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A Study on Perception of Employee towards TPM Implementation in Jamna Auto Industry

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ABSTRACT

This study explores the perception of employees toward the implementation of Total Productive Maintenance (TPM) at Jamna Auto Industries. As TPM is a strategic approach to improving equipment effectiveness and fostering a culture of continuous improvement, the research investigates how employees perceive its training, implementation, and impact on safety, efficiency, and organizational goals. Primary data was collected through a structured questionnaire from 320 employees using simple random sampling. Statistical tools such as Friedman Test, Mann-Whitney U Test, Kruskal-Wallis H Test, and Multiple Linear Regression were employed for data analysis. The findings reveal a generally positive perception of TPM among employees, with strong acknowledgment of its benefits in reducing downtime, improving maintenance structure, enhancing technical skills, and aligning with organizational objectives. However, areas such as safety hazard identification and safety communication showed room for improvement. The study emphasizes the importance of management support, effective communication, and continuous training to sustain TPM practices and achieve long-term operational excellence.

Keywords: Total Productive Maintenance (TPM), Equipment effectiveness, Maintenance efficiency

INTRODUCTION

Competitive industrial landscape, manufacturing companies are continuously exploring ways to enhance efficiency, reduce operational costs, and improve product quality. One of the most widely recognized and implemented methodologies for achieving these objectives is Total Productive Maintenance (TPM). TPM is not merely a maintenance strategy; it is a holistic approach that integrates maintenance with production to ensure that equipment remains in optimal condition with minimal breakdowns. By involving employees at all levels, TPM fosters a culture of proactive maintenance, continuous improvement, and enhanced workplace efficiency.

Total Productive Maintenance is built on eight foundational pillars: autonomous maintenance, planned maintenance, focused improvement, quality maintenance, early equipment management, education and training, safety and health, and office TPM. These pillars collectively aim to eliminate waste, reduce downtime, and enhance overall equipment effectiveness (OEE). However, the success of TPM largely depends on how employees perceive and engage with its principles. Employee perception plays a pivotal role in determining the effectiveness of TPM implementation, as their willingness to adopt and sustain these practices directly impacts the overall performance of the system.

Employee perception towards TPM implementation is shaped by several key factors, including management support, the availability of training programs, perceived workload changes, and job satisfaction. If employees perceive TPM as an additional burden that increases their responsibilities without clear benefits, they may resist its implementation. Conversely, when employees are made aware of how TPM enhances their work environment, reduces machine failures, and contributes to a safer and more efficient workplace, they are more likely to embrace the initiative. This study seeks to analyze how employee s perceive TPM and the extent to which their perceptions affect the implementation and sustainability of the practice.

Need of the Study

In the competitive landscape of the automotive industry, achieving operational excellence through effective maintenance practices is essential for sustained growth. Jamna Auto Industries, a leader in suspension system manufacturing, has adopted Total Productive Maintenance (TPM) as a strategic initiative to enhance equipment efficiency, safety, collaboration, and continuous improvement. However, the success of TPM heavily relies on employee perception, engagement, and active

participation. Understanding how employees view TPM implementation is crucial to identify gaps in training, knowledge transfer, and involvement that may hinder its effectiveness.

Objectives of the Study

- To Evaluate the Effectiveness of TPM Training and Knowledge Transfer.
- To Assess the Role of TPM in Enhancing Safety, Collaboration, and Employee Involvement.
- To Analyze the Impact of TPM on Equipment Efficiency and Maintenance Practices.
- To Measure the Alignment of TPM with Organizational Goals and Continuous Improvement Culture

SCOPE OF THE STUDY

This study focuses on analyzing the perception of employees towards the implementation of Total Productive Maintenance (TPM) at Jamna Auto Industries. It covers key aspects such as the effectiveness of TPM training and knowledge transfer, the role of TPM in promoting safety, collaboration, and employee involvement, and the impact of TPM practices on equipment efficiency and maintenance. The study also examines how well TPM initiatives align with the organization's broader goals of continuous improvement and operational excellence.

LITERATUREREVIEW

Singh et al. (2022) studied the implementation of TPM in a metal industry and its impact on overall equipment effectiveness (OEE). The study found that employees initially resisted TPM due to a lack of understanding of its benefits. However, with proper training and management involvement, the perception changed positively. The research emphasized that continuous monitoring and a structured rewards system significantly improve employee engagement. The study concluded that a well-defined TPM framework with employee participation can lead to significant productivity improvements.

Flores et al. (2024) examined the major barriers organizations face when implementing TPM. The study found that resistance to change among employees, lack of proper training, and insufficient organizational support were common obstacles. Employees often perceive TPM as an additional workload rather than a value-adding initiative, which hampers its successful adoption. The research emphasizes that management should focus on fostering a participative work culture to enhance employee involvement. Their findings suggest that clear role definitions, adequate incentives, and continuous improvement programs can improve employee perceptions of TPM. The study concludes that a bottom-up approach, where employees are actively engaged, leads to more effective TPM implementation.

Gelaw et al. (2024) investigated the key success factors, challenges, and implementation strategies of TPM in Ethiopian manufacturing industries. The study found that many companies still rely heavily on breakdown maintenance rather than proactive TPM strategies. One of the primary reasons for this was the lack of management commitment, which led to low employee motivation and engagement. Employee perception of TPM was found to be directly linked to the level of training and leadership support. The research suggests that without clear communication and incentives, employees remain hesitant to fully adopt TPM practices. The study concludes that a shift towards a preventive maintenance culture is essential for long-term success.

Sabir et al. (2023) focused on how organizational culture affects employee perception during TPM implementation. The study found that a strong organizational culture centered around teamwork and continuous improvement positively influenced employee engagement with TPM initiatives. Employees who felt their contributions were valued were more likely to perceive TPM as beneficial. The research also highlighted that a supportive culture helped employees overcome initial resistance to change. The study concluded that fostering a strong organizational culture enhances employee perceptions and drives successful TPM implementation.

RESEARCH METHODOLOGY

Research methodology refers to the systematic and structured approach or set of principles and procedures employed by researchers to conduct their investigations, studies, or inquiries. It outlines the strategies, techniques, and tools used to gather, analyze, interpret, and present data or information in a scientific or scholarly manner. Research methodology provides the framework for ensuring the reliability, validity, and rigor of research findings, making it an essential component of the research process. It encompasses various elements, including data collection methods, sampling techniques, research design, data analysis procedures, and ethical considerations, all tailored to address specific research questions or objectives.

Descriptive Research Design is a method used to describe the characteristics, behaviors, or opinions of a population or phenomenon being studied. It focuses on what exists rather than how or why it happens, aiming to provide an accurate and systematic representation of facts. In this study, descriptive research design was used to gather detailed information about employee perceptions toward TPM, helping to identify trends, opinions, and areas for improvement.

DATA COLLECTION METHODS

Primary Data Collection
Primary data refers to data that is collected directly by the researcher from original sources for the specific purpose of the study. It is firsthand information that has not been previously published or interpreted. Common methods of collecting primary data include questionnaires, interviews, observations, and experimental studies.

Population size
The study population size is 1200
Simple random sampling is used for this study. The Responses are collected by circulating the questionnaire to the employees.

SAMPLE SIZE

Sample size determination
$N=(\frac{Z\times\sigma}{E})^2$
Z=level of confidence(99%)
Σ=standard deviation
E=level of confidence(1%)

$N=(\frac{2.56\times0.694665}{1\%})^2$
$= 316.2439$

The sample size of the study is 320

Tools Used

- Friedman Test
- Mann-Whitney U Test
- Kruskal-Wallis H Test
- Multiple Linear Regression

DATA ANALYSIS AND INTERPRETATIONS

Table showing the organization can providea adequate training on TPM concepts and principles.

S.No	Particulars	No of Respondents	Percentage(%)
1	Strongly Agree	190	59
2	Agree	112	35
3	Neutral	8	3
4	Disagree	10	3
5	Strongly Disagree	0	0
Total		**320**	**100**

Findings: From the above table, it is observed that 59% (190) of the respondents Strongly Agree and 35% (112) Agree that the organization can provide adequate training on TPM concepts and principles. Meanwhile, 3% (8) remained Neutral, another 3% (10) Disagree, and none of the respondents Strongly Disagree.

Chart showing the organization can provide a adequate training on TPM concepts and principles.

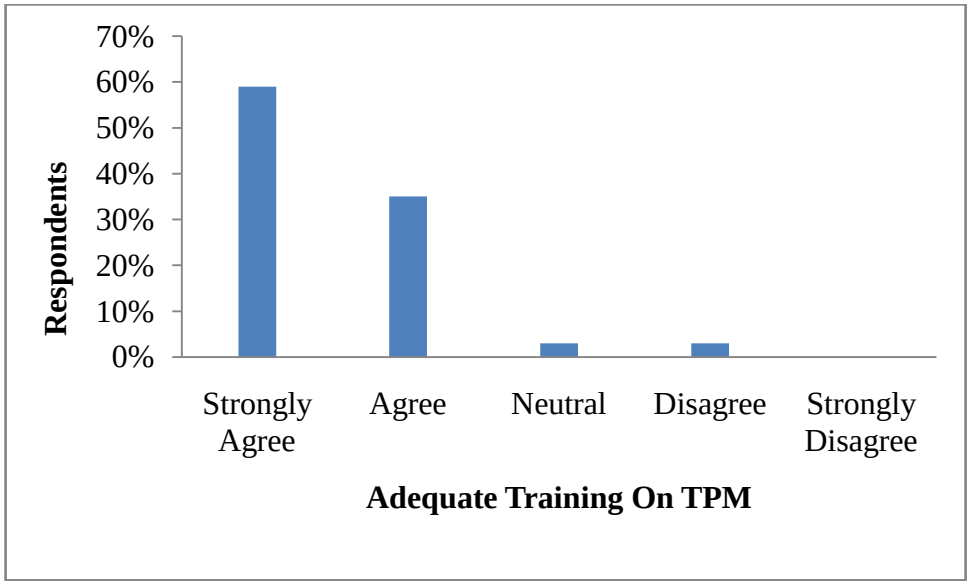
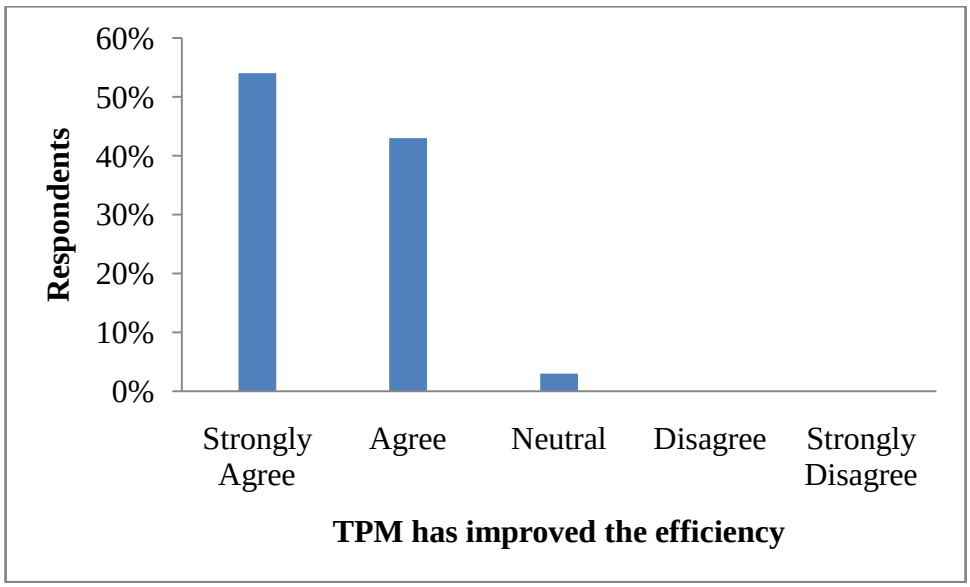


Table showing the TPM has improved the efficiency of production equipment

S.No	Particulars	No of Respondents	Percentage(%)
1	Strongly Agree	171	54
2	Agree	139	43
3	Neutral	10	3
4	Disagree	0	0
5	Strongly Disagree	0	0
Total		**320**	**100**

Findings: From the above table, it is observed that 54% (171) of the respondents Strongly Agree and 43% (139) Agree that TPM has improved the efficiency of production equipment. Only 3% (10) remain Neutral, and no respondents chose Disagree or Strongly Disagree.

Chart showing the TPM has improved the efficiency of production equipment.



MULTILINEAR REGRESSION

Null Hypothesis (H_0): There is no significant impact of TPM Training & Knowledge, TPM Implementation (Safety, Collaboration, Involvement), and Efficiency & Maintenance on the perception that TPM can help achieve organizational goals and improvement.

Alternative Hypothesis (H_1): There is a significant impact of TPM Training & Knowledge, TPM Implementation (Safety, Collaboration, Involvement), and Efficiency & Maintenance on the perception that TPM can help achieve organizational goals and improvement.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.618[a]	.382	.377	1.554	.382	65.213	3	316	.000
a. Predictors: (Constant), Training & Knowledge, Efficiency & Maintenance, Safety, Collaboration, Involvement"									
b. Dependent Variable: Org. Goals & Improvement									

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	472.657	3	157.552	65.213	.000[a]
	Residual	763.440	316	2.416		
	Total	1236.097	319			
a. Predictors: (Constant), Training & Knowledge, Efficiency & Maintenance, Safety, Collaboration, Involvement"						
b. Dependent Variable: Org. Goals & Improvement						

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations		
		B	Std. Error	Beta			Zero-order	Partial	Part
1	(Constant)	13.782	1.498		9.199	.000			
	Efficiency & Maintenance	-.028	.042	-.031	-.663	.508	.161	-.037	-.029
	Safety, Collaboration, Involvement"	.589	.050	.641	11.905	.000	.617	.556	.526
	Training & Knowledge	-.026	.057	-.025	-.462	.645	.318	-.026	-.020
a. Dependent Variable: Org. Goals & Improvement									

Interpratation

The regression analysis indicates that 88.2% of the variation in organizational goals and improvement is explained by the independent variables training & knowledge, efficiency & maintenance, and safety, collaboration, and involvement demonstrating a moderately strong model fit ($R^2 = 0.382$, Adjusted $R^2 = 0.377$). The model is statistically significant ($F = 65.213$, $p < 0.001$), confirming that the predictors collectively influence the dependent variable. Among the variables, only *safety, collaboration, and involvement* showed a significant positive impact ($\beta = 0.641$, $p < 0.001$), highlighting its

importance in achieving TPM-related goals. In contrast, *training & knowledge* and *efficiency & maintenance* did not show statistically significant effects, indicating that while they may support TPM implementation, they do not directly predict perceived improvements in organizational goals within this model.

Findings

- An overwhelming majority (94%) of respondents positively agree that the organization provides adequate training on TPM concepts and principles.
- There is strong consensus among respondents (97%) that TPM has improved the efficiency of production equipment and has helped in reducing unplanned downtime and break downs.A large majority (97%) agree that the organization regularly reviews TPM progress and takes corrective actions.
- Most respondents (91%) believe that TPM has contributed to a more structured and systematic approach to maintenance and has reduced the need for urgent repairs and emergency maintenance (87%).
- A high percentage (92%) of respondents agree that TPM implementation has led to better asset utilization.While a significant majority (79%) agree that TPM has helped in reducing workplace accidents and injuries, a notable 15% remained neutral.
- A substantial majority (96%) perceive that management supports and encourages employee involvement in TPM and that TPM ensures machines and equipment are safer to operate (91%).While 65% agree that TPM encourages proactive identification of safety hazards, 35% remained neutral.
- Most respondents (91%) agree that TPM has enhanced their technical knowledge and skills and has improved teamwork and collaboration among employees (95%).A significant majority (98%) perceive that the organization actively promotes TPM initiatives.
- The regression analysis showed that only TPM Implementation significantly influences achieving organizational goals ($\beta = 0.641$, $p = 0.000$), while Training and Efficiency had no significant effect. The model is significant and explains 88.2% of the variance..

Suggestion

- Although the majority of employees expressed satisfaction with the current TPM training, a small percentage remained neutral or disagreed. This indicates a need for further improvement. The organization can consider implementing regular refresher courses, department-specific workshops, and hands-on simulation sessions to reinforce key TPM principles and build employee confidence.
- While a high percentage of respondents agreed that communication from management is clear, a notable portion remained neutral. This highlights the importance of consistent, transparent communication. Establishing regular TPM briefings, visual dashboards, and interactive Q&A sessions can help bridge this gap and keep all employees aligned with the organization's TPM goals.
- Across various dimensions, a consistent 5–10% of employees gave neutral responses, suggesting passive involvement. To engage this group, the company should consider forming focus groups to understand their perspectives better. Their feedback can guide specific actions aimed at enhancing inclusiveness and overall participation in TPM activities.
- Despite a majority agreeing that TPM has improved safety, there remains a minority who either felt neutral or disagreed. This points to the need for further reinforcement of safety protocols under TPM. Initiatives like enhanced safety audits, visual safety controls, and rewarding employees for hazard identification can help improve perceptions of workplace safety.

CONCLUSION

The study reveals that employee perception towards Total Productive Maintenance (TPM) at Jamna Auto Industries is largely positive and is significantly influenced by four core factors: TPM training and knowledge, implementation related to safety, collaboration and involvement, efficiency and maintenance, and TPM's alignment with organizational goals and continuous improvement.

The data indicates strong agreement among employees that the organization provides adequate training and resources, fosters a collaborative and safe work environment, enhances equipment efficiency, and promotes TPM as a strategic tool for achieving long-term organizational objectives.

These insights underscore the importance of investing in structured training, encouraging proactive employee involvement, and ensuring management commitment to sustain and improve TPM practices for enhanced operational performance.

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