008), the objectives of quality control are:

1. Helping companies achieve production standards set
2. Can minimize the cost of supervision or inspection
3. Make production costs as low as possible while maintaining good quality. Meanwhile,

According to Jay Heizer and Barry Render (2015), quality control itself can help companies increase sales and reduce costs, which can increase profitability.

1. Quality control indicators, according to R. Bambang Dwi Waryanto (2011), are as follows: Quality control in the materials division, inspection of raw materials, and inspection of inventory
2. In quality control in the process division, there is regular or periodic inspection and maintenance of all production factors and whether production is appropriate or not.

There are many methods that can be used for quality control. One method that can be used is the Process Control Statistics (SPC) method. Statistical process control (SPC) is a statistical technique used to control various processes. In addition, statistical process control (SPC) is also defined as a statistical technique to ensure that a series of processes meet the standards of Jay Heizer and Barry Render (2015).

Research on quality control has been carried out by Siregar (2019) using the Control Process Statistics method for product defects that occur a lot in fabric products, where the implementation of product quality control is carried out starting from raw materials, production processes, and finished products. Meanwhile, research conducted by Lumbono (2017) using Process Control Statistics tools carried out by companies can reduce the percentage of errors in the company's production process.

In the tapioca flour industry sector in Indonesia, growth is very fast, giving rise to competition between companies. The main purpose of establishing a company is to earn profits, and it is hoped that this can be achieved effectively and efficiently. One of them is a company engaged in the agro-industry sector.

According to Ramadhan and Syarfan (2016), in order to survive for a long time, companies must be innovative in developing their products to advance the company going forward. PT Gunung Sugih is one of the industrial players that produces tapioca flour in the form of 50-kg sacks located in Sidokerto Village, Kec. Bumi Ratu Nuban Kab. Central Lampung. PT Gunung Sugih was founded in 1957 and has a product distribution warehouse in the Tangerang area. In the production process, the company has carried out quality control on raw materials, production processes, and finished products.

In production, the types of damage or defects in tapioca flour at PT Gunung Sugih that often occur are damage to color, moisture content, and clumping of tapioca flour. The problem that occurs in the production process is that there is damage caused by the raw material, but it also enters the production process, causing defects in tapioca flour products. In recent years, PT Gunung Sugih has experienced a decrease in profits because it has to bear the damage. This lowered the company's image in 2021.

The damage that has occurred to PT Gunung Sugih's tapioca flour products over the past few years is damage to the color, moisture content, and clumping of tapioca flour. So that makes it interesting to assess the quality control of tapioca flour products at PT Gunung Sugih.

RESEARCH METHOD

PT Gunung Sugih is a company built on a noble purpose. Purpose is the "heart" of everything we do, whether as employees, brands, or companies. After more than 66 years, PT Unilever's goals have never changed, and the desire to make sustainable living commonplace PT Gunung Sugih always strives to create a better future every day through products and inspires people to take small actions in their daily lives to make a difference in the world. In this study, data and information were obtained directly from PT Gunung Sugih. After the data is obtained, the results will be presented, and in the end, the research will be analyzed to determine the quality control carried out and the factors contributing to production damage at PT Gunung Sugih.

Table 1. List of Tapioca Flour Companies in Central Lampung 2023

Company Name	Factory Name	Address
PT Gunung Intan	PT Gunung Intan	Rukti Basuki, Kec. Rumbia, Central Lampung Regency, Lampung

PT Gunung Sugih Sidokerto	PT Gunung Sugih	Jl. Pandawa, Sidokerto, Kec. Bumi Ratu Nuban, Central Lampung Regency Lampung
PT BX Sukajadi	PT Sukajadi	Sukajadi, Kec. Bumi Ratu Nuban, Central Lampung Regency, Lampung
PT Sri Kencono	PT Sri Kencono	Sri Kencono, Kec. Bumi PT, Central Lampung Regency, Lampung

Source: 2023 Survey Data

Table 1 shows that PT Gunung Sugih, in managing the company, has many competitors, so the company is required to be able to compete in it. PT Gunung Sugih is one of the industry players that produces tapioca flour in the form of 50-kg sacks located in Sidokerto Village, Kec. Bumi Ratu Nuban Kab. Central Lampung. PT Gunung Sugih was founded in 1957 and has a product distribution warehouse in the Tangerang area.

Table 2. List of PT Gunung Sugih Products

List of Tapioca Flour Products		
Superior Quality	Standard Quality	Poor Quality
Delman Green	Delman Red	Walu
YN Green	YN Red	

Source: PT Gunung Sugih 2023

From Table 2. shows that PT Gunung Sugih groups its products into three types, namely tapioca flour with superior, standard and poor quality. Business people who want to win competition in the industrial world must pay more attention to the quality of their products. Attention to product quality will have a positive impact on business in two ways, namely the impact on production costs and the impact on income. The implementation of proper and planned quality control is very important for a company. Good quality control can guarantee the effectiveness and efficiency of a production process within the company.

Table 3. Quality and defects of PT Gunung Sugih Tapioca Flour Products September 2020-June 2022

Month	Production Amount (kg)	Damage Type (kg)			Total Damage (kg)	Presentace (%)
		Color	Water Content	Clot		
Sep-21	148.450	1.050	5.250	3.000	9300	6,3
Octo-2021	145.600	1.500	5.000	3.250	9750	6,7
Nov-2021	146.250	950	4.800	3.250	9000	6,2
Des-2021	141.250	1.250	4.800	4.250	10300	7,3
Jan-2022	140.300	1.500	5.600	3.900	11000	7,8
Feb-2022	143.100	750	3.900	5000	9650	6,7
Mar-2022	142.650	1150	4250	4900	10300	7,2
Apr-2022	146.500	1000	5250	5350	11600	7,9
May-2022	141.000	850	3750	1500	6100	4,3
June-2022	145.750	600	6150	2900	9650	6,6
Jul-2022	140.750	800	3900	4900	9600	6,8
Augst-2022	142.500	1050	3750	3450	8250	5,8
Jumlah	**1.724.100**	**12.450**	**56.400**	**45.650**	**114.500**	**6,6**

Source: PT Gunung Sugih archive data

This research aims to obtain a CNN architecture model using Mel Frequency Cepstral Coefficients (MFCC). The MFCC method is used as an extraction of voice features that have a high level of accuracy and fast feature extraction time when compared to other feature extraction methods. For classifiers using supervised artificial neural networks such as Learning Vector Quantization (LVQ).

Learning Vector Quantization (LVQ) is one of the supervised Artificial Neural Networks, which is a pattern classification method where each output unit represents a certain category or group. The category or group referred to in this study is a regional language with 3 (three) Sundanese tribal areas, identified based on accents and characters from Bandung, Bogor and Cirebon in Indonesia.

RESULTS AND DISCUSSION

The results of PT Gunung Sugih's production report in April 2023 with a total observation of data collection for 30 days obtained a total production of 144,250 kg of tapioca flour with details of damage, namely, color, water content, and also clumping tapioca flour. The damaged colors in April 2023 production were 1,100 kg, the damage to the water content was 2,875 kg and the damage caused by clumping of tapioca flour was 2,050 kg with a total damage of 6,025 kg. The types of damage obtained indicate that the most dominant level of damage occurs in water content.

This damage is caused by the fact that the raw material (cassava) that is produced is still too young. Young cassava contains a lot of water and a little starch. This type of damage is also caused by an oven temperature level that is too low. If the oven temperature is too low, tapioca flour still has a water content above the company's standard, which is 9–15%.

The level of types of damage that exceed the control limit occurs on day 1, with a damage percentage of 8%. On the first day, the number of products produced was 5,000 sacks, with a high level of damage that exceeded the upper control limit. This damage was caused by the unfocused employees in production, which caused the viscosity of tapioca flour to exceed the standard limit set by the company, so that tapioca flour was difficult to dry with the oven temperature that had been set.

From the calculation results obtained from statistical tools, overall PT Gunung Sugih tapioca flour production is still within the standard limits set by the company, which is 5%, where the percentage of damage from the data taken in April 2023 is 4.2%. This shows that quality control or damage that occurs in PT Gunung Sugih tapioca flour products is still within tolerance limits. The results of the analysis using Statistical process control and several quality control tools can identify the factors that cause damage to tapioca flour produced by PT Gunung Sugih. Broadly speaking, the main factors that cause damage are materials or raw materials, humans, machines, methods, and the environment.

Damage to color is caused by materials (raw materials), people, methods, and machines. next to the damage to the moisture content caused by raw materials, people, methods, machines, and the environment. Clumping damage to tapioca flour is caused by humans, machines, methods, and the environment. Of the three damages, it is known that raw materials, machines, people, and methods are the most dominant factors causing damage to PT Gunung Sugih's tapioca flour production.

CONCLUSION

1. Data processing is carried out using statistical tools, namely control charts that can identify damage to tapioca flour products at PT Gunung Sugih. This is shown in the control chart graph, where the quality control of tapioca flour products is still within the control limits, although there are still points that are out of the control limits, namely on day 1 with a percentage of damage of 8%. On the first day, the number of products produced was 5,000 sacks, with a high level of damage that exceeded the upper control limit. This damage was caused by employees not focusing on production, which caused the viscosity of tapioca flour to exceed the standard limits set by the company so that tapioca flour was difficult to dry with the oven temperature that had been set. Overall, the percentage of damage to tapioca flour products at PT Gunung Sugih is 4.2%, where the damage is still within the quality standard set by the company, which is 5%. This shows that the tapioca flour production process at PT Gunung Sugih is still within tolerance limits.

2. Based on data processing obtained from PT Gunung Sugih using cause-and-effect diagram analysis, it can be seen that the factors causing damage in tapioca flour production activities come from humans, raw materials, machines, methods, and the environment. Damage to color is caused by materials (raw materials), people, methods, and machines. next to the damage to the moisture content caused by raw materials, people, methods, machines, and the environment. Clumping damage to tapioca flour is caused by humans, machines, or methods.

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