
Effectiveness on TPM Implementation in Automobile Industry: A Case Study of Volvo Group India Private Limited, Bangalore

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Abstract

Total Productive Maintenance (TPM) is the World Class technology used in the automobile industries. This paper mainly contributed to the improving the organization performance in different areas using TPM implantation in Automobile industries. The main aim of this study is examine the employee's roles played during TPM implementation and to assess demographic profile of the employees of Volvo Group India Private Ltd and TPM implementation effect on organization performance in improvement dimensions and different areas in the organization and also analyses overall performance of the organization improved by implementation of TPM in selected industries. Finally researcher come out with results increasing in reliability of machine, increases in the productivity and improving in the quality, to reduce the breakdown of machines, easy in routine maintenance work is reduced in the work station, better utilized work area and reduces the repetitive work in plant layout, reduction of customer complaints due to logistics, improves safety of workers in work station, it helps increases the suppliers quality and customer satisfaction these are major performances has been improved with help of TPM implementation in the Volvo Group India Private Ltd

Key Words: *TPM, Efficiency of Machine, Increased in Quality, TQM.*

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INTRODUCTION

TPM effectiveness is crucial for keeping the organization's determinations on the track. It should be measured occasionally during complete TPM development program, and the findings can further be used to work out new strategies for meeting the goals. The emergence of quality has become a top priority in many manufacturing entities and is primarily due to the globalization of world trade and the modest pressure taken about by the escalating demands of consumers, who want better products and services. These days quality has been typically regarded as a key strategic component of competitive advantage and the improvement of product quality is still a matter of key concern for today's firms. In other words TPM is a upholding program which comprises a recently characterized idea for keeping up plants and machinery. The purpose of the TPM program is to especially enlarge production while, in the meantime, expanding worker pledge and occupation completion. TQM and TPM are thus popular initiatives employed by the manufacturing organizations as Organizational Performance Improvement Techniques.

TPM Performance Indicators:

The TPM implementation effects on organization performance are plays a wider role. The below table shows the major organization performance indicators as follows:

1. Performance of Productivity (P)
2. Performance of Quality (Q)
3. Performance of Cost(C)
4. Performance of Delivery (D)
5. Performance of Safety (S)

Review of Literature:

Adoss (2013), this paper concludes that TPM is a difficult task, which is a great disadvantage for various organizational operations.

Senapati (2016), stressed on implementation of TPM in the manufacturing sector.

Ignatio (2018) evaluated a study on implementing successful total productive maintenance (TPM) in a manufacturing plant. He examines a study on the impact of Total Productive Maintenance (TPM) implementation on an organization in terms of productivity and quality levels.

Suliman (2019), conducted a study to investigate the improvement of performance by implementation of TQM.

RESEARCH METHODOLOGY:

The study is based on both primary and secondary sources. The total population size for study was only 50 respondents, which is considered optimum for the study. The questionnaire issued for employees of Volvo Group India Private Limited, situated in Bangalore. The convenient sampling method has been used for the study. The TPM implementation effects in Automobile Industries. The data analysis we used Mean, Standard deviation, Mann – Whitney U test, chi square test, Spearman's Rank Order Correlation) and Kruskal – Wallis Z-Test, etc

Objectives of the Study:

The following are the major objectives of the study:

1. To highlight the demographic profile of the employees of Volvo Group India Private Ltd.;
2. To examine the employee's roles played during TPM implementation in the organization;
3. To analysis the TPM implementation effect on organization performance in improvement dimensions and different areas in the organization;
4. To assess the overall performance of the organization improved by implementation of TPM; and
5. To offer findings and suggestions in the light of the study.

HYPOTHESES FOR THE STUDY:

The study is based on the following hypotheses:

- H1: There is a significant variation in demographic profile of the employees.
- H2: There is a significant relationship between the employee's roles played during TPM implementation in the organization
- H3: There is no significant relationship between TPM implementation effect on organization performance in improvement dimensions and different areas in the organization.
- H4: There is a significant relationship between overall performance of the organization improved by implementation of TPM.

ANALYSIS AND INTERPRETATION:

1. Demographic Profile of the Respondents:

Table No.1 show the demographic profile of employees of Volvo Group India Private Ltd Bangalore. The overall respondents were numbering, 50 employees out of that 37 respondents are belongs to male category and 13 respondents are belongs female category this shows male employees were more compared to the female employees. In the context of age pattern, majority of the respondents

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numbering, 25 and 15 employees were belongs to age group of between 25 to 35 years and between 35 to 45 years respectively. Further the educational background of the respondents majority numbering, 15 and 13 respondents were mechanical engineering and electronic engineering respectively. In the context of occupation, majority numbering, 22 and 10 respondents were belongs to production executives and engineers respectively and number of years experienced in industry, around numbering, 18 and 17 despondences were had between 4 to 6 years and below 2 years respectively.

Table No.1
Demographic profile of the Employees

<i>Sl. No</i>	<i>Factors</i>	<i>Classification</i>	<i>Frequency</i>	<i>Chi-Square (Results)</i>
1.	Gender	Male	37	$\chi^2=2.547$ $P=0.000$ <i>(H0 Significant)</i>
		Female	13	
2.	Education Background	Electronic Engineering	10	$\chi^2=1.218$ $P=0.000$ <i>(H0 Significant)</i>
		Industrial Engineering	13	
		Mechanical Engineering	15	
		Diploma in Engineering	12	
3	Age Pattern	Between 25-35Years	25	$\chi^2= 2.543$ $P=0.001$ <i>(H0 Significant)</i>
		Between 35-45Years	15	
		Above 45 years	10	
4	Occupation	Production Executives	10	$\chi^2= 3.014$ $P=0.055$ <i>(H0 In Significant)</i>
		Engineers	22	
		Machine operators	10	
		Supervisors	08	
5.	No of years experienced in industry	Below 2 Years	17	$\chi^2= 3.527$ $P=0.081$ <i>(H0 In Significant)</i>
		Between 2 to 4 Years	10	
		Between 4 to 6 Years	18	
		Above 6 Years	05	

Sources: Primary data

2. Employees roles played during TPM implementation:

Table No.2 observed that employee's roles played during TPM implementation in the organization. Majority of the employees opinioned that problem solver category were assigned to the highest mean rank and standard deviation was recorded the value of 4.98 (*Spearman's rank I*) and 2.82.As against the communicator category were assigned to the lowest mean rank and standard deviation was recorded the value of 3.45 (*Spearman's rank VI*) and 1.02 respectively.

Table No.2
Employees roles played during TPM implementation

Role Played	Mean Rank	Standard Deviation	Variance	Spearman's Rank Order Correlation
Motivator	4.73	1.21	1.68	III
Investigator	3.61	1.38	1.54	V
Problem Solver	4.98	2.82	1.38	I
Communicator	3.45	1.02	1.11	VI
Facilitator and Co-ordinator	4.88	2.23	1.03	II
Trainer and Decision maker	3.95	1.31	1.77	IV

Sources: Primary data.

3. TPM implementation effect on organization performance in improvement dimensions:

Table No.3 highlights the TPM implementation effect on organization performance in improvement dimensions. Majority of the respondents or the employees has been strongly agreed that positively TPM implementation effect on organization performance in context of different improvement dimensions. The results indicate that the stated null hypothesis to be rejected and alternative hypothesis is accepted since alpha value is more than 0.05.

Table No.3
TPM implementation effect on organization performance

Organization Performance	Mean	S.D	Mann – Whitney U-Test	P-Value	(Sig 2-tailed P-value) Hypothesis (H0)
Process Performance	4.78	1.214	3.075	0.000	<i>H0 Significant</i>
Workforce Performance	4.44	1.023	4.112	0.001	<i>H0 Significant</i>
Sales Performance	2.47	0.011	3.221	0.075	<i>H0 Not Significant</i>
Delivery Performance	4.56	1.038	4.881	0.063	<i>H0 Not Significant</i>
Quality Performance	3.78	1.011	3.112	0.002	<i>H0 Significant</i>
Cost Performance	3.22	1.036	2.417	0.071	<i>H0 Not Significant</i>

Sources: Primary data

4. Organization performance in different areas after TPM implementation:

Table No.4 represents that organization performance in different areas after TPM implementation in Volvo Group India Private Ltd. Most of the employees has been strongly agreed and partially positive opined that organization performance of different areas after TPM implementation. According to the *Kruskal –Wallies Z-Test* it's a category of nonparametric test it is describes to test the

significant difference between organization performance in different areas after TPM implementation. The highest mean and standard deviation were found increasing in quality of product and reduction machine break down and losses was recorded the value of 4.93 and 1.354 respectively.

Table No.4
Organization performance in different areas

Organization Performance	Mean	S.D	<i>Kruskal – Wallies Z-Test</i>	P-Value	(Sig 2-tailed P-value) Hypothesis (H0)
Increasing in productivity	3.78	1.121	2.154	0.000	<i>H0 Significant</i>
Increasing in quality of product	4.93	1.354	3.355	0.000	<i>H0 Significant</i>
Reduction in man hours	3.91	1.152	4.223	0.000	<i>H0 Significant</i>
Reduction machine break down and losses	4.91	1.333	3.221	0.001	<i>H0 Significant</i>
Increases the loyalty of employees	4.56	1.244	4.124	0.000	<i>H0 Significant</i>
Increasing in reliability of machine	3.33	1.083	4.216	0.061	<i>H0 Not Significant</i>
Easy in routine maintenance and work is reduced in the work station	3.77	1.022	3.570	0.058	<i>H0 Not Significant</i>
It helps increases the suppliers quality and customer satisfaction	2.88	0.918	3.210	0.000	<i>H0 Significant</i>
improves safety of workers in work station	2.81	0.909	4.214	0.077	<i>H0 Not Significant</i>

Sources: Primary data

To be concludes that, increasing in productivity, increasing in quality of product, reduction in man hours, reduction machine break down and losses, increases the loyalty of employees.

FINDINGS OF THE STUDY:

1. In the context of occupation, majority numbering, 22 and 10 respondents were belongs to production executives and engineers respectively and number of years experienced in industry,
2. In the context of age pattern, majority of the respondents numbering, 25 and 15 employees were belongs to age group of between 25 to 35 years and between 35 to 45 years respectively.
3. Around numbering, 18 and 17 despondences were had between 4 to 6 years and below 2 years respectively.
4. The employees opinioned that problem solver category were assigned to the highest mean rank and standard deviation was recorded the value of 4.98 (Spearman’s rank I) and 2.82 respectively.

5. The highest mean and standard deviation were found process performance was recorded the value of 4.78 and 1.214 respectively.
6. The highest mean and standard deviation were found increasing in quality of product was recorded the value of 4.93 and 1.354 respectively.

SUGGESTIONS FOR THE STUDY:

1. Organization should promote champion employees activity. Through this activity others will be influenced. Every individual's importance should be developed so that the employee should be a part of the system to play a key role.
2. Production Engineer and Maintenance Engineer should play the role of leaders to whom operators would like to whole heartedly imitate.
3. After successful implementation of TPM, organization has to look after, to imbibe the quality of continuous efforts to excel. For that appropriate evaluation and monitoring system should be developed.
4. Empowering the employees through decentralization of decision making and encourage employees to be involved in decision making. When employees present appropriate strategy suggestions or quality initiatives it leads improve the organization performance.

CONCLUSION

The current study elaborates the TPM implementation effects on overall organization performance in different improvement dimensions in Volvo Group India Private Ltd Bangalore. From the above analysis Majority of the respondents has strongly agreed and positively opined about that TPM implementation is most benefited and it improves the higher organization performance as well as reduces the loss of the production process. Therefore this study come with results of there is no significant differences between increasing in productivity, increasing in quality of product, reduction in man hours, reduction machine break down and losses, increases the loyalty of employees, improves basic maintenance skills among machine operators and maintain an accident free environment in the organization with these evidence finally this study concludes TPM implementation effects positively it increases the performance and reduces the risk in Volvo Group India Private Ltd.

REFERENCES:

1. Murug adoss (2013),”TPM implementation to invigorate manufacturing performance: an Indian industrial rubric” International Journal of Scientific & Engineering Research, 1 ISSN 2229-5518.Volume 3, Issue 6, PP.No.2-13.
2. Filmon Andemeskel (2014), “Total productive maintenance implementation in manufacturing organizations using Axiomatic design principles” The Seventh International Conference on Axiomatic Design Worcester, ISSN: 2145-7851,Volume No.3,Issue No.2,PP.No.41-53.
3. Ajit Senapati (2016), “A review on implementation of TPM in manufacturing industry” International Journal Of Modern Engineering Research (IJMER), ISSN: 2249–6645, Vol. 4, Issues No.11,PP.No.11-16.
4. Borikar (2016), “Critical success factors for effective implementation of TQM and TPM”, International Journal for Innovative Research in Science & Technology, ISSN (online): 2349-6010, Volume 2 | Issue 09, PP No.160-164.
5. Ranjeet M. Jadhav (2017),“Total Productive Maintenance Theoretical Aspect: A Journey Towards Manufacturing Excellence”, IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE, ISSN: 2278-1684, PP No.51-59.
6. Ujjwal Kalki (2018), “Total Productive Maintenance to Improve Overall Equipment Effectiveness”. Global Journal of Researches in Engineering: General Engineering, Volume No.18 Issue No.3, PP No.57-65.
7. Ignatio Madanhire (2018),”implementing successful total productive maintenance (TPM) in a manufacturing plant” Proceedings of the World Congress on Engineering, ISBN: 978-988-14047-0-1 ISSN: 2078-0958 (Print); London, U.K.,PP.No.1-6.
8. Mannai Suliman (2019), “An investigation into the effects of the application of TQM, TPM and JIT on performance of industry in Bahrain”. International Journal of Industrial Engineering Research and Development (IJIERD), Journal Impact Factor No. 6,Volume 8, Issue 1, pp.09–19,
9. Stephen Chima (2021),”overall equipment effectiveness and the six Big Losses in Total Productive Maintenance”, Journal of Scientific and Engineering Research, ISSN: 2394-2630 CODEN(USA): JSERBR, Issue No. 5, Volume No.(4), PP No.156-164.