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APPLICATION OF CONTROL CHART FOR DEFECT CONTROL IN ASINAN AND RUJAK CIAMIX BASED ON POM-QM

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ABSTRACT

This study aims to control defect rates in the production process of Asinan and Rujak Ciamix, a product of a micro, small, and medium enterprise (MSME), using control chart methods supported by POM-QM software. Primary data were collected from production volumes and defect occurrences during the production process in November 2024. The analysis revealed that the defect rate remained within control limits, despite the occurrence of defects such as overly sour taste, hard texture, and burnt sugar. The implementation of control charts facilitated real-time monitoring of the production process, enhanced operational efficiency, and supported accurate data-driven decision-making. This study demonstrates that integrating control chart methods with POM-QM software can assist MSMEs in maintaining process stability, minimizing product defects, and improving quality consistency to meet customer expectations. The findings underscore the potential of this approach to enhance quality management practices in MSME production processes.

1. INTRODUCTION

Competition in business is becoming increasingly intense, especially in the Micro, Small, and Medium Enterprises (MSME) sector. The ability to produce high-quality products is one of the keys to success (Arring, 2024). MSMEs face challenges not only from local competitors but also from global products that are increasingly accessible to consumers. Inconsistent product quality is often the main cause of MSMEs' failure to build customer loyalty. Consumers today have high expectations for quality standards, so products that fail to meet expectations are likely to be abandoned. Therefore, MSMEs must ensure that every product produced not only meets standards but also creates sustainable added value (Haryadi et al., 2022; Pujari & Kamble, 2022).

Quality, in the context of operational management, has a very fundamental goal, namely ensuring customer satisfaction by producing products that meet or even exceed their expectations. According to Goetsch and Davis (1994), quality is a dynamic condition related to products, services, people, processes, and environments designed to meet customer needs continuously. In the MSME context, maintaining quality means ensuring that every production process, from raw materials to the final product, runs according to established standards. Without effective quality control, a business risks losing customer trust, which can ultimately impact its sustainability (Listiani, 2011; Pramudia et al., 2016).

One proven effective tool for quality control is the control chart. Control charts are used to monitor variations in the production process and help ensure that these variations remain within predetermined control limits (Prasetyo, 2020). By using this tool, companies can identify problems in the production process early, enabling corrective actions before defective products are produced in large quantities. Control charts are not only relevant for large companies but also very suitable for MSMEs because they are relatively easy to implement and provide significant results in improving product quality consistency.

MSME Asinan and Rujak Ciamix is one of the local businesses based in South Jakarta with great potential for growth but still faces challenges in maintaining its product quality. Frequent issues include

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defective products produced during the process, especially in vegetable pickles. These defective products, such as overly sour seasoning variations, hard cracker textures, and burnt sugar, can reduce customer satisfaction and lower MSMEs' competitiveness in the market. If this issue is not addressed immediately, it can negatively impact the brand image and long-term business sustainability.

Based on these problems, this study aims to apply the control chart method with the support of POM-QM software as a solution to control the defect rate in MSME Asinan and Rujak Ciamix products. This method was chosen because it has advantages in quickly and accurately processing data and providing relevant recommendations for improving product quality. By implementing a POM-QM-based control chart, MSMEs are expected to monitor production processes more effectively, reduce defect rates, and improve overall operational efficiency.

Literature Review

Quality

Quality is the ability of a product or service to meet or exceed customer needs and expectations. Quality involves not only the physical characteristics of a product, such as shape and function, but also non-physical aspects such as service, durability, and added value offered (Bernardino, 2023). In the competitive business world, quality is a strategic element to attract and retain customers. High-quality products not only fulfill customer needs but also create loyalty and strengthen the brand image in the market.

Quality Control

Quality control is the process of ensuring that produced products meet established standards. This process involves monitoring, evaluation, and improvement of various aspects of the production process. Quality control is carried out to minimize variations in production processes and prevent defective products that could negatively impact customer satisfaction (Puspasari, 2024). Defective products are production outputs that do not meet specified specifications or standards. The causes of defective products can stem from various factors, such as human errors, low-quality raw materials, inefficient work methods, or poorly maintained machinery. For example, in the food industry, product defects can include inconsistent taste, damaged packaging, or improper texture. Therefore, effective quality control must be implemented to systematically identify the causes of defects and prevent them from recurring (Al Ghani et al., 2022).

Control Chart

A control chart is a statistical tool used in quality control to monitor the stability of production processes. This tool helps companies identify whether a process is statistically controlled or experiencing significant variations (Simbolon, 2016). Control charts are designed to distinguish between variations caused by common causes and those caused by special causes. In practice, a control chart consists of data plotted on a graph with an upper control limit (UCL) and a lower control limit (LCL). Data points that fall outside the control limits indicate special cause variations that require immediate corrective action. For instance, in food production like pickled vegetables and fruit salads, control charts can be used to monitor quality parameters such as acidity levels, sugar content, or product weight (Mykhailenko et al., 2020).

POM-QM

POM-QM is software designed to support quantitative analysis in operations and quality management. This software offers various features, including the creation and analysis of control charts, which are very useful in quality control. With a user-friendly interface, POM-QM enables users to process data quickly and generate informative reports. Recent studies indicate that the use of POM-QM not only enhances operational efficiency but also provides significant economic benefits (Adriantantri & Julia, 2022). By automating data analysis processes, companies can reduce human errors and make faster and more accurate decisions. Therefore, POM-QM is a highly relevant tool for companies seeking to optimize quality control.

2. METHODS

This research was conducted at the Micro, Small, and Medium Enterprise (MSME) Asinan and Rujak Ciamix, located in Petukangan, Pesanggrahan, South Jakarta. The research flowchart can be seen in Figure 1.

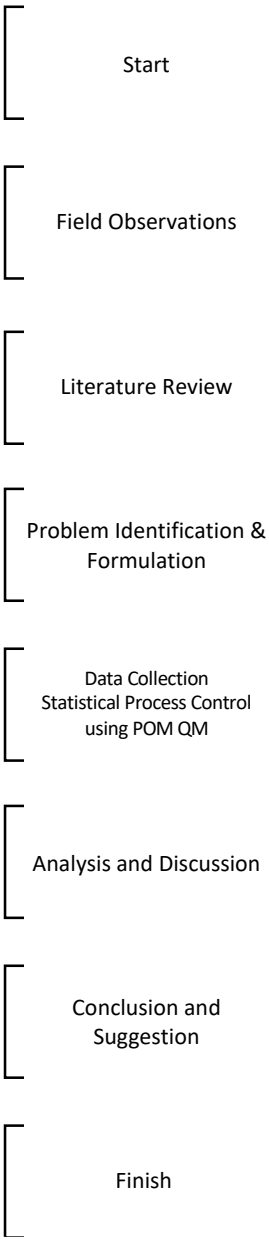

Figure 1. Research Flow Chart

The data used in this study consists of primary data, including production volume and defect data obtained from the production of vegetable pickles. Additionally, secondary data, such as literature reviews, were utilized to strengthen the theoretical foundation by studying prior research. The data collection techniques used in this study included interviews and observations. The data covered production volume and defects recorded during the production process from November 1, 2024, to November 30, 2024, obtained through interviews. After collecting the data, the next step involves processing the data related to quality control using the Statistical Process Control **(SPC)** method. The tool applied is a **control chart** with the assistance of **POM-QM software** to analyze and monitor production quality.

Data analysis in this study was carried out through the application of the Statistical Process Control (SPC) method using a control chart supported by POM-QM software. Primary data in the form of daily production volume and the number of defective products during the period 1–30 November 2024 were collected through interviews and direct observation. The daily defect proportion was calculated by dividing the number of defective products by the total daily production, then averaged to obtain the average defect proportion value ($\bar{p}$). The upper control limit (UCL) and lower control limit (LCL) were calculated using the

SPC formula to determine whether the production process was within the control limits. The control chart was mapped to visually monitor process variations, which were then analyzed to detect any data that was outside the control limits. If variations were found outside the control limits, an analysis was carried out to identify the causes, such as problems with raw materials, production processes, or human error. Secondary data from the literature review were used to strengthen the theoretical basis and validate the results of the analysis. Patterns and trends on the control chart were evaluated to detect potential problems that required further attention. The results of this analysis provide an overview of the stability of the production process and the effectiveness of quality control. Based on these results, recommendations for improvement are provided to improve product quality and consistency to meet customer needs.

3. RESULTS AND DISCUSSIO

Research Results

Data Collection Results

Based on interviews with the owner of MSME Asinan and Rujak Ciamix, production and defect data for November 2024, specifically for the vegetable pickle products, were obtained as follows:

Table 1. Production and Defect Data for Vegetable Pickles

Day	Production (Unit)	Defects Product			Defects Product	Percentage
		Sour	Burnt	Tough		
1	50	5	2	3	10	3,47%
2	75	2	5	4	11	3,82%
3	60	3	2	3	8	2,78%
4	65	4	2	1	7	2,43%
5	55	4	1	1	6	2,08%
6	45	4	5	3	12	4,17%
7	40	1	2	5	8	2,78%
8	40	3	4	2	9	3,13%
9	55	2	1	5	8	2,78%
10	50	4	1	5	10	3,47%
11	60	3	3	2	8	2,78%
12	60	4	2	3	9	3,13%
13	65	1	5	3	9	3,13%
14	75	3	2	5	10	3,47%
15	50	1	4	4	9	3,13%
16	55	5	3	1	9	3,13%
17	80	6	4	2	12	4,17%
18	65	1	3	5	9	3,13%
19	60	6	2	3	11	3,82%
20	45	1	5	3	9	3,13%
21	45	1	3	6	10	3,47%
22	55	5	2	4	11	3,82%
23	75	1	6	3	10	3,47%
24	40	2	4	3	9	3,13%

25	50	4	6	1	11	3,82%
26	85	4	2	6	12	4,17%
27	50	1	2	5	8	2,78%
28	65	2	2	5	9	3,13%
29	70	4	3	6	13	4,51%
30	50	4	2	5	11	3,82%

Data Analysis

Based on the obtained data, the calculation results were obtained using the control chart tool with the assistance of POM software.

Table 2. Data *Result*

Asinan dan Rujak Ciamix Solution

Sample	Number of Defects		3 sigma (99.73%)
Sample 1	10	Total Defects	288
Sample 2	11	Total units sampled	30
Sample 3	8	Defect rate (lambda)	9,6
Sample 4	7	Std dev	3,098
Sample 5	6		
Sample 6	12	UCL (Upper control limit)	18,895
Sample 7	8	CL (Center line)	9,6
Sample 8	9	LCL (Lower Control Limit)	,305
Sample 9	8		
Sample 10	10		

Using calculations with the control chart tool, it was determined that the total number of defective products during November 2024 was 288, with a standard deviation of 3.098. Additionally, the UCL (Upper Control Limit) for vegetable pickles was 18.895, the CL (Center Line) was 9.6, and the LCL (Lower Control Limit) was 0.305. The control chart diagram is shown as follows:

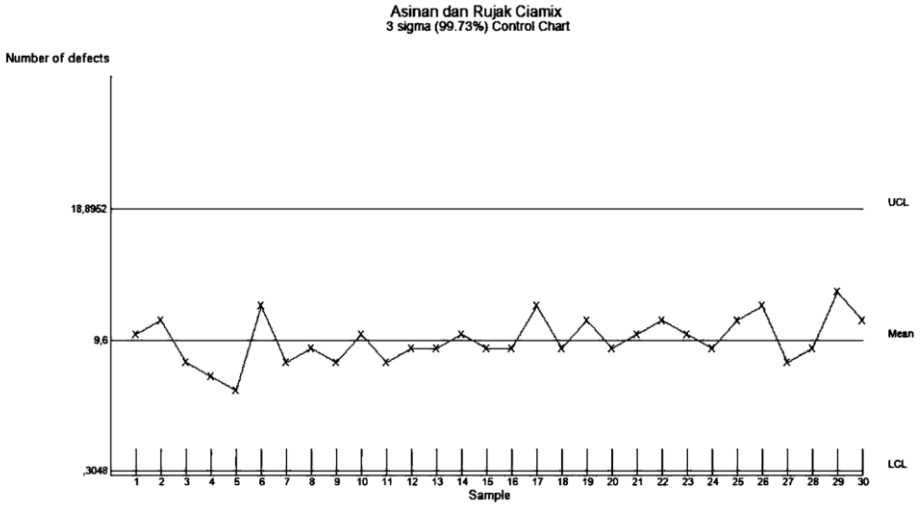

Figure 2. Control Chart Diagram

Based on the control chart diagram above, it can be observed that defective vegetable pickle products from MSME Asinan and Rujak Ciamix are still within control limits, as there are no lines crossing the UCL, and the blue line indicates that defective production remains within acceptable limits.

Defective products are products that are finished, but the condition of the goods does not meet the standards set by the company. Goods or products that do not meet these standards cannot be sold directly to the market, but must be reprocessed or repaired before being marketed. Reducing defects in goods in the production process will have an impact on reducing production process costs (Kholil & Prasetyo, 2017). In Habsen and Mowen (2001:964), defective products are products that do not meet their specifications. This is also not in accordance with the quality standards that have been set. Defective products are products that do not meet specifications or quality characteristics. Defective products that occur during the production process refer to products that have not been accepted by consumers (Sartika & Muttaqin, 2022). Failure Mode Effects Analysis (FMEA) is a method that allows to obtain the relationship between the causes and effects of defects to find a solution by describing the best decision about implementing the right action (Pangaribuan & Handayani, 2018).

4. CONCLUSION

The application of the control chart using POM-QM software at MSME Asinan and Rujak Ciamix successfully demonstrated that the defect rate is still within control limits. Defective products, such as overly sour taste, improper texture, or non-homogeneous ingredients, can be quickly detected using this tool. This indicates that the production process operates relatively stably but still requires attention to variations that may cause quality deviations. This production process stability suggests that the MSME already has a reasonably good quality control system. However, even a small number of defective products can affect customer satisfaction and the company's image. Therefore, these findings encourage MSMEs to further improve operational standards to ensure that products fully meet customer expectations. To enhance the effectiveness of quality control, MSME Asinan and Rujak Ciamix are advised to combine the use of control charts with other quality control tools, such as Pareto diagrams and fishbone diagrams (cause-and-effect diagrams). This combination can help identify root causes of variations contributing to defects, even if defect levels remain within control limits. Additionally, it is crucial for MSMEs to regularly evaluate the production process by involving employee training in quality management. Regular maintenance of production equipment should also be prioritized to ensure operational efficiency. With these measures, MSMEs can improve product competitiveness in the market while maintaining customer satisfaction and loyalty through consistent product quality.

5. REFERENCES

Adriantantri, E., & Julia, C. (2022). *Optimasi Proses Produksi Menggunakan Metode ABC dan Seven Tools.*

Al Ghani, L. I., Nurisusilawati, I., & Ananda, R. (2022). *Implementasi Pengendalian Kualitas untuk Mengatasi Produk Cacat Genteng dengan Penerapan Metode Statistical Process Control (SPC).*

Arring, K. . (2024). Pengendalian Kualitas Bagian Produksi Di Pabrik Roti. *Uajy*.

Bernardino, M. (2023). *Penerapan CUSUM-Tukey's Control Chart Untuk Mendeteksi Perubahan Rata-Rata Proses pada Data Non-Normal.*

Haryadi, H., Azhari, A., & Peker, K. (2022). Comparative Study of Technology Approaches in Using Online Marketing Strategies for Small and Medium Enterprises in Indonesia During the COVID-19 PANDEMIC. *Mobile and Forensics*, *3*(2), 85–97. https://doi.org/10.12928/mf.v3i2.6017

Listiani, T. (2011). Manajemen Kinerja, Kinerja Organisasi serta Implikasinya Terhadap Kualitas Pelayanan Organisasi Sektor Publik. *Jurnal Ilmu Administrasi*, *VIII*(3), 312–321.

Mykhailenko, O., Desenko, V., Ivanauskas, L., & Georgiyants, V. (2020). Standard operating procedure of Ukrainian Saffron Cultivation According with Good Agricultural and Collection Practices to assure quality and traceability. *Industrial Crops and Products*, *151*(November 2019), 112376. https://doi.org/10.1016/j.indcrop.2020.112376

Pangaribuan, B. M., & Handayani, N. U. (2018). Analisis Penyebab Cacat Produksi Roma Kelapa Pada Mesin Oven Dengan Metode Failure Modes Effects Analysis (Fmea). *Engineering Journal*, 1–9.

Pramudia, W., Susila, G. P. A. J., & Bagia, I. W. (2016). Analisis Manajemen Sumber Daya Manusia Strategik pada Dinas Kebersihan dan Pertamanan. *Jurnal Bisma Universitas Pendidikan Ganesha*, *4*(1).

Prasetyo, A. . (2020). Dampak Makro ekonomi Terhadap Non Performing Loans: Studi Kasus Bank Konvensional di Aset. *Kompetensi*, *14*(2), 223–233.

Pujari, N., & Kamble, G. S. (2022). Women entrepreneurship development through MSMEs. *International Journal of Health Sciences*, 4823–4830. https://doi.org/10.53730/ijhs.v6nS2.6165

Puspasari, D. (2024). *Analisis Quality Control Terhadap Risiko Kerusakan Produk dan Kendali Kualitas Produk Bersih: Studi Kasus pada UMKM Keripik Pisang Az-Zahra Desa Sindangsari Purwakarta.*

Sartika, N., & Muttaqin, H. (2022). Analisis Perlakuan Produk Rusak Dan Produk Cacat Dalam PenentuanHarga Jual Produk (Studi Kasus Pada Bumdesa Langgam Sako Desa (Teluk Latak). *Seminar Nasional Industri Dan Teknologi (SNIT)*, *November*, 134–149.

Simbolon, J. (2016). "Pengaruh Pengungkapan Sustainability Reporting Terhadap Kinerja Keuangan Perusahaan. *Simposium Nasional Akuntansi XIX,*.