R E V E N U E
Review of Management, Accounting, and Business Studies
Published by:
International Office, Universitas Pendidikan Nasional, Jalan Bedugul No. 39, Sidakarya, Denpasar, Bali, Indonesia
Email: journal.revenue@undiknas.ac.id Website: https://journal.undiknas.ac.id/index.php/REVENUE
p-ISSN : 2723-4584
e-ISSN : 2962-4819

Quality control planning to minimize waste at a manufacturing company

Najib Salim

ABSTRACT

In industrial fields that developed very rapidly, the manufacturing industry was no exception. It was characterized by increasing consumer needs and significant competition between companies. With tight connections between one industry and another, high-quality products or services became a requirement for competitive advantage and a company's need to guarantee business process requirements. In companies, quality control had long been established as an important management strategy to achieve competitive advantage. PT Slamet Langgeng was a manufacturing industry producing candy products. According to existing data, many defects occurred, causing waste in operational costs and affecting the output produced. This paper aimed to analyze the causes of Davos Roll defects and formulate quality control plans so that businesses could be more competitive and able to compete in the global industry. After further review, three types of defects were identified: soft candy, broken candy, and packaging defects. Broken candy had the highest defect rate, reaching 53.89%. These results indicated the need for more intense quality control planning. Problem analysis used a fishbone diagram to determine the root causes, which served as a reference in the process of preparing quality control plans.

Keywords: Manufacturing, quality control planning, fishbone diagram

Affiliation
Industrial Engineering Department, Faculty of Science and Technology
Universitas Islam Negeri (UIN) Sunan Kalijaga Yogyakarta
Jl. Laksda Adisucipto, Papringan, Caturtunggal, Kec. Depok, Kab. Sleman, Daerah Istimewa Yogyakarta 55281
Email: najibsalim400@gmail.com

INTRODUCTION

The industrial sector, including the rapidly developing manufacturing industry, is characterized by increasing consumer needs and intense competition between companies worldwide (Farida & Setiawan, 2022; Handoyo et al., 2023; Sudirjo, 2023). This sector is a cornerstone of economic growth and development, driving innovation and technological advancements. The global market demands higher efficiency, superior quality, and cost-effectiveness, pushing companies to constantly evolve and improve their processes (Kraus et al., 2021; Wichmann et al., 2022; Pascucci, 2023). As a result, organizations are compelled to adopt rigorous standards and practices to stay ahead in the competitive landscape.

With tight competition between industries, high-quality products or services become essential for competitive advantage and for ensuring the continuity of business processes (Nuresa, Khosi'in, & Febriyani, 2022). High quality is not just a market expectation but a prerequisite for survival in today's market (Lawson & Samson, 2001; Rajapathirana & Hui, 2018). Companies that fail to meet these standards risk losing their market share and credibility. Therefore, quality control has become a vital component of strategic planning in manufacturing and service industries. It ensures that products or services consistently meet or exceed customer expectations, thus fostering customer loyalty and brand trust.

Quality control has long been established as an important management strategy to achieve competitive advantage (Untoro & Iftadi, 2020). It encompasses various activities, from the inspection of raw materials to the

final evaluation of finished products. Implementing effective quality control measures can prevent defects, reduce waste, and enhance overall operational efficiency. It also helps in maintaining compliance with industry standards and regulations, which is critical for avoiding legal issues and penalties.

Quality control is necessary for a company, especially in the production line (Zacharias, 2022). According to Yang, Arndt, & Lanza (2016), quality control ensures that a company's products or services meet the required standards and specifications. This systematic approach to quality management helps in identifying and rectifying issues before they escalate, thus saving time and resources. Moreover, a robust quality control system can lead to the development of best practices that further enhance production processes and product quality.

This helps maintain customer satisfaction and loyalty, as customers expect reliable, safe, and high-quality products (Albari, 2019; Suhendi & Sabihis, 2021; Grace et al., 2021; Rane et al., 2023). Satisfied customers are more likely to become repeat buyers and advocates for the brand, which is invaluable for business growth. Additionally, quality control helps improve operational efficiency and reduce costs. By monitoring and controlling the quality of inputs, processes, and outputs, companies can identify areas for improvement and implement measures to enhance efficiency (Trzeciak & Jonek-Kowalska, 2021). This can lead to cost savings through reduced waste, rework, and scrap, as well as improved productivity and resource utilization.

From these points, it can be concluded that quality control plays a crucial role in maintaining a company's reputation and brand image. Consistently delivering high-quality products or services builds trust and credibility among customers, suppliers, and other stakeholders, which can result in increased market share, customer loyalty, and a competitive advantage (Khadka & Maharjan, 2017; Ali, 2022). The ripple effect of effective quality control extends beyond the immediate benefits of cost savings and efficiency. It cultivates a culture of excellence and continuous improvement within the organization, leading to sustainable business success.

PT. Slamet Langgeng is a mint candy manufacturing company with the DAVOS brand. DAVOS candy has been produced since 1933 and is still in demand, especially in Central Java, West Java, East Java, and the Special Region of Yogyakarta. DAVOS is a legendary brand in Indonesia and remains in production. The longevity of DAVOS candy in the market is a testament to its consistent quality and the company’s commitment to meeting consumer preferences. Over the years, PT. Slamet Langgeng has adapted to changing market trends while maintaining the traditional appeal of DAVOS candy.

The candy products produced by PT. Slamet Langgeng include DAVOS Roll, DAVOS Lux, DAVOS Classic, DAVOS Mild, and DAVOS Mini, which are packaged differently. This diverse product line caters to various consumer tastes and preferences, ensuring that there is a DAVOS candy for every occasion. The company’s ability to innovate within its product range while preserving the core qualities of its brand has been crucial to its sustained success.

Based on data on DAVOS Roll production from Monday, July 10, 2023, with a production volume of 2003 kg, there were 31 kg of defective products. If this issue is not addressed, it will result in waste on the production line. Therefore, further research is needed to reduce product defects and minimize waste. This underscores the need for a follow-up analysis of product quality at PT. Slamet Langgeng, particularly for DAVOS Roll products, so they can compete with other mint products produced by competitors. Even though defective candies are re-ground to be made into candy again, this still results in waste from a lean manufacturing perspective. By addressing these defects, the company can improve its lean manufacturing processes, reduce costs, and enhance the overall quality of its products.

LITERATURE REVIEWS

Quality Control

Quality control is an activity to measure the characteristics of a product or service, then compare the results of these measurements with the desired standards (Shiyamy, Rohmat, & Sopian, 2021) In a company, quality control activities are mandatory because they impact the results of the products produced. If the product does not comply with predetermined standards, the company needs to improve its quality.

Referring to Widjaja et al. (2022), quality control has various objectives, including ensuring the product has a size that is in accordance with the plan, minimizing operational costs for inspections, and minimizing production costs. Therefore, the manufacturing industry requires extensive quality control of its products (Huda & Safitri, 2021).

Quality control needs to be carried out to reduce operational and production costs. Implementing quality control on products will ensure they meet the set standards and are approved by customers, thereby providing customer satisfaction (Saputra & Purnawati, 2023).

Fishbone Diagram

Fishbone diagrams, commonly known as cause and effect diagrams or Ishikawa diagrams, are visual tools used for problem-solving and root cause analysis (Ciocoiu & Ilie, 2010). Developed by Dr. Kaoru Ishikawa, a Japanese quality control expert, the diagram resembles the shape of a fish skeleton, hence the name fishbone diagram

(Sakdiyah, Eltivia, & Afandi, 2022). The fishbone diagram can be used as an appropriate visual representation of phenomena that involve the investigation of multiple cause-and-effect factors and how they interrelate (Coccia, 2018).

To create and use a fishbone diagram, clearly define the problem you want to analyze or solve. The problem statement should be concise and specific. This initial step is crucial as it sets the focus for the entire analysis. Next, draw a horizontal line across the center of the page or whiteboard. This line represents the fish's spine. On the left side of the horizontal line, draw a small box or circle to represent the problem statement. This forms the head of the fish. Then, draw several diagonal lines extending from the spine to the head, creating a fishbone-like structure. These diagonal lines represent the main categories or factors that may be contributing to the problem. Typical categories include People, Process, Equipment, Materials, Environment, and Management. Label each diagonal line with one of these categories. Finally, identify the causes within each category. Along each diagonal line, list the specific causes under the respective category. These causes can vary depending on the nature of the problem but should be comprehensive enough to cover all potential factors. By following these steps, you create a detailed visual representation that helps teams visualize the various factors contributing to the problem, facilitating structured brainstorming and analysis.

Fishbone diagrams are a valuable tool for problem-solving because they help teams visualize the various factors that can cause problems and encourage structured brainstorming and analysis (Tuti, Ilinawati, & Putri, 2023). They are commonly used in industries such as manufacturing, healthcare, and quality control to improve processes and address problems systematically.

METHODS

The research uses data collected from the company's history between 10-18 July 2023 as a sample for measuring the defect rate. The research is divided into several stages:

Identification of Defective Products

At this stage, product defects occurring in production are identified. This includes Critical to Quality (CTQ) factors, which specify the types of defects occurring in production. These will later be used for calculations and improvement analysis (Fitria, Tauhida, & Sokhibi, 2023).

Calculation of Defective Products

In this stage, the percentage of defects is calculated using the total production output and a standard formula. Additionally, the Defect per Unit (DPU) and Defect Per Million Opportunities (DPMO) are analyzed using the following formulas (Elfanda, 2021):

$$DPU = \frac{number\ of\ defective\ products}{(total\ output\ production\ x\ CTQ)} \quad (1)$$

$$DPMO = DPU\ x\ 1.000.000 \quad (2)$$

During this stage, graph analysis is also utilized to analyze the movement of the defect rate to determine whether it increases or decreases over time.

Cause and Effect Analysis (Fishbone Diagram)

After determining the defect rate in the company, a cause and effect analysis is conducted to identify the root causes of the problems. This analysis is assisted by the fishbone diagram method, which serves as a reference for process improvement.

RESULTS AND DISCUSSION

Results

Identification of Defective Products

The following are the results of data collection on production and product defects for Davos Roll in the period 10 to 18 July 2023:

TABLE 1. Product Defects

Date	Production (Kg)	Total Defect (Kg)
10 July 2023	2003	31
11 July 2023	3023	48
12 July 2023	1037	38

13 July 2023	1733	44
14 July 2023	1486	39
17 July 2023	2010	82
18 July 2023	2438	78
Total	**13730**	**352**

From the data obtained regarding the number of defective Davos Roll products, the defects can be categorized as follows:

1. Soft Candy: In this defect, the candy is too soft and cannot be marketed. It is selected again for grinding and then goes back into the mill.
2. Broken Candy: In this defect, the candy has broken due to strong pressure or contact with a hard object.
3. Packaging Does Not Meet Standards: At PT. Slamet Langgeng, packaging that does not meet standards is grouped into one category. This includes packaging that is not neat, torn, or slanted.

From the analysis of the types of defects, the data on defects at PT. Slamet Langgeng for Davos Roll products are as follows:

TABLE 2. Types of Defects

Period	Date	Total production (Kg)	Types of Defect (Kg)		
			Soft Candy	Broken Candy	Packaging
1	10 July 2023	2003	13	15	3
2	11 July 2023	3023	13	33	2
3	12 July 2023	1037	7	29	2
4	13 July 2023	1733	13	29	2
5	14 July 2023	1486	16	16	7
6	17 July 2023	2010	40	32	10
7	18 July 2023	2438	18	40	20

Calculation of Defective Products

After determining the types of defects, the percentage of each defect type is identified as shown in the following table:

TABLE 3. Types of Defects

Period	Soft Candy	Broken Candy	Packaging	Percentage
1	13	15	3	8,61%
2	13	33	2	13,33%
3	7	29	2	10,56%
4	13	29	2	12,22%
5	16	16	7	10,83%
6	40	32	10	22,78%
7	18	40	20	21,67%
Percentage	**33,33%**	**53,89%**	**12,78%**	**100%**

Based on the analyzed percentages, it is known that the highest number of product defects occurred in the 6th period (Monday, July 17, 2023), with a defect percentage of 22.78%. The most common type of defect was broken candy, which was observed in 7 periods, accounting for 53.89% of the total defective products, meaning it constitutes more than half of the defective items.

In the next stage, the measurement of Defect per Unit (DPU) and Defect per Million Opportunities (DPMO) in quality control for Davos Roll products at PT. Slamet Langgeng is conducted. The measurements are as follows:

TABLE 4. Calculation DPO and DPMO

Production	Total Defect	DPU	DPMO
2003	31	0,015477	15477
3023	48	0,015878	15878
1037	38	0,036644	36644
1733	44	0,025389	25389
1486	39	0,026245	26245

2010	82	0,040796	40796
2438	78	0,031993	31993

After calculating and determining the percentage of defects in the quality control of Davos Roll at PT. Slamet Langgeng, the next stage is to analyze the quality control graph for the 7 production periods. This analysis is based on the following graph:

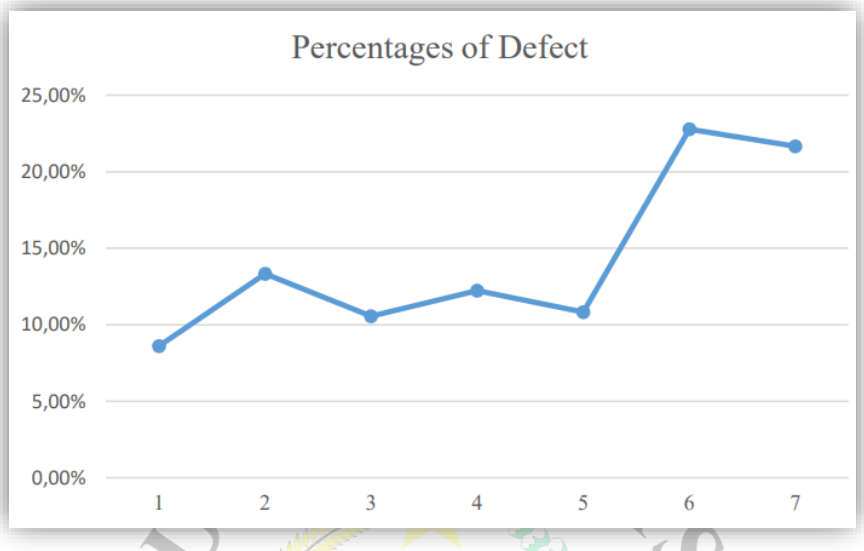

FIGURE 1. Graph of Defect Product

From the percentage graph above, it can be observed that the defect percentage increases from one period to the next. This trend suggests that the quality value is likely to continue declining in the upcoming periods. Therefore, changes or improvements are necessary to enhance and increase the quality value of Davos Roll quality control at PT. Slamet Langgeng.

Before implementing improvements, it is crucial to analyze the factors influencing defects in Davos Roll products at PT. Slamet Langgeng. This analysis will help identify the root causes of the defects and guide effective corrective actions for the production line.

Cause and effect analysis (Fishbone Diagram)
This analysis uses a cause-and-effect or fishbone diagram to identify the factors influencing product defects.

Broken Candy
The following is a fishbone diagram analysis for defects categorized as broken candy:

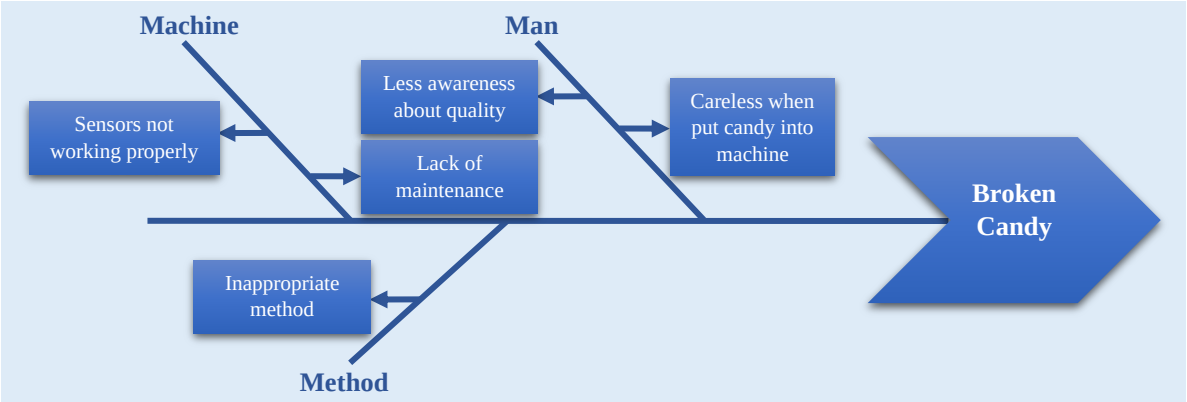

FIGURE 1. Fishbone Diagram Broken Candy
In the Fishbone Diagram, broken candy defects occur due to several factors:

1. **Man**: This factor influences defects in broken candy products due to a lack of concern for quality among workers or machine operators, as well as a lack of caution from workers tasked with placing candy into

the machine.

2. **Method**: This factor impacts defects in broken candy products due to inappropriate work methods that may lead to improper handling or processing of the candy.
3. **Machines**: This factor affects defects in broken candy products due to issues such as sensors that cannot read correctly, causing the candy to fall and break, as well as inadequate maintenance on the machines, leading to frequent problems.

Soft Candy

The following is a fishbone diagram analysis for defects categorized as soft candy:

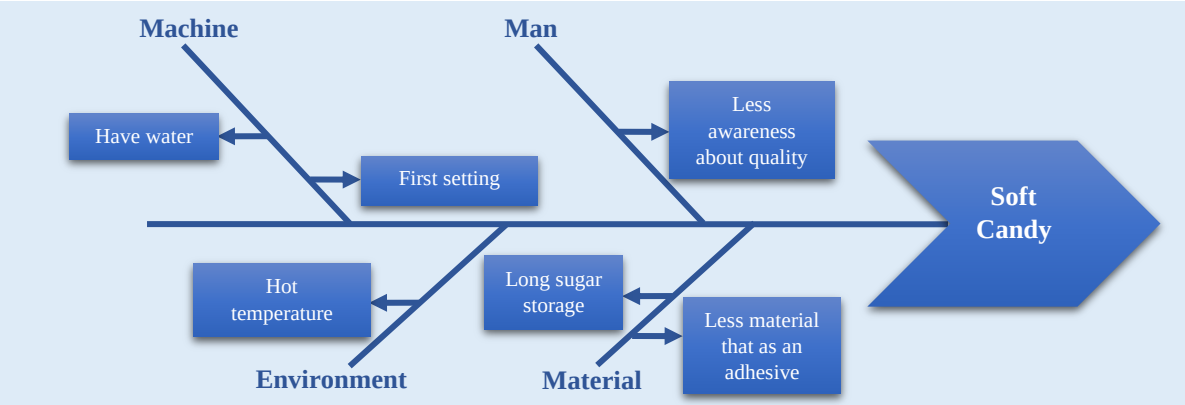

FIGURE 3. Fishbone Diagram Soft Candy

In the Fishbone Diagram related to soft candy defects, several factors contribute to these issues:

1. **Man**: The lack of concern for quality among workers or machine operators is a key factor leading to defects in soft candy products.
2. **Material**: Material factors influencing defects include storing sugar for extended periods, which can lead to moisture in the sugar when it is ground. Additionally, incorrect dosages of additional ingredients, such as adhesives, can also contribute to the defects.
3. **Machine**: Machine-related factors include initial settings that may not align with the company's specifications and the presence of water in the machine. The latter causes the candy to become exposed to moisture and turn soft.
4. **Environment**: Environmental factors such as inadequate cooling or insufficient air conditioning can cause defects. If the temperature is not sufficiently controlled, ingredients, particularly sugar, may melt, leading to soft candy.

Packaging

The following is a fishbone diagram analysis for product defects of type packaging.

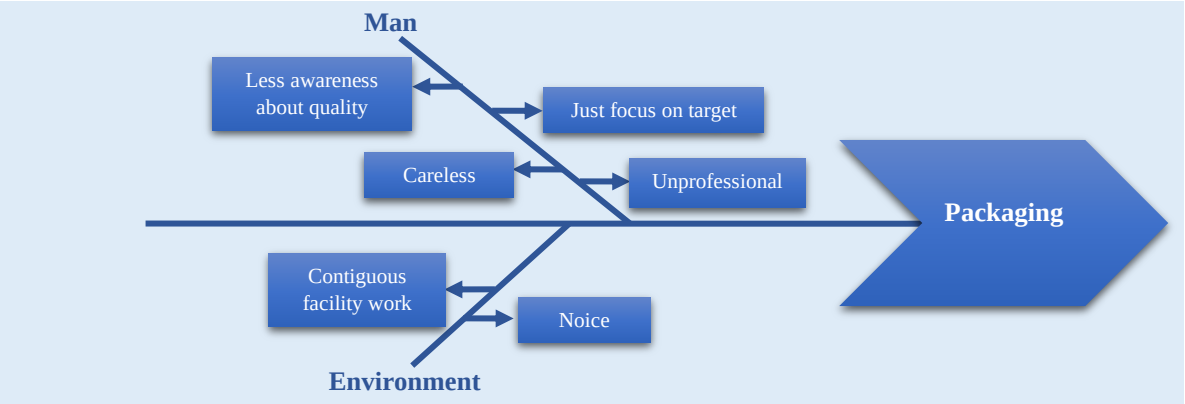

FIGURE 4. Fishbone Diagram Packing

In the Fishbone Diagram, defects in packaging that do not comply with standards occur due to several factors:

1. **Man:** This factor influences packaging defects due to a lack of concern for quality among workers and machine operators. Issues include workers who are less careful, focus solely on meeting production targets rather than maintaining product quality, and those who mix personal problems with work, leading to decreased focus and professionalism.
2. **Environment:** This factor affects packaging defects through the noise of the Davos Lux packaging machine, which can disturb workers. Additionally, the crowded placement of facilities can create a distracting work environment, further impacting the quality of the packaging.

Discussion

Quality Control Planning

The analysis conducted using the Fishbone Diagram provides valuable insights into the factors contributing to defects in Davos candy production at PT. Slamet Langgeng. Based on these findings, several recommendations for improvement are proposed to address the issues identified for broken candy, soft candy, and packaging defects.

Broken Candy

The Fishbone Diagram analysis reveals that broken candy defects are primarily influenced by three factors. To address these issues, several targeted recommendations are suggested. Firstly, there is a need for comprehensive education and training for workers. By increasing their awareness of product quality and emphasizing the importance of careful handling, workers can be encouraged to take more care when placing candy into the machine. This can help reduce instances of broken candy. Secondly, it is crucial to review and improve workers' working postures. Conducting an assessment of how workers interact with the machinery can identify ergonomic issues or inefficient practices that contribute to defects. Addressing these issues can enhance the overall handling process and reduce breakage. Lastly, machine maintenance plays a critical role in preventing defects. Regular checks and repairs of engine sensors are essential to ensure their proper functioning. Additionally, establishing Standard Operating Procedures (SOPs) and scheduling routine maintenance can help prevent breakdowns and ensure that machines operate smoothly, reducing the likelihood of defects.

Soft Candy

For soft candy defects, the Fishbone Diagram identifies four key factors contributing to the problem. The following recommendations aim to address these issues effectively. Firstly, increasing worker education and awareness is essential. Workers should be trained not only to focus on production output but also on maintaining product quality. This broader understanding can lead to more careful handling and processing of ingredients. Secondly, a review of the raw material management process is needed. Specifically, the purchasing schedule for raw materials should be examined to prevent the storage of sugar for extended periods, which can lead to moisture issues. Additionally, ensuring that the dosage of additional materials, such as adhesives, is correct can help prevent defects. Thirdly, it is important to review the machine's initial settings and ensure that it is dry before use. Implementing a practice of drying the machine immediately after washing it can prevent moisture-related issues that contribute to soft candy defects. Finally, controlling the production environment is crucial. Adding equipment such as air conditioners (AC) to maintain a cooler room temperature can prevent ingredients, particularly sugar, from melting. This environmental control can significantly reduce the incidence of soft candy.

Packaging

The Fishbone Diagram analysis highlights two primary factors contributing to packaging defects. Addressing these factors with the following recommendations can improve packaging quality. Firstly, regular supervision and training of workers are necessary. By ensuring that workers understand the importance of quality and receive professional work education, the likelihood of packaging defects can be reduced. This includes educating workers about proper handling techniques and the impact of their work on overall product quality. Secondly, revising the facility layout can help minimize disruptions. Separating the Davos Lux machine from the Davos Roll packaging area and reviewing the overall layout of the company's facilities can reduce noise and other distractions that affect workers. This adjustment can create a more efficient working environment and improve the quality of packaging. By implementing these recommendations, PT. Slamet Langgeng can address the root causes of defects in Davos candy production, leading to improved product quality and greater operational efficiency.

CONCLUSION

Based on the discussion regarding quality control at PT. Slamet Langgeng for Davos Roll, several conclusions can be drawn from the Fishbone Diagram analysis of the three main defects: soft candy, broken candy, and packaging defects. The analysis indicates that broken candy represents the highest defect rate, accounting for 53.89% of the total defects. This is followed by soft candy defects at 33.33%, and packaging defects at 12.78%. Given this distribution, it is crucial for the company to focus on addressing the broken candy issue, as it constitutes the most significant area of concern. The Fishbone Diagram analysis identifies various factors contributing to each type of defect. For soft candy defects, the causes include issues related to man, machine, material, and environment. Specifically, improper handling by workers, moisture in stored materials, inadequate machine settings, and insufficient environmental control contribute to the occurrence of soft candy defects. In the case of broken candy, the primary causes are man, method, and machine factors. These include worker negligence, inappropriate work methods, and problems with machinery such as faulty sensors or insufficient maintenance. Packaging defects, on the other hand, are influenced by man and environment factors. Issues such as a lack of worker attention to packaging quality and environmental distractions like excessive noise and poor facility layout contribute to these defects. To effectively address these issues, it is recommended that the company promptly review and implement the proposed improvements. By concentrating efforts on the most prevalent defects and addressing their underlying causes, PT. Slamet Langgeng can enhance quality control, improve product standards, and achieve greater operational efficiency.

REFERENCES

Articles

[1] Albari, A. K. (2019). The influence of product quality, service quality and price on customer satisfaction and loyalty. *AJEFB - Asian Journal of Entrepreneurship and Family Business, 3*(1), 49-64. Retrieved from https://www.researchgate.net/publication/339796640_The_Influence_of_Product_Quality_Service_Quality_and_Price_on_Customer_Satisfaction_and_Loyalty

[2] Ali, M. A. B. (2022). The effect of firm's brand reputation on customer loyalty and customer word of mouth: The mediating role of customer satisfaction and customer trust. *International Business Research 15*(7), 30. http://dx.doi.org/10.5539/ibr.v15n7p30

[3] Ciocoiu, C. N. & Ilie, G. (2010). Application of fishbone diagram to determine the risk of an event with multiple causes. *Knowledge Management Research & Practice, 2*(1), 1-20. https://www.researchgate.net/deref/http%3A%2F%2Fideas.repec.org%2Fcgi-bin%2Fhtsearch%3Fq%3DApplication%2BOf%2BFishbone%2BDiagram%2BTo%2BDetermine%2BThe%2BRisk%2BOf%2BAn%2BEvent%2BWith%2BMultiple%2BCauses?_tp=eyJjb250ZXh0Ijp7ImZpcnN0UGFnZSI6InB1YmxpY2F0aW9uIiwicGFnZSI6InB1YmxpY2F0aW9uIn19

[4] Coccia, M. (2018). the Fishbone diagram to identify, systematize, and analyze the sources of general purpose technologies. *Journal of Social and Administrative Sciences, 4*(4), 291-303.

[5] Elfanda, M. E. (2021). Implementation of six sigma in product quality control. *Jurnal Ekonomi dan Bisnis Airlangga, 31*(1), 51-63. doi:10.20473/jeba.V31I12021.51-63

[6] Farida, I. & Setiawan, D. (2022). Business strategies and competitive advantage: the role of performance and innovation. *Journal of Open Innovation: Technology, Market, and Complexity, 8*(3):163. https://doi.org/10.3390/joitmc8030163

[7] Fitria, L., Tauhida, D., & Sokhibi, A. (2023). Quality control with six sigma method to minimize polyester fabric product defects at PT Sukuntex. *OPSI: Jurnal Optimasi Sistem Industri, 16*(1), 110-120. https://doi.org/10.31315/opsi.v16i1.6786

[8] Grace, E., Girsang, R. M., Simatupang, S., Candra, V., & Sidabutar, N. (2021). Product quality and customer satisfaction and their effect on consumer loyalty. *International Journal of Social Science (IJSS), 1*(2), 69-78. https://doi.org/10.53625/ijss.v1i2.138

[9] Handoyo, S., Suharman, H., Ghani, E. K., & Soedarsono, S. (2023). A business strategy, operational efficiency, ownership structure, and manufacturing performance: The moderating role of market uncertainty and competition intensity and its implication on open innovation. *Journal of Open Innovation: Technology, Market, and Complexity, 9*(2), 100039. https://doi.org/10.1016/j.joitmc.2023.100039

[10] Holifahtus Sakdiyah, S., Eltivia, N., & Afandi, A. (2022). Root cause analysis using fishbone diagram: Company management decision making. *Journal of Applied Business, Taxation and Economics Research, 1*(6), 566–576. https://doi.org/10.54408/jabter.v1i6.103

[11] Huda, M., & Safitri, W. (2021). Analysis of production control, quality control, and total quality management against product failure. *Kontigensi: Scientific Journal of Management, 9*(2), 644–652. https://doi.org/10.56457/jimk.v9i2.225

[12] Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital transformation: An overview of the current state of the art of research. *SAGE Open, 11*(3), 1-15.

https://doi.org/10.1177/21582440211047576
[13] Lawson, B. & Samson, D. A. (2001). Developing innovation capability in organisations: A dynamic capabilities approach. *International Journal of Innovation Management, 5*(3), 377-400. http://dx.doi.org/10.1142/S1363919601000427
[14] Nuresa, R., Khosi'in, E. M., & Febriyani, A. R. (2022). Penerapan prinsip six sigma dalam membangun manajemen mutu pendidikan islam. *Evaluasi: Jurnal manajemen Pendidikan Islam, 06*(02), 295-306. http://doi.org/10.32478/evaluasi. v6i2.1052
[15] Pascucci, F., Svelli, E., & Gistri, G. (2023). How digital technologies reshape marketing: Evidence from a qualitative investigation. *Italian Journal of Marketing,* 27-58. https://doi.org/10.1007/s43039-023-00063-6
[16] Rajapathirana, R. P. J. & Hui, Y. (2018). Relationship between innovation capability, innovation type, and firm performance. *Journal of Innovation & Knowledge, 3*(1), 44-55. https://doi.org/10.1016/j.jik.2017.06.002
[17] Rane, N., Achari, A., & Choudhary, S. P. (2023). Enhancing customer loyalty through quality of service: Effective strategies to improve customer satisfaction, experience, relationship, and engagement. *International Research Journal of Modernization in Engineering Technology and Science, 5*(5), 427- 452. http://dx.doi.org/10.56726/IRJMETS38104
[18] Saputra, I. K. D. W., & Purnawati, N. K. (2023). Analysis of quality control of chocolate production process at CAU Chocolates Bali. *European Journal of Business and Management Research, 8*(1), 162–167. https://doi.org/10.24018/ejbmr.2023.8.1.1800
[19] Shiyamy, A. F., Rohmat, S., & Sopian, A. (2021). Analisis pengendalian kualitas produk dengan statistical process control. *KOMITMEN: Jurnal Ilmiah Manajemen, 2*(2), 32-45. https://doi.org/10.15575/jim.v2i2.14377
[20] Sudirjo, F. (2023). Marketing strategy in improving product competitiveness in the global market. *Journal of Contemporary Administration and Management (ADMAN), 1*(2), 63-69. https://doi.org/10.61100/adman.v1i2.24
[21] Suhendi, D. & Sabihis. (2021). Service quality and product quality key to improve customer loyalty. *Journal of Business and Management Review, 2*(9), 620-633. https://doi.org/10.47153/jbmr29.2092021
[22] Tuti, Ilinawati, & Putri, N. K. (2023). The use of tree diagram technique to improve students' writing ability. *JOEEL: Journal of English Education and Literature, 4*(2), 90-97. https://doi.org/10.38114/joeel.v4i2.282
[23] Trzeciak, M. & Jonek-Kowalska, I. (2021). Monitoring and control in program management as effectiveness drivers in polish energy sector: Diagnosis and directions of improvement. *Energies, 14*, 4661. https://doi.org/10.3390/en14154661
[24] Untoro, O. B., & Iftadi, I. (2020). Six sigma as a method for controlling and improving the quality of bed series products. *Jurnal Ilmiah Teknik Industri, 19*(2), 131–141. https://doi.org/10.23917/jiti.v19i2.11623
[25] Wichmann, J. R. K., Uppal, A., Sharma, A., & Dekimpe, M. G. (2022). A global perspective on the marketing mix across time and space. *International Journal of Research in Marketing, 39*(2), 502-521. https://doi.org/10.1016/j.ijresmar.2021.09.001
[26] Yang, S., Arndt, T., & Lanza, G. (2016). A flexible simulation support for production planning and control in small and medium enterprises. *Procedia CIRP, 56*, 389–394. https://doi.org/10.1016/j.procir.2016.10.062
[27] Zacharias, M. V. V. (2022). The importance of quality control for the success of a company. *Asian Journal of Logistics Management, 1*(2), 99-106. Retrieved from https://ejournal2.undip.ac.id/index.php/ajlm/article/download/16787/8408

Books

[28] Alan, W., Zeithaml, V. A., Bitner, M. J., and Gremler, D. D. (2016). *Services Marketing: Integrating Customer Focus Across the Firm*. Edition: 3rd European Edition. McGraw Hill.
[29] Widjaja, W., Munim, A., Sutaguna, I. N. T., Aghivirwiati, G. A., Khasanah, E., Dhiana, P., Purbaningsih, Y., Setiadi, B., Sutangsa, & Rosalina, T. (2022). *Manajemen Produksi dan Operasi*. Retrieved from https://books.google.com/books?hl=en&lr=&id=6EwCEAAAQBAJ&oi=fnd&pg=PA2&dq=manajemen&ots=sFp8VnxwTZ&sig=_5cVXXnNZvbI9hGaaPnyfJnUn8o

Thesis

[30] Khadka, K. & Maharjan, S. (2017). *Customer satisfaction and customer loyalty* [Master's Thesis, Centria University of Applied Sciences]. https://core.ac.uk/download/pdf/161421179.pdf