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A Review Paper on Productivity Improvement Using Lean Manufacturing Techniques in Food Industries

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Abstract - Productivity improvement is an important objective for food manufacturing industries due to increasing production demands, quality requirements, and the need for efficient resource utilization. Lean Manufacturing provides a systematic approach to improving operational performance by identifying and eliminating non-value-added activities. This review paper examines the application of Lean Manufacturing techniques in food processing, baking, and packaging operations. The major techniques discussed include 5S, Kaizen, Value Stream Mapping (VSM), Total Productive Maintenance (TPM), Just-in-Time (JIT), and Lean Six Sigma. These methods support the identification of production bottlenecks, reduction of material wastage, improvement of equipment availability, and standardization of work practices. The review indicates that selecting appropriate Lean tools according to process requirements can help improve productivity, product quality, and resource utilization. However, the effectiveness of proposed improvements depends on reliable production data, management support, employee involvement, and consistent monitoring. This paper provides a foundation for identifying improvement opportunities and developing practical strategies for enhancing productivity in food manufacturing industries.

Key Words: Lean Manufacturing, Kaizen, Productivity Improvement, Biscuit Manufacturing, Rejection Reduction

1.INTRODUCTION

The food manufacturing industry plays a significant role in fulfilling the growing demand for processed and packaged food products. Increasing competition, production costs, and quality expectations have encouraged manufacturing organizations to improve productivity and utilize available resources efficiently. However, several operational challenges, such as material wastage, production defects, equipment downtime, unnecessary movement, and packaging losses, can affect manufacturing performance. Therefore, adopting systematic approaches to identify process inefficiencies and reduce operational waste has become essential for improving productivity.

Literature Review

Upadhye, Deshmukh and Garg studied the application of Lean Manufacturing in a biscuit manufacturing plant. Their research examined techniques such as 5S, Kaizen, quick changeover, Total Productive Maintenance (TPM) and employee involvement. The study highlighted the usefulness of these practices in improving equipment availability, reducing material wastage and maintaining product quality. The findings indicate that the combined application of suitable Lean tools can support better production performance in biscuit manufacturing. [1]

Lubis, Pujangkoro and Hidayati investigated waste reduction in biscuit production using the Value Stream Mapping (VSM) method. Their study examined production flow and identified non-value-added activities, including waiting and transportation. The research demonstrated the importance of mapping the existing process to understand delays and identify opportunities for improvement. The findings indicate that Value Stream Mapping can help reduce unnecessary processing time and improve the flow of materials in biscuit production. [2]

Almansur, Sukardi and Machfud examined the improvement of biscuit production performance through Lean Six Sigma. Their research used a structured problem-solving approach to study production performance and identify opportunities for process improvement. The study emphasized the importance of examining process data and investigating the causes of production problems before selecting corrective measures. The findings support the use of systematic analysis for improving process consistency, product quality and manufacturing performance. [3]

Debnath investigated the role of Kaizen in improving customer satisfaction in a manufacturing-related case study. Kaizen

focuses on continuous, incremental improvements through employee participation and systematic evaluation of work practices. The study provides a basis for understanding how regular improvement activities can support better quality and operational consistency. Its findings highlight the importance of maintaining improvement practices rather
than relying only on occasional major changes. [4]

Shah and co-researchers examined Lean production and supply-chain innovation in the baked-food sector. Their research considered the relationship between production practices, organizational participation and operational performance. The study highlighted the importance of management support, employee involvement and continuous training when introducing Lean practices. These factors indicate that successful process improvement depends not only on technical methods but also on the participation and commitment of the people involved in production activities. [5]

Castro and Posada studied the implementation of Lean Manufacturing techniques in the bakery industry in Medellin. Their research considered Lean practices for improving production operations and reducing inefficiencies. The study discussed the relevance of tools such as Value Stream Mapping and Just-in-Time for improving process flow and operational efficiency. The findings suggest that applying suitable Lean methods can help food-manufacturing operations make better use of available resources and improve the performance of production activities. [6]

Nishizawa and co-researchers examined the use of Lean Manufacturing tools to minimize waste in a massconsumption food company. The study considered improvement practices such as Kaizen and Total Productive Maintenance for supporting process optimization. The research emphasizes the importance of identifying operational losses and applying suitable methods to control them. Its approach provides a useful basis for understanding how continuous improvement and equipment-related practices can contribute to waste reduction in food
manufacturing. [7]

Pramono and co-researchers investigated waste in the biscuit industry using the DMAIC methodology. DMAIC consists of five stages: Define, Measure, Analyze, Improve and Control. This approach provides a systematic way to identify a problem, measure the existing condition, investigate possible causes and develop suitable improvement measures. The study demonstrates the relevance of structured data analysis in biscuit production and highlights the importance of controlling identified problems to maintain process performance. [8]

Zamalloa-Menacho and co-researchers proposed a production model based on Lean Manufacturing and continuous improvement for small and medium-sized baking enterprises. Their research focused on improving productivity through organized production practices and the application of appropriate improvement methods. The study highlights the importance of evaluating existing operations before selecting changes to the production system. Its findings support the use of Lean principles to improve process efficiency and strengthen production performance in the baking sector. [9]

Habib and co-researchers studied Lean Manufacturing for improving operational performance in a labeling and packaging plant. Their research examined the use of Lean practices in packaging-related operations, where process consistency and effective use of materials are important. The study highlights the value of identifying operational inefficiencies and developing systematic improvement measures. The findings are relevant to understanding how standardized work and better control of packaging activities can contribute to improved production performance. [10]

Joseph and co-researchers examined productivity improvement through the application of Lean Manufacturing concepts. Their research focused on the relationship between manufacturing practices and operational performance. The study discussed the importance of identifying unnecessary activities and improving the utilization of available production resources. The findings provide a general basis for using Lean principles to examine manufacturing operations and identify practical opportunities for improving productivity and process efficiency. [11]

Singh and co-researchers investigated productivity improvement through Lean Manufacturing in the manufacturing industry of Northern India. Their research considered Lean techniques, including Just-in-Time practices, as methods for improving production performance. The study highlighted the importance of reducing unnecessary inventory and improving the coordination of manufacturing activities. The findings suggest that suitable Lean practices can support better resource utilization, lower avoidable costs and improved productivity in manufacturing operations. [12] Palange and Dhatrak reviewed Lean Manufacturing as a tool for enhancing productivity in manufacturing. Their study discussed the role of Lean techniques in reducing non-valueadded activities, improving workflow and controlling production costs. The research highlighted that productivity improvement requires a systematic examination of work processes and the selection of appropriate improvement methods. The findings provide a general understanding of how Lean Manufacturing can support operational efficiency
across different manufacturing environments. [13]

Nandakumar and co-researchers examined bottleneck identification and process improvement using the Lean Six Sigma DMAIC methodology. Their research focused on locating constraints within a process and applying a structured approach to improve performance. Bottleneck analysis helps

identify operations that restrict the overall flow of production, while DMAIC provides a systematic method for investigating and controlling the identified problems. The study highlights the importance of data-based analysis in improving process flow and reducing production
inefficiencies. [14]

Shihab and co-researchers studied process improvement in a biscuit manufacturing industry using the DMAIC approach. Their research considered production defects and the use of systematic quality-improvement methods. The study emphasized the importance of collecting process data, examining defect-related causes and applying appropriate control measures. The findings indicate that structured process analysis and regular monitoring can help improve production consistency and control manufacturing defects in the biscuit industry. [15]

CONCLUSIONS

The review indicates that Lean Manufacturing techniques such as 5S, Kaizen, Value Stream Mapping, Total Productive Maintenance, and Lean Six Sigma can improve productivity in food manufacturing industries. These techniques help reduce material wastage, production defects, equipment downtime, and processing delays while improving product quality and resource utilization. Successful implementation requires proper data collection, root-cause analysis, employee participation, and continuous monitoring. Overall, Lean Manufacturing provides an effective approach to improving operational efficiency, reducing waste, and achieving sustainable productivity improvement in food industries.

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REFERENCES

1. D. A. Lubis, S. Pujangkoro, and J. Hidayati, “Lean Approach to Minimize Waste in Biscuit Production Process Using Value Stream Mapping Method at PT. XYZ,” Jurnal Sistem Teknik Industri, vol. 26, no. 2, pp. 120–127, 2024.[1]

2.N. Upadhye et al., “Lean Manufacturing in Biscuit Manufacturing Plant: A Case Study,” International Journal of Advanced Operations Management, 2010. Volume, issue, and page range require verification[2].

3.A. M. Almansur, S. Sukardi, and Machfud, “Improving Performance of Biscuit Production Process Through Lean Six-Sigma at PT XYZ,” Indonesian Journal of Business and Entrepreneurship, vol. 3, no. 2, 2017[3].

4.R. M. Debnath, “Enhancing Customer Satisfaction Using Kaizen: A Case Study of Imperial Tobacco Company (ITC),” Journal of Advances in Management Research, 2019. Volume, issue, and page range require verification.[4]

5.S. R. Shah and E. Naghi Ganji, “Lean Production and Supply Chain Innovation in Baked Foods Supplier to Improve Performance,” British Food Journal, vol. 119, no. 11, pp. 2421–2447, 2017.[5]

6.M. R. Q. Castro and J. G. A. Posada, “Implementation of Lean Manufacturing Techniques in the Bakery Industry in Medellin,” Gestão & Produção, vol. 26, no. 2, article e2505, 2019.[6]

7.K. Nishizawa, M. Lagos, and E. Ramos, “Applying Lean Manufacturing Tools to Minimize Waste in a Mass Consumption Food Company,” conference contribution. Publication year, volume/issue, and page range require verification.[7]

8. M. Lagos et al., “Lean Manufacturing Model to Improve the Order Fulfillment in a Company in the Wine Sector in Peru,” Proceedings of the 2nd LACCEI International Multiconference on Entrepreneurship, Innovation and Regional Development, 2022.[8]

9. Y. B. Pramono et al., “Optimizing the Production Process of Biscuit Industry as an Approach to Strengthening the Local Agricultural Sector: Analysis of Waste in Coconut Biscuit Industry with the DMAIC Method,” IOP Conference Series: Earth and Environmental Science, 2024.[9]

10. A. Zamalloa-Menacho et al., “Proposal of Production Model Based on Lean and Continuous Improvement to Improve
Productivity in SMEs of Baking: An Empirical Investigation in Peru,” ACM International Conference Proceeding Series, pp. 66–71, 2022.[10]

11. M. A. Habib, R. Rizvan, and S. Ahmed, “Implementing Lean Manufacturing for Improvement of Operational Performance in a Labeling and Packaging Plant: A Case Study in Bangladesh,” Results in Engineering, vol. 17, article 100818, 2023.[11]

12. R. E. Joseph et al., “Analysis on Productivity Improvement, Using Lean Manufacturing Concept,” Materials Today: Proceedings, vol. 45, part 7, pp. 7176-7182, 2021.[12]

13.J. Singh et al., “Productivity Improvement Using Lean Manufacturing in Manufacturing Industry of Northern India,” International Journal of Productivity and Performance Management, vol. 67, no. 8, pp. 1394–1415, 2018.[13]

14.A. Palange and P. Dhatrak, “Lean Manufacturing: A Vital Tool to Enhance Productivity in Manufacturing,” Materials Today: Proceedings, vol. 46, part 1, pp. 729–736, 2021.[14]

15.G. Garcia-Garcia, Y. Singh, and S. Jagtap, “Optimising Changeover through Lean-Manufacturing Principles: A Case Study in a Food Factory,” Sustainability, vol. 14, no. 14, article 8279, 2022.[15]