

# Investigating the Feasibility of Lean Concepts in Manufacturing Industries

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## Abstract:

Lean manufacturing is a rapidly evolving technique utilized in modern manufacturing arena. Lean tools can be effectively incorporated to the enterprise in eliminating non-value adding activities from the production process. In present competitive and commercialized market, industries should continuously improve their production processes in order to match the rapidly fluctuating consumer demands while maintaining the financial stamina of the company. As a result, majority of the fast growing industries have implemented lean concepts into their core business functions to remain competitive in cost, quality and delivery. However, only a handful of companies have successfully benefited from lean implementation. This paper discusses the feasibility of lean practices in the manufacturing industries in terms of barriers encountered during lean implementation and sustainability.

**Keywords** –Barriers, Implementation, Lean, Manufacturing, Sustainability

## INTRODUCTION

In today's highly competitive economic world most of the companies have been successful in implementing lean philosophies to survive and prosper in their business environment. Therefore, lean thinking is considered to be one of the potential approaches for improving organizational performance [1]. As customers demand high quality, on time delivery and value for money, lean concepts have been more promisingly used to address these demands [2]. However, only handful of successful companies have been able to implement and retain lean manufacturing, whereas majority failed either in implementing stage [3] or post implementation. [4].

Companies in different sectors have widely incorporated lean philosophies with slight modifications to the original principles to cater their needs [5]. However, [6] and [7] show that some companies do not continue the implemented lean concepts. Therefore, it is required to recognize the hindrances faced by the management of these companies while implementing lean philosophies into their business model. So the purpose of this research is to identify the barriers pertaining to implementation and sustainability of lean manufacturing and to provide feasible solutions.

## LITERATURE REVIEW

Lean is "a systematic approach in identifying & eliminating waste through continuous improvements by making products/services on time with best quality and lowest cost." [8].

Lean manufacturing has grown to be one of the most prominent models used by almost all the industries in the world today [9] due to its dual focus on increasing the value of businesses and eliminating the waste generated. Lean manufacturing has been able to assist companies in improving their overall value chain activities by reducing waste [10] and eliminating inefficient processes. This technique emerged as a philosophy in automobile manufacturing industry in early 19th century [11] and gradually started to spread into the other industries such as hospitals, education, banking, military etc. as a performance improvement method.

There are evidences for lean practices in assembly lines in mass production of "Model-T" by Henry Ford in 1910 [12] which is also known as the birthplace of lean manufacturing. Then, "Taiichi Ohno" of the Toyota group in Japan developed a novel concept known as "Toyota Production System (TPS)" [13] which is more sophisticated and innovative technique to eliminate waste (Muda), enhance quality at the source (Jidoka) and continuous improvement (Kaizen).

The main objective of lean manufacturing is to identify ways to eliminate waste (Muda) from the process to improve the efficiency and the effectiveness [14]. It has been identified that there are 7 types of wastes (7 deadly wastes) within an organization namely over production, waiting, transportation, over processing, inventory, motion and defects [15]. Companies are using different types of lean manufacturing tools to assist them in eliminating the above seven deadly wastes.

At present, lean manufacturing concepts are being modified by manufacturers to improve their performance in-order to increase the profitability [16] based on their requirements. Standardised work, 5-S, Total Productive Maintenance,

Quick Change Over, Poke Yoke, Kanban, Kaizen and Problem Solving [14] are some of the basic lean tools used by most of the manufacturing companies who are producing different portfolio of products.

## **REQUIREMENTS FOR SUCCESSFUL LEAN IMPLEMENTATION**

Lean Manufacturing involves a series of steps which require detailed attention during the implementation stage. It is an organizational wide complete cultural transformation process which requires commitment from all levels of employees [17]. This means the integration of all infrastructure of the enterprise in order to make vision and strategy into action.

### **1.1 Lean Culture**

Initially a culture should be developed which facilitates the lean practices [18]. Employees should be educated and trained to understand the key benefits expected from lean manufacturing [19]. Further, the level of resistance for lean implementation should be reduced by establishing proper communication network among the organizational hierarchy.

### **1.2 Proper Communication Network**

Communication network within the organization plays a pivotal role in successful lean implementation process [20]. Reference [21] emphasizes on the importance of lean philosophies in developing rapid information sharing systems among upstream suppliers and downstream customers in order to benefit from Just-In-Time concepts.

### **1.3 Top Management Support**

According to [22] the support and guidance given by the top management to facilitate flexible working environment, provide effective leadership and provision of adequate resources are fundamental critical success factors for effective lean implementation procedure.

### **1.4 Employee Empowerment**

Lean manufacturing does not sustain under an autocratic management approach where top management command the entire implementation process of lean principles. Therefore, [23] claims that it is essential to motivate and empower employees by the top management by involving entire workforce in decision making process.

### **1.5 Adequate Resource Allocation**

Successful implementation of lean manufacturing requires allocation of adequate capital investment to alter the factory layouts, procurement of machineries as per the TPM guidelines, institute training programmes and acquire relevant certifications. As discussed by [24], having sufficient finance strength is a must for a manufacturing company to transform their process into lean systems.

Reference [25] claimed that lean implementation process is a difficult task. To be successful in lean manufacturing, companies should overcome barriers pertaining to implementation of lean philosophies within the organization [26].

## **BARRIERS TO LEAN IMPLEMENTATION**

Due to huge benefits that can be achieved from lean manufacturing a lot of companies have been tried to implement lean into their business model. But only a handful of them were successful in implementing lean concepts. [27]. Key barriers to lean implementation are described under this section.

### **4.1 Inadequate support from the top management**

As per [28] the level of support from the top management is a key requirement for successful lean implementation. Focus leadership, pioneering cultural transformation, provision of adequate resources are the main areas where the top management support is inadequate which can be identified as major causes for lean failures [29].

### **4.2 Barriers in Communication**

Employees at all levels in the organizational hierarchy should be informed about proposed changes being made during lean transformation [20]. Success of lean projects should be communicated to employees in different functions in order to get their support for sustaining lean methodologies. Reference [30] claimed that lean manufacturing has failed due to the lack of proper communication between employees.

### **4.3 Shortage of resources**

Certain manufacturing companies have failed during the process of lean implementation due to insufficient resource allocation in terms of finance, human capital and machinery [31].

In addition to that, excess time requirement plays a major role for companies in hindering the implementation of fully fledged lean practices.

**4.4 Differences in organizational culture**

Culture of an organization reflects the attitudes, behavioural patterns and norms of an organization. Poor utilization of lean philosophies is a result of employees not fostering a lean culture [32]. Language and cultural barriers have also been identified particularly as main factors pertaining to disruptions in the lean culture in manufacturing industry.

**4.5 Lack of motivation to implement and sustain lean**

There is always a “Fear Factor” among employees towards novel organizational policies. Since lean manufacturing is concerned about removal of non-value adding activities. [33] Fear of employees of losing their jobs can lead to resistance hence lack of motivation for lean implementation. [34]. Employee motivation plays an important role in the growth potential of any company. Demotivated employees reduce the profit and productivity of manufacturers in a rapid scale.

**4.6 Lack of understanding & knowledge about lean**

Lean manufacturing is a complete changeover which includes many concepts and require a proper understanding prior to the implementation. Insufficient knowledge about the lean concepts has laid an unsupportive culture among the employees regarding lean transformations. Number of lean implementation initiatives have failed due to the insufficient understanding about the lean practices and tools by the employees. [35]. Therefore, the lack of training provided to the employees in terms of adoptability of lean methodologies to the manufacturing industry has been identified as a major barrier.

**Table 1** shows a summary of previous findings on the barriers of lean implementation in organizations.

	Egglestone, 1994)	(Bamber & Dale, 2000)	(Bonavia & Marin, 2006)	Reference (Melton, 2005)	Rathje, Boyle, & Defflorin)	(Worley & Doolen, 2006)	Brown, & Graves, 2003)	(Lee-Mortimer, 2008)	Reference (Stewart, 2001)
Lack of understanding & knowledge about lean	X	X	X				X	X	
Shortage of resources	X		X	X			X		
Differences in organizational culture	X			X		X			
Barriers in communication		X			X	X			
Inadequate support from top management		X			X			X	X
Lack of motivation to implement and sustain lean					X				X

Table 1: Barriers to Lean Implementation in Manufacturing Industries

**CONCLUSION**

Successful lean implementation requires a culture which facilitates lean practices, top management support, improved communication network, employee empowerment and adequate resource allocation. It involves reforming and restructuring the organizational structure to foster a lean adapted culture.

Based on the findings from the literature, it appears that certain number of barriers are inevitable in most of the manufacturing companies. Lack of understanding & knowledge about lean, shortage of resources, differences in organizational culture, inadequate support from the top management and the lack of motivation to implement and sustain lean manufacturing methodologies are the most critical barriers among them.

As a result of this, only a handful of companies have managed to successfully implement and sustain lean whereas majority fails in the endeavour either at the implementation stage or post implementation stage.

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