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A Study On Effectiveness Of 5S Implementation Process And Its Outcome On Productivity

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Abstract
In today's competitive manufacturing environment, organizations are increasingly focusing on improving efficiency through better workplace organization and systematic practices. The 5S methodology has emerged as a key lean management tool that promotes cleanliness, order, discipline, and waste reduction, thereby supporting higher levels of productivity and operational performance.The present study evaluates how the implementation of 5S practices influences productivity within a manufacturing organization. Data were collected from employees across various departments using a structured questionnaire, and the responses were analysed with statistical techniques such as percentage analysis, correlation, and ANOVA.
The results reveal that effective adoption of 5S practices leads to improved workplace organization, reduced time loss, and enhanced employee performance. At the same time, the findings emphasize the need for continuous training, regular monitoring, and active employee participation to maintain long-term benefits. Based on the results, the study offers practical suggestions to strengthen 5S implementation and support ongoing productivity improvement initiatives.
Keywords: 5S, Lean Manufacturing, Workplace Organization, Productivity, Continuous Improvement.

I. Introduction

The manufacturing industry has been evolving rapidly due to rising global competition, technological progress, and the continuous demand for higher efficiency. To remain competitive, organizations are increasingly turning toward lean manufacturing practices that help streamline operations, reduce waste, and maintain workplace discipline. Among the various lean tools, the 5S methodology has gained wide acceptance as an effective approach for creating a well-organized, safe, and productive work environment. In the Indian manufacturing landscape, the adoption of 5S has become an important step toward improving production performance, employee participation, and overall operational efficiency.
Although the benefits of 5S are widely recognized, its successful implementation brings both advantages and challenges. Several factors contribute positively to its effectiveness, including employee awareness, management commitment, workplace discipline, and continuous monitoring of practices. At the same time, organizations often encounter difficulties such as resistance to change, insufficient training, inconsistency in maintaining standards, and limited employee engagement in improvement initiatives. Understanding both the supporting factors and the obstacles is essential for evaluating how 5S practices truly impact workplace productivity.
This research aims to examine the effectiveness of the 5S implementation process and its influence on productivity within a manufacturing setting. The study also investigates whether demographic factors such as age, work experience, and job role play a role in shaping employees' perception and adoption of 5S practices. A descriptive research design was followed, using structured questionnaires and statistical tools such as correlation analysis and ANOVA, chi-square to interpret employee responses.
Objectives of the Study:
• To assess the level of employee awareness and understanding of 5S practices.
• To evaluate how effectively 5S has been implemented in workplace organization.
• To examine the relationship between 5S practices and productivity improvement.
• To identify the challenges encountered during the implementation of 5S.
• To suggest measures for strengthening and sustaining 5S practices.

Research Questions
1. How effective is the implementation of the 5S methodology in improving workplace organization and productivity among employees?
2. What is the level of employee familiarity with workplace management and organization practices?
3. How aware are employees about the 5S methodology and its purpose in the organization?
4. Through which sources do employees primarily learn about workplace organization practices such as 5S?
5. How do employees perceive the importance of workplace organization in improving productivity and efficiency?

Hypothesis
H1: The implementation of the 5S methodology has a significant positive impact on workplace organization and employee productivity.
H2: Employees with higher familiarity in workplace management practices show greater awareness of the 5S methodology.
H3: Employee awareness of the 5S methodology significantly influences the effectiveness of its implementation in the organization.
H4: The source of learning about workplace organization practices significantly affects employees' understanding and adoption of 5S.
H5: Employees who perceive workplace organization as important demonstrate higher support for 5S practices and productivity improvement.

Significance Of The Study
This study explains how the 5S methodology supports workplace organization and productivity in manufacturing. It focuses on the role of employee awareness, training, and participation in maintaining consistent 5S practices. The research highlights how proper implementation helps reduce waste, improve safety, and streamline workflow. The findings will help management strengthen training programs and workplace organization strategies. Understanding employee perceptions also supports the development of long-term improvement initiatives. Overall, the study contributes to better operational efficiency and sustainable productivity growth.
Theoretical Framework
The Technology Acceptance Model (TAM), created by Davis (1989), acts as the main basis for the present research. This research is based on Lean Manufacturing and the Kaizen philosophy of continuous improvement. The 5S methodology helps eliminate non-value-added activities such as unnecessary movement and poor workplace organization. Employee awareness and discipline are key factors for sustaining improvements. The framework shows that consistent 5S implementation improves efficiency and productivity, while lack of awareness can reduce its effectiveness.

Ii. Review of Literature

1. **Singla (2023)**Singla's case study in an automotive plant showed that proper 5S implementation improved productivity, reduced search time, enhanced workflow, and strengthened workplace safety through better organization and visual management.
2. **Patel (2023)**Patel found that 5S practices support preventive maintenance by improving tool storage and visual control, which reduces machine downtime and enhances equipment reliability and production efficiency.
3. **Raut (2023)**Raut highlighted that 5S improves teamwork and communication by promoting clear labeling and standardized procedures, resulting in better collaboration, higher job satisfaction, and faster problem solving.
4. **Mishra (2023)**Mishra reported that 5S helps improve process flow and product quality by reducing errors, minimizing rework, and enabling early detection of defects through better workplace organization.
5. **Sharma.(2023)**Sharma concluded that long-term 5S implementation strengthens workplace discipline, improves safety, reduces operational costs, and supports a culture of continuous improvement in manufacturing organizations.

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III. Research Gap

Even though earlier studies have highlighted the advantages of 5S in manufacturing, some important gaps still remain. Research by Singla (2023) and Sharma (2023) mainly concentrates on productivity, safety, and long-term organizational benefits, but gives limited attention to how employee awareness and participation influence the sustainability of 5S practices. In the same way, Patel (2023) and Mishra (2023) focus more on equipment performance, process flow, and quality improvement, without deeply examining the role of employee understanding and behaviour in the success of 5S implementation.

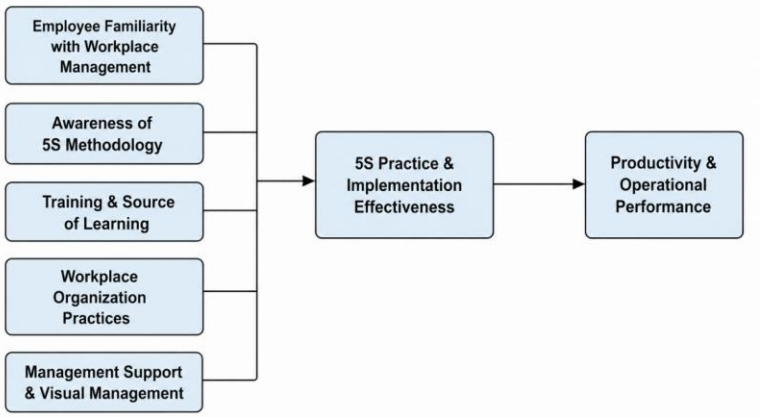
Raut (2023) explains the benefits of teamwork and communication, yet there is very little empirical evidence linking employee perception, training, and workplace behaviour with measurable production outcomes. Most existing studies are general in nature and not specific to individual automotive component manufacturing units. There is also a shortage of case-based research that focuses on a single plant or division.

Therefore, the present study aims to address these gaps by analysing the effectiveness of 5S from an employee perspective and by examining its direct influence on workplace organization and production efficiency within a specific manufacturing unit.

Research Design:

The present study adopts a **descriptive research design**. Descriptive research is used to describe the characteristics, opinions, and perceptions of respondents regarding a particular concept or practice. In this study, descriptive research design is suitable because it helps in understanding the awareness, perception, and understanding of individuals regarding the 5S methodology and its role in improving workplace organization and productivity.

Research Model



Sampling

• **Population:** The study focused on employees working in the Brake Division of the manufacturing unit.
• **Sample Size:** A total of 150 employees participated in the survey.
• **Sampling Technique:** Convenience sampling was adopted to select respondents who were readily available and willing to participate.

Data Collection

• **Format:** Primary data was gathered through a structured questionnaire based on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).
• **Mode:** The questionnaires were distributed personally to employees across shop-floor and administrative departments to obtain direct responses.

Data Analysis Tools

• **Software Used:** SPSS Statistics 22

Statistical Techniques Applied:

• Descriptive statistics (percentage analysis) to summarize responses
• Correlation analysis to identify relationships between variables
• Regression analysis to measure the impact of variables
• ANOVA to test differences among groups

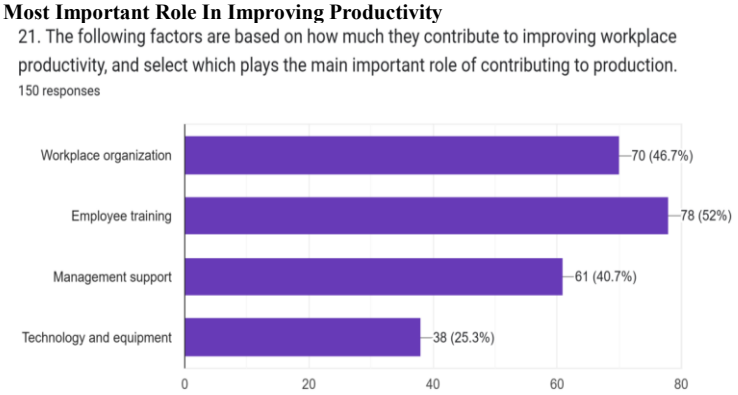
Ethical Considerations

• Participants were informed about the purpose of the study before collecting responses.
• The identity of respondents was kept anonymous and their information was handled confidentially.
• Participation was voluntary, and respondents could choose not to answer any question.
• The data collected was used strictly for academic research purposes only.

Results:**Table Key Factor that Plays the Most Important Role in Improving Productivity.**

Important Role in Production	No. of. Respondents	Percentage
Workplace organization	70	46.7%
Employee training	78	52%
Management support	61	40.7%
Techonology & equipment	38	25.3%

Chart Key Factor That Plays The Most Important Role In Improving Productivity



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Interpretation: Employee training (52%) was identified as the most important factor contributing to productivity improvement. Workplace organization (46.7%) and management support (40.7%) were also considered highly influential. Technology and equipment received comparatively fewer responses. This suggests that human-focused initiatives such as training and management involvement are seen as more critical. The results emphasize the importance of skill development and leadership support.

Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
1	.171[a]	.029	.023	.52822	.029	4.454	1

Model Summary

Model	Change Statistics	
	df2	Sig. F Change
1	148	.036

a. Predictors: (Constant), iv_mean

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.243	1	1.243	4.454	.036[b]
	Residual	41.295	148	.279		
	Total	42.538	149			

a. Dependent Variable: dv_mean
b. Predictors: (Constant), iv_mean

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.602	.149		17.412	.000
	iv_mean	.146	.069	.171	2.110	.036

a. Dependent Variable: dv_mean

The overall regression model is statistically significant (p = 0.036), therefore the null hypothesis is rejected at the model level. However, the model shows only a weak level of influence as the explanatory power is low.

Hence, the proposed null hypothesis (H_0) can be rejected, and it can be concluded that the independent variable has a statistically significant but weak influence on the dependent variable.

Correlation

Familiar with workplace management practices.	Pearson Correlation	1	.432**	.224**
	Sig. (2-tailed)		.000	.006
	N	150	150	150
How aware are you of the 5S methodology that is commonly used in manufacturing industries?	Pearson Correlation	.432**	1	.194*
	Sig. (2-tailed)	.000		.017
	N	150	150	150

The results show a **moderate positive relationship (r = 0.432)** between employees' familiarity with workplace management practices and their awareness of the 5S methodology. Since the significance value is **0.000**, which is below the 0.05 threshold, the null hypothesis of no relationship is rejected. This means that employees who have greater exposure to workplace management practices tend to have higher awareness of 5S concepts.

In addition, the relationship between familiarity with workplace management practices and the perceived importance of workplace organization is **weak but positive (r = 0.224)**. The significance value of **0.006** is less than 0.05, indicating that this relationship is statistically significant. This suggests that employees who are more familiar with workplace management practices are more likely to recognize the importance of maintaining an organized workplace.

ANNOVA

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
1. Gender	Between Groups	2.283	4	.571	2.665	.035
	Within Groups	31.051	145	.214		
	Total	33.333	149			
2. Age Group	Between Groups	3.563	4	.891	2.184	.074
	Within Groups	59.130	145	.408		
	Total	62.693	149			
3. Educational Qualification	Between Groups	1.167	4	.292	.562	.690
	Within Groups	75.207	145	.519		
	Total	76.373	149			
4. Current Occupation	Between Groups	3.493	4	.873	1.407	.235
	Within Groups	89.980	145	.621		
	Total	93.473	149			

The ANOVA results reveal that most of the demographic variables, including age group, educational qualification, and current occupation, do not have a statistically significant effect on the dependent variable, as their p-values are higher than 0.05. In particular, age group (Sig = 0.074), educational qualification (Sig = 0.690), and current occupation (Sig = 0.235) show no meaningful differences across the groups. The comparatively low F-values also suggest that the variation between these groups is minimal.

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In contrast, gender shows a statistically significant effect since its significance value is below 0.05 (Sig = 0.035). This indicates that there is a noticeable difference between gender groups with respect to the dependent variable.
Overall, the findings suggest that gender plays a significant role, whereas age, educational qualification, and current occupation do not significantly influence the dependent variable.

Suggestion:
1. Continuous Training and Awareness Programs: Employees should be provided with regular training sessions on 5S principles to enhance their understanding and involvement. Awareness programs will help in sustaining the practices effectively.
2. Employee Involvement and Motivation: Employees should be encouraged to participate in improvement activities through suggestion schemes, rewards, and recognition programs. This increases ownership and responsibility towards workplace organization.
3. Focus on Sustain (5th S): Organizations should give more importance to the "Sustain" phase, as maintaining discipline over time is the most challenging aspect of 5S implementation.
4. Implementation of Visual Management Tools: Use of labels, color coding, floor markings, and display boards should be enhanced to improve workplace visibility and reduce confusion.
5. Standardization of Work Procedures: Standard operating procedures (SOPs) should be clearly defined and displayed to ensure uniformity in processes and sustain 5S practices.

Limitations Of The Study
- The study relies primarily on questionnaire-based responses, which reflect individual perceptions and may vary based on personal understanding and experience.
- Although the sample size is adequate for analysis, it represents only a segment of the total workforce and may not capture every viewpoint.
- External factors such as machine efficiency, production demand, and organizational policies were not examined in detail, even though they may affect overall performance.

Future Scope
Future research can extend this study by collecting data from larger samples across multiple manufacturing units and regions to improve reliability. Comparative studies between different industries can provide broader insights into the effectiveness of 5S practices. Researchers can also examine the integration of 5S with other lean tools such as Kaizen, TPM, and Industry 4.0 technologies. Long-term studies may help understand how sustainable 5S practices influence organizational culture and employee behaviour. Future work can focus on measuring financial benefits like cost reduction and waste minimization. The role of leadership support and employee training in successful 5S implementation can also be explored. Additionally, digital monitoring systems and automation can be studied to understand their impact on sustaining continuous improvement and productivity growth.

IV. Conclusion

This research explored how 5S practices influence workplace organization and productivity in manufacturing settings. The findings show that applying 5S effectively helps maintain cleanliness, minimize unnecessary movement, improve safety, and use resources more efficiently. A structured and organized workplace also supports higher employee motivation and better overall performance.
The study emphasizes that awareness, regular practice, and continuous monitoring are key to sustaining these improvements. While demographic factors show limited influence, strong organizational support and training play a major role in successful implementation. Overall, 5S can be considered a practical foundation for lean manufacturing and continuous improvement. Organizations that consistently adopt these practices are more likely to achieve long-term efficiency, reduced waste, and a positive workplace culture.

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