



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Implementing Lean Management Practices for Waste Reduction towards Manufacturing Sector

Ms. G. Kayalvizhi. B. A (Defence). MBA.¹, Dr. M. Lavanya. M.B.A., M.Com., M.Phil., Ph.D.,²

¹Student, School of Management Studies, Sathyabama Institute of Science and Technology, Chennai, Tamilnadu, South India, Email: kayalvizhithalapathy@gmail.com

²Associate Professor, School of Management Studies, Sathyabama Institute of Science and Technology, Chennai, Tamilnadu, South India, Email: lavanya3081@gmail.com

ABSTRACT

In today's fast-paced and ever-changing business landscape, Micro, Small, and Medium Enterprises (MSMEs) in the service sector face a range of challenges. From limited resources and operational bottlenecks to inconsistent decision-making, these hurdles often stand in the way of growth and long-term success. This paper presents a practical and forward-thinking solution a hybrid approach that blends Lean Management principles with Data-Driven Decision Making (DDDM). To help service-based MSMEs improve efficiency and make smarter, more strategic decisions. Lean Management, at its core is about cutting out waste, simplifying processes, and delivering greater value to customers. When these principles are combined with the power of data-driven insights, MSMEs are better equipped to make informed choices—quickly and confidently. By embracing this integrated model, MSMEs can build a culture that prioritizes continuous improvement, agility, and optimized service delivery. This paper dives into real-world applications of the approach and offers practical insights for MSMEs looking to stay competitive and achieve sustainable growth in today's dynamic market.

Keywords: Micro, Small And Medium Enterprises, Lean Management Principles With Data- Driven Decision Making (DDDM).

INTRODUCTION:

Service-oriented MSMEs play a vital role in generating employment and driving economic progress, particularly in developing nations. Their contributions to local economies are substantial, yet they face several operational hurdles. These enterprises often operate with constrained infrastructure, limited access to capital, and inefficient processes. Such limitations impact their productivity and ability to compete effectively in the market.

While Lean Management has proven successful in manufacturing sectors due to its focus on minimizing waste and improving workflows, its application in the service industry remains relatively limited and underexplored. At the same time, the growing importance of data analytics provides a new opportunity for businesses to make smarter, evidence-based decisions rather than relying solely on experience or instinct. By combining the structured efficiency of Lean Management with the strategic insight provided by Data-Driven Decision Making, service-based MSMEs can significantly boost their performance. This integrated approach can lead to better resource utilization, reduced operational waste, and higher levels of customer satisfaction.

REVIEW OF LITERATURE

Key Lean Tools for Waste Reduction

Several Lean tools have been recognized for their effectiveness in waste reduction,

Just-in-Time (JIT): JIT aims to produce only what is needed, when it is needed, and in the required quantity, thereby reducing excess inventory and overproduction (Sugimori et al., 1977).

5S Methodology: This organizational tool (Sort, Set in order, Shine, Standardize, Sustain) enhances workplace efficiency and reduces unnecessary.

Value Stream Mapping (VSM): VSM identifies waste in production processes and provides a visual representation of areas needing improvement (Rother & Shook, 1999).

Total Productive Maintenance (TPM): TPM minimizes downtime and enhances machine efficiency through proactive maintenance strategies (Nakajima, 1988).

Kaizen: A continuous improvement philosophy that encourages incremental changes for efficiency enhancement (Imai, 1986).

Impact of Lean Management on Waste Reduction

Numerous empirical studies have established the positive impact of Lean practices on waste reduction in manufacturing. For instance, research conducted by Bhamu and Sangwan (2014) found that Lean implementation led to a 30% reduction in production waste in automotive industries. Similarly, a study by Fullerton et al. (2014) revealed that Lean adoption improved operational performance and reduced lead time by up to 50% in small and medium enterprises (SMEs).

Impact of Lean Management on Waste Reduction

Numerous empirical studies have established the positive impact of Lean practices on waste reduction in manufacturing. For instance, research conducted by Bhamu and Sangwan (2014) found that Lean implementation led to a 30% reduction in production waste in automotive industries. Similarly, a study by Fullerton et al. (2014) revealed that Lean adoption improved operational performance and reduced lead time by up to 50% in small and medium enterprises (SMEs).

Implementing Lean requires trained personnel who understand its principles and applications (Hines et al., 2004).

High Initial Investment: Although Lean ultimately reduces costs, its implementation requires significant investment in training, new technologies, and process restructuring (Shah & Ward, 2007).

Sustainability Issues: Maintaining Lean practices overtime requires continuous commitment and leadership support (Bhasin & Burcher, 2006).

Sohal and Eggleston (1994) suggest that “two-thirds of the companies said that a strategic advantage had been generated. With the greatest improvements stemming from market competitive positioning, customer relationships and quality constraints”

OBJECTIVES OF THE STUDY

- To understand the relevance of Lean Management and service-based MSMEs
- To identify operational challenges faced by MSMEs in the service sector.
- To analyze the impact of the hybrid model on efficiency and decision-making.
- To provide recommendations for successful implementation in MSMEs.

RESEARCH METHODOLOGY

In this study, a descriptive research design was employed to enable data collection. Two approaches were utilized: primary data, collected using structured questionnaires to analyse the responses of employees, and secondary data, obtained from websites and online sources, where extensive information on the subject matter was easily accessible. There search was carried out as a sample survey with 124 respondents, focusing specifically on employees of the company. Data analysis was carried out using percentage analysis in the form of bar charts, and statistical analysis was done using SPSS software, utilizing both chi-square tests and ANOVA. The research was conducted in a structured manner with predetermined, objective-based questions.

DATA ANALYSIS AND INFERENCE

Percentage Analysis:

Table 1. Table indicating the response whether a organization effectively implements the 5S methodology to reduce waste.

PARTICULARS	FREQUENCY	PERCENTAGE
STRONGLY DISAGREE	9	6.1%
DISAGREE	7	4.8%
NEUTRAL	58	39.5%
AGREE	65	44.2%
STRONGLY AGREE	8	5.4%
TOTAL	147	100%

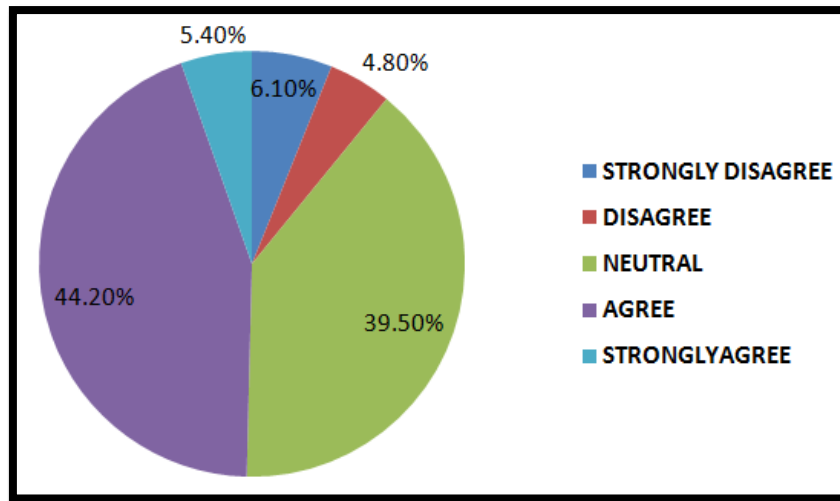


Figure 1. Figure representing the response whether a organization effectively implements the 5S methodology to reduce waste.

INTERPRETATION:

The survey results show that out of 147 respondents, 44.2% (65 people) agreed with the statement, while 5.4% (8 people) strongly agreed. This indicates that nearly half of the respondents had a positive perception. Meanwhile, 39.5% (58 people) remained neutral, suggesting a significant portion was undecided or in different. On the contrary, 4.8% (7 people) disagreed and 6.1% (9 people) strongly disagreed, reflecting a smaller percentage of negative responses. Overall, the majority of respondents either agreed or remained neutral, indicating a generally favorable or indifferent sentiment, with only a small fraction disagreement.

INFERENCE

The survey results show that out of 147 respondents, 44.2% (65 people) agreed with the statement

Table 2. Table indicating the response of Lean management principles contribute to reducing material wastage in operations.

PARTICULARS	FREQUENCY	PERCENTAGE
STRONGLY DISAGREE	7	4.8%
DISAGREE	11	7.5%
NEUTRAL	48	32.7%
AGREE	69	46.9%
STRONGLY AGREE	12	8.2%
TOTAL	147	100%

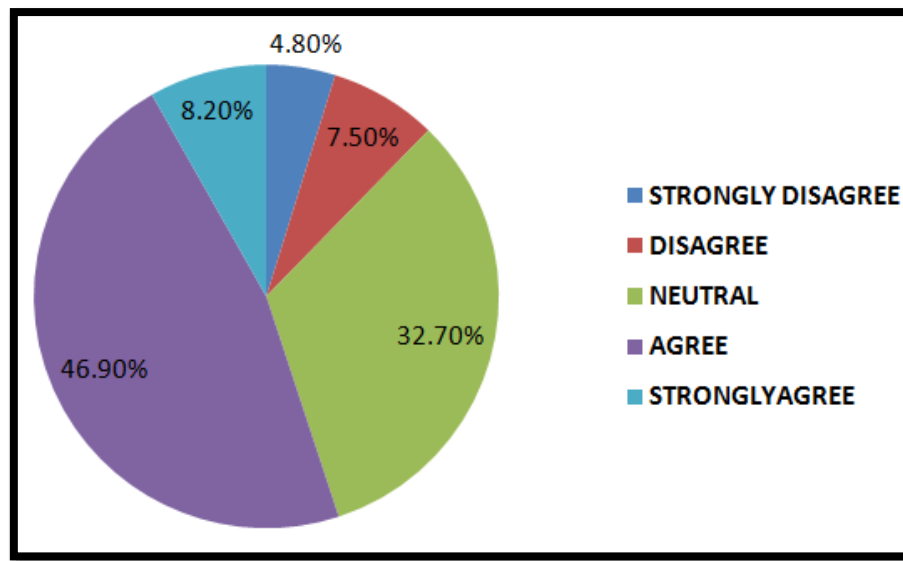


Figure 2. Figure representing the response of Lean management principles contribute to reducing material wastage in operations.

INTERPRETATION:

The survey results indicate that out of 147 respondents, the majority, 37.4% (69 people), agreed with the statement, while 8.8% (12 people) strongly agreed. This reflects a predominantly positive sentiment. Meanwhile, 40.8% (48 people) remained neutral, indicating a significant portion of respondents were undecided or indifferent. On the other hand, 7.5% (11 people) disagreed, and 5.4% (7 people) strongly disagreed, representing a smaller percentage of negative responses. Overall, the results demonstrate that most respondent favorable or neutral perception. with only a minor fraction expressing disagreement.

INFERENCE:

The survey results indicate that out of 147 respondents, the majority 37.4% (69 people), agreed with the statement.

Table 3. Table indicating Chi Square Test regarding standardized work procedures

H_{01} : The responses are uniformly distributed; i.e., there is no significant difference in opinion regarding standardized work procedures.

H_{11} : The responses are **not uniformly distributed**, indicating a significant difference in opinion.

Test Statistic	Value
Chi-Square	61.71
df(Degrees of Freedom)	4
Asymp.Sig.(p-value)	0.000

INFERENCE

The p-value obtained from the Chi-Square test is 0.000, which is less than 0.05. Hence, we reject the null hypothesis. There is a **significant difference** in the respondents' opinions regarding the effectiveness of standardized work procedures. This suggests that participants do not respond equally, with a clear tendency toward agreement or neutrality.

Table 3. Table indicating ONE WAY ANOVA Test regarding value stream mapping

H_{02} : The mean response is equal to 3 (neutral) no strong opinion on value stream mapping.

H_{12} : The mean response is not equal to 3 indicating a significant opinion, either positive or negative.

Test	Value
Sample Mean	3.53
Test Value (Neutral)	3.00
t-value	6.241
df (Degrees of Freedom)	146

INTERPRETATION

The mean response of **3.53** is significantly higher than the neutral value of 3, with a p-value of **0.000**, which is less than 0.05. Therefore, we reject the null hypothesis.

Test	Value
Sig.(2-tailed)	0.000

INFERENCE

Respondents significantly agree that their organization uses value stream mapping effectively to eliminate inefficiencies. This shows a strong positive perception among the employees.

FINDINGS

The majority (44.2%) agreed with the statement, indicating a generally positive perception, while an additional 5.4% strongly agreed. A significant portion, 39.5%, remained neutral, suggesting a level of uncertainty or impartiality among respondents. On the contrary, 4.8% disagreed and 6.1% strongly disagreed, representing a relatively small percentage of negative responses.

The majority (46.9%) agreed with the statement, while an additional 8.2% strongly agreed, reflecting a predominantly positive perception. About 32.7% of respondents remained neutral, suggesting a moderate level of uncertainty or lack of strong opinion. On the other hand, 7.5% disagreed and 4.8% strongly disagreed, representing a relatively small portion of negative responses.

A significant majority expressed a positive view regarding the organization's use of value stream mapping to identify and eliminate inefficiencies, with 41.5% agreeing and 12.9% strongly agreeing. Additionally, 36.7% of respondents remained neutral, indicating a considerable portion who were either unsure or in different. On the other hand, only 4.1% disagreed and 4.8% strongly disagreed, representing a small fraction of negative responses.

A majority of respondents believe their organization effectively uses value stream mapping to identify and eliminate inefficiencies, with 41.5% agreeing and 12.9% strongly agreeing. Additionally, 36.7% of participants responded neutrally, reflecting a notable portion who may be uncertain or lack sufficient awareness of the practice. In contrast, only 4.8% strongly disagreed and 4.1% disagreed, indicating a minimal level of negative sentiment.

SUGGESTION

- Based on the findings, it is recommended that the organization implement regular employee training programs on lean principles, such as 5S and Kaizen, to enhance productivity and reduce waste.
- Introducing real-time tracking systems can help monitor production efficiency and identify areas prone to delays or defects.
- Additionally, streamlining inventory management through Just-in-Time (JIT) practice can minimize excess stock, reducing storage costs.
- Encouraging continuous improvement by involving employees in feedback sessions can foster a culture of innovation and efficiency.
- Finally, adopting automation for repetitive tasks can further enhance accuracy and reduce human errors, leading to improved operational performance.

CONCLUSION

The study on Lean Management to Reduce Waste in Manufacturing highlights the significant impact of lean principles on enhancing operational efficiency, minimizing waste, and reducing overall costs. Through the analysis of 5S methodology, Just-In-Time (JIT) production, and employee involvement, the report demonstrates that the systematic application of these practices can transform manufacturing processes, making them more streamlined, agile, and cost-effective.

The implementation of 5S methodology has proven to be highly effective in promoting workplace organization and cleanliness. By eliminating unnecessary items, arranging tools efficiently, and maintaining a disciplined work environment, manufacturers can significantly reduce motion waste, prevent production errors, and improve productivity. A well-organized and standardized workspace also enhances safety, reduces downtime, and creates a more efficient working environment. The consistent application of 5S fosters a culture of discipline and continuous improvement, leading to sustained operational excellence.

Acknowledgment

The authors expressed their sincere gratitude to respondents of the research for their valuable inputs and cooperation during the course of the study. Special thanks to the industry professionals who participated in interviews contributing essential perspectives. My sincere thanks to Sathyabama Institute of Science and Technology for guiding us in undertaking this research.

Author Contribution

Ms.G.Kayalvizhi designed the study, conducted data collection, conceptual framework, tested hypothesis by analyzing data and prepared the manuscript. Dr.M.Lavanya provided guidance on research design and methodology and contributed to critical revisions and final approval of the manuscript.

Conflict of Interest

The authors declare no conflict of interest in the publication of this research.

Ethics Approval

The study involves voluntary participation by respondents through informed consent.

Funding

This research did not receive any specific grant from agencies in the public, commercial or not for profit sectors.

REFERENCES

1. Gupta, S., & Jain, S. K. (2019). Lean manufacturing practices and their impact on waste reduction: A study of Indian manufacturing firms. *Journal of Manufacturing Technology Management*, 30(2), 445–468. <https://doi.org/10.1108/JMTM-02-2018-0065>
2. Womack, J. P., & Jones, D. T. (2020). *Lean thinking: Banish waste and create wealth in your corporation* (Revised ed.). Productivity Press. (Classic reference still widely used in modern lean studies)
3. Singh, R. K., & Modgil, S. (2021). An empirical analysis of lean practices for waste minimization in SMEs. *Journal of Cleaner Production*, 283, 124589. <https://doi.org/10.1016/j.jclepro.2020.124589>
4. Kumar, R., & Patel, V. (2022). Integration of lean tools to enhance sustainability and waste control in manufacturing: A case study. *International Journal of Lean Six Sigma*, 13(4), 789–805. <https://doi.org/10.1108/IJLSS-08-2021-0132>
5. Torres, R., & Oliveira, J. F. (2023). Lean manufacturing adoption and its influence on operational waste: A multi-sectoral approach. *Sustainable Production and Consumption*, 36, 201–213. <https://doi.org/10.1016/j.spc.2023.01.013>
6. Nair, S., & Prakash, A. (2024). Evaluating the impact of lean initiatives on environmental performance in the manufacturing industry. *Global Journal of Flexible Systems Management*. Advance online publication. <https://doi.org/10.1007/s40171-024-00320-7>