

THE IMPACT OF LEAN MANUFACTURING ON OEE (OVERALL EQUIPMENT EFFECTIVENESS)

C.N.Udayashankar¹ & Meera Uday²

¹Director of Mu Consultants, Karnataka, India

²Professor & Head of Visvesvaraya Technological University, Don Bosco Institute of Technology, Bangalore, India

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ABSTRACT

Productivity is the key to the success of any organization and directly contribute to the Economic growth of the Country

Many Industrial Engineers and Professionals have contributed to the field of manufacturing Industry practices since centuries, and have formulated various theories and formulae to enhance the productivity, quality and quantity.

Lean Manufacturing is the current trend in a Manufacturing Industry which emphasizes on the wastage elimination and more efficient output/productivity. OEE is one such important result which is a reflection of Lean Manufacturing principles and practices.

This research paper aims to find and analyze how Lean Manufacturing helps in enhancing the OEE in turn, the productivity of an organization and hence the economic development of a country.

The study is conducted among the Automotive ancillaries' of Bangalore City.

KEYWORDS: *Development of Nation-GDP-Productivity-OEE-Lean Manufacturing-Value Stream*

INTRODUCTION

A Nation is recognized as a developed state when it is backed by a sound economy. One of the measures of the economy, is the Gross Domestic Product (GDP) of the country. GDP can witness a good score with the contribution from various sectors viz manufacturing and Service sectors predominantly. In a developed Nation, Service sectors contribute more wealth than the industrial sector. On the contrary, the Industrial sector contributes more wealth, than the service sector in a developing nation.

In this context, a research study is taken up to understand the contribution of Industries towards the wealth and GDP of a nation. This is possible when the Industries function efficiently producing more output with less input or resources. To improve efficiency, industries need to improve productivity on a continuous basis. This improvement is possible only when the industries change from the conventional method of production to a better and efficient method of production.

Toyota Motor Corporation started a new method of production in 1950 called the Toyota Production System. With this new system of production, Toyota Motor Corporation, which was in 4th position among major car manufacturers in the world, reached to 1st position. It has been maintaining this No.1 position, thereby supporting the belief that Toyota Production is one of the best systems in the world. This has been accepted by all manufacturing industries and interestingly, all major industries are practicing this system. The generic name for Toyota Production is Lean Manufacturing.

Objectives of the Study

- To understand Overall Equipment Effectiveness(OEE) and its' benefits.
- To analyze whether Implementation of Lean manufacturing practices helps in improving the OEE

Scope of the Study

The scope of the study is limited to Automotive ancillaries, who are practicing Lean manufacturing and who are located in Bangalore

Research Methodology

Auto ancillaries and vendors of major Automotive Industries in Bangalore viz, Bosch, Toyota and TVS, who are having turnover more than Rs. 10 lakhs and practicing Lean Manufacturing were considered for the study.

The total population for the study is 220 vendors.

The sample size of 130 nos was selected by random sampling method using Lottery method.

A structured questionnaire was administered to these 130 vendors. The data was collected and the analysis is done using a Paired 2 sample T-test.

What is a Valuestream?

A sequence of activities required to design, produce and provide a specific good or service, starting from vendors till delivery to the customer.

What is Lean Manufacturing?

Lean Manufacturing is a systematic method of identifying the waste in a value stream and eliminates it by using the appropriate Lean Tool. The reduction in waste will make the value stream **Lean** and directly contributes to the increased profit of an organization, which can be determined by checking whether productivity has improved or not.

OEE

Overall Equipment Effectiveness is one of the important Lean tool used to measure the performance of an industry. OEE reflects in productivity. The advantage of measuring OEE is, it clearly indicates the area of focus so that productivity can be improved by focusing on those weak areas. OEE is calculated using the following formula.



Figure 1

$OEE = Availability \times Quality \times Performance$

Again Availability is calculated using the following formula

$Availability = Availability\ of\ Men \times Availability\ of\ Machine \times$

$Availability\ Material$

$Quality = \frac{\text{The ratio of Good parts produced}}{\text{Total number of parts produced}}$

$Performance = \frac{\text{The ratio of actual parts produced}}{\text{Target}}$

The maximum score that will be obtained after multiplying the 3 factors Availability, Quality and Performance (OEE) can be 1.

If OEE is less than 1, then we need to analyze the real root cause for the reduction in OEE.

There are more than 50 Lean tools and if all tools are followed properly, then the OEE, in turn, productivity can be increased.

The study is conducted to analyze whether practicing lean manufacturing in an organization will result in the improvement of OEE.

RESULTS AND ANALYSIS

Table 1

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	OEE_Before	.915923	130	.0250177	.0021942
	OEE_After	.996585	130	.0052721	.0004624

The Result shows that there is a Strong Correlation in OEE Before and After Implementation Lean Manufacturing Practices

Table 2

Pair 1	OEE_Before & OEE_After	130	.823	.000
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There is an Increase in Mean OEE From 91.59% to 99.65% After Implementing Lean Manufacturing Practices

Paired Samples Correlations

The Result Shows that there is a Strong Correlation in OEE Before and After Implementing Lean Manufacturing Practices

Table 3

	Mean	Std. Deviation	Paired Differences		t	df	Sig. (2-tailed)	
			Std. Error Mean	95% Confidence Interval of the Difference				
				Lower				Upper
Pair 1 OEE_Before - oee_After	-.0806615	.0208920	.0018323	-.0842869	-.0770362	-44.021	129	.000

There is a Significant Change in the Overall Equipment Effectiveness (OEE) Before and After Lean Methodology Intervention, T(129) = -44.021, P=0.00

SUGGESTIONS AND CONCLUSIONS

Any business organization has to relook into its' strategies', business process, Products and services, production planning process as well as modern production techniques and procedures.

The organization has to make changes as per the dynamics of the market situation and strategizing approaches with a constant eye on the bottom lines of business operations demands an important measure of productivity viz OEE.

OEE results in better productivity and in turn better performance of the organization. A better performing organization contributes directly to the GDP and economics of the Nation.

The contribution of OEE to Organization success is substantiated in this research work considerably. since the results of this research work support the hypothesis of the researchers' that OEE impacts Organizational success, now another set of questions arise in the minds of researchers as to whether OEE alone can make a successful organization and improves GDP of the country? Are there any other contributing factors for the success of an organization and GDP?

This thirst for further knowledge paves way for further research.

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