

LEAN MANUFACTURING ISSUES AND CHALLENGES IN SMALL MEDIUM ENTERPRISES: A REVIEW

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Abstract-This review paper presents identification of barriers in implementation of lean manufacturing system in small and medium enterprises (SMEs). Growth of SMEs is one of the most significant indicators of positive economic growth of a nation. In today's business scenario, competitiveness of small and medium size organizations is determined by their flexibility in meeting and responding quickly to the changing customer needs and supplying high quality products at lower cost as per demand. There is a cut throat competition in the SMEs and all are working hard to achieve their objectives by enhancing their capabilities through application of automation and innovative concepts such as, Lean Manufacturing System (LMS), Total Quality Management (TQM) and Just in Time (JIT). Lean Manufacturing (LM) is a rapidly growing culture in manufacturing organizations. Lean Manufacturing is defined as an effective tool, used for the elimination of all kinds of waste in a production process, efficiently. Implementation of new management philosophies and strategies arise always difficult and uncertain because of the inevitable change. Organizations therefore have to develop its strategies as per the customer's requirement. Implementation of lean in large and medium-size manufacturing organizations resulted in reduction in material handling cost, reduction of manufacturing lead time and improvement in product quality with other benefits. An effective lean manufacturing programme includes tools and techniques for identification of wastes, commitment from management, participation of employee and their training and education.

Keywords - Introduction, Literature Survey, Expected Outcomes, Conclusions, References.

1. Introduction

Lean manufacturing system is an analytical approach for eliminating all type of wastes from manufacturing operation. It was first presented in Toyota and it is also called "Toyota Production System (TPS)". LMS has evolved and spread to all manufacturing sectors and not just focussed only in automotive industry. Global competition, increasing production costs and scarcity of resources are compelling organizations to think about new tools and techniques. To stay focussed, it is important to have flawless, accurate and streamed lined production processes. The barriers in implementation of lean in manufacturing companies are classified on cultural, technical, organizational and economic grounds (Darabi R et al., 2012). Lean is a well recognized structure for its ability to grow the organization on all aspects but many companies face problems its implementation. Lean methodology is in practice for past 20 years in India, but only a few organizations were able to implement Lean Manufacturing successfully. In Indian industries higher management's attitude and approach towards lean philosophy needs improvement as described by (Singh et al., 2010)

Achanga et al., (2006) analyzed that there is a direct relation between management styles and factors influencing the outputs such as the lead-time, number of employees and the return on investments (ROIs). The main barrier to lean implementation is that there is no appreciation from middle and senior management. This can also be found in the study done by Moradlou and Asadi (2015) where attitude of top management is one of the key reasons for the failure of lean implementation in SMEs. Salaheldin (2005) analyzed that the main obstacle for implementing the lean is lack of skilled manpower in SMEs. Shah and Ward (2003) analyzed that the large size of the organization is main obstacle in implementation of lean methods. This was further analysed and it was found that not all Just in Time (JIT) practices are suitable solution in SMEs (Shah and Ward, 2003). In 2012, in Gallois report, authors suggested that SMEs experienced major hindrances such as, lack of capital, difficulty in opening up capital and fear of risk on investments (Bonavia and Marin, 2006). Perez and Sanchez (2004) demonstrated that small sized manufacturing firms are least interested in implementing the lean ideas because of specific obstructions and limitations. This was established in the survey which involved managing directors, production managers, executives and quality managers.

2. Literature Survey

Jadhav et al. [9] analysed that implementation of lean frameworks isn't free from barriers, obstructions are social distinction, poor administration, breaking faith or absence of diligence. Legislature of numerous nations around the globe is empowering the little and medium-scale businesses to comprehend and execution of lean frameworks by getting available database of lean experts, financial related help to preparing by experts and setting up proficient affiliations.

Moradlou and Perera [10] identified that worldwide the manufacturing sectors is a foundation in any economy has direct influence on areas such as warehousing, mining and transportation. On analysing it is found that the main barriers are classified into four categories (i) weak support from top management, (ii) financial inability (iii) lack of skill of employees (iv) culture of organisation.

Sieckmann et al. [11] concluded that Lean Production Systems (LPS) has been a solution to requirements in pertaining to flexibility, costs, process quality and time. Special attention is given to factors related to humans and the appropriate lean methods. A major barrier in implementing lean production system in pharmaceutical industry is the limited use of particular lean strategy and tool in production processes

Kherbach et al. [12] analysed the implementation of lean in a small enterprises and evaluated the level of acceptance of lean concepts. Successful implementation and advantages of the lean depends upon the training of workers. Small scale manufacturing organizations have difficulties at the implementation stage. Thus, it is found that 87% of factories need to train their employees. The awareness about various needs of SMEs can help the management to accordingly arrange training of the employees and establish appropriate strategies for the successful implementation of a lean

Cirjaliu and Draghici [13] investigated that many organisation are concerned about the welfare and job satisfaction of human resources. Nowadays this is advantageous for an organisation's long term objectives and especially for their employees. The implementation of lean manufacturing is very complex and the possible changes can bring ergonomic issues.

Nirwana and Dhewanto[14] evaluated the barriers which were caused by a small number of customers and no media could capture the feedback. The Feedback was possible, only through a direct conversation with the customers interested in incremental product. The principle of Quick Iteration was having problem which was caused by the administrative regulation.

Othman [15] identified different reasons for hindrances in the selection of the lean generation framework. It is contended that the reception of the lean creation framework is an activity in information exchange. The recipient of knowledge can also contribute to unwillingness in transferring the knowledge. A problem related to LPS adoption is rooted in non transfer of knowledge which provides a deeper understanding of the barriers in LPS implementation. It provides a basic framework for understanding the Lean Production System implementation techniques as a knowledge transfer issue instead of issues in application of techniques. It opens a new approach of analysis in the research on LPS adoption that includes dealing with the various aspects of human motivation, nature of the knowledge transferred and the complex nature of changes in processes that should accompany LPS implementation.

Almanei et al. [16] investigated the organisations that found implementation of lean difficult and as a result fail to implement lean. These organizations not only have a harmful impact on its resources but also more importantly, affect the employees' credibility towards lean philosophy. Different organizations may have different barriers such as leadership, less involvement of employees, tools and techniques etc. The key conclusion drawn is that there is no unique roadmap to "lean" and the process, tools and techniques needed for lean system has to be tailored for every organization.

Kumar and Kumar [17] investigated the most underrated barriers associated with management such as, absence of support from management, lack of focus in lean methods, failure in creating sense of urgency for implementation and absence of long term vision for the organization based on lean methods. Management should help in providing adequate consultancy, adequate time, allocation of funds and financial support for implementation of new technology and adopt better technology for better communication.

Ankomah et al. [18] identified that SMEs still experience the ill effects of numerous issues, such as low product quality, working inefficiency, budget overruns etc. Although, Lean methodology has progressively been implemented as potential solutions for organisations who found that Lean standards could be significant in SMEs, yet it must be contextualized within their peculiar characteristics such as size, financial capabilities, organisational culture and human resource. This is a critical finding for the Construction SMEs who don't have the ability to implement the Lean methods but intend to build up a Lean execution structure to improve its execution.

Antosz and Stadnicka [19] identified that lean manufacturing uses many methods to minimize the cost, improve quality of product and reduce work overload but, they do not realize that there can be other alternatives for increasing efficiency of the enterprise. In any organisation major wastes occur due to waiting for material, unnecessary movement of man, material, machine and Breakdown. The key reasons for implementing LM are to improve the production process and to gain a competitive advantage.

Dombrowski and Karl [20] investigated that product development process (PDP) in the manufacturing industries has been progressively outlined by the standards of lean development (LD). Lean development is effectively adopted by the manufactures however suppliers barely or don't work at all as indicated by those standards and techniques. This situation comes about because of the dissimilarity in the process and the supplier specific task. When execution of LDS in those organizations, the standards of

institutionalization and zero-defect must be considered. LDS efficiently executed until the new techniques and tool must be recognized in the structure of Interface Management.

Matt and Rauch [21] examined that small enterprises have difficulties in the implementation of LMS, because they fear that they lack knowledge about lean and other needed resources like time, capital and personnel. It is exceptionally difficult for small enterprises to seek professional advice because of the limited budget. Also these organizations are less attractiveness to highly qualified and experienced engineers. Many small firms hire inexperienced engineers for whom the Lean concepts and techniques are not conceivable.

kumar [22] analysed that while implementing the lean in any organisation there are number of barriers faced such as absence of methodology, poor planning, unwillingness of top management, resistance to change and, various other human aspects. One of the major difficulties organisations come across in adopting lean is non availability of comprehensive lean knowledge and solution to the problems. The ISM methodology is helpful in comprehending the mutual dependence of barriers. It identifies barriers which contribute to other barriers (driving barrier) and barriers which are aggravated by other barriers (dependent barriers). ISM methodology is used to develop relationship amongst these barriers.

Alefari et al. [23] identified that the process of implementation of lean manufacturing is generally a long process, eventually managements' commitment and the participation of employees is essential for the implementation of lean. There is a wide conception that implementation of lean methods cannot be successful until the top management are ready to change the approach as per the necessities of lean manufacturing. Inclination of leadership towards lean can be considered as a method for maintaining and enhancing the employee's performances in lean production system. The leadership should be focussed on reviewing the standards of lean practices that can lead in enhancing the performance of workers.

Singh and Jain [24] recognized that the barriers in implementation of lean manufacturing in SMEs are poorly-designed structure of organization, improper methodology and nonexistence of systems of procedures (SOPs).

Moef et al. [25] identified the barriers in implementation of Lean in SMEs and observed various conflicts between the attributes such as absence of functional organization, absence of short term strategy, lack of expertise, lack of resources, improper methodology and deficiency of formal procedures. Other crucial barriers when implementing Lean Manufacturing include lack of leadership, unavailability of proficient consultant and poor decision-making.

Prakash and Prasad [26] analysed that there are a few hindrances to implement the lean such as insufficient funding, misconception about the lean philosophy, inappropriate training and failure of commitment by top management. It is highly prescribed that organisations shed their traditional practices and states of mind and embrace lean practices and tool to contend viably with today's global manufacturing scenario.

Lodgaard et al. [27] investigated that, employees at various levels see hindrances to lean in an unexpected manner. Top managers attributed the restricted accomplishment to hindrances identified with lean tools and practices. Employees essentially indicated management related challenges whereas middle managers fundamentally indicated that roles and responsibilities of workers were not clearly defined and the best tools and techniques were not chosen. To upgrade the outcomes more research is required.

Widiasih et al. [28] studied that to identify, analyse and evaluate the potential risks, top management needs basic decision making tools. To achieve this, a model of risk management by integrating the several tools is developed. Interpretive Structural Modelling (ISM) is utilized to map the relationship between risk events. After developing relationship among these barriers, it is concluded that to achieve KPI and to deliver the lean knowledge to employee, ISM strategy ought to be coordinated with another technique, Structural Equation Modelling for validation purpose.

Wyrwicka and Mrugalska [29] identified that there are three kinds of barriers in lean practice in industries related to organisational culture, human related factors and insufficient resources. It was found in research that despite high degree of accuracy in implementing lean tools, the normal effect to end waste did not show. When comparing the results, it was noticed that the high degree of accuracy in implementation does not eliminate the wastes but such knowledge can remove misconceptions about lean and its implementation.

Jaiswal and Kumar [30] analysed that while implementing lean in SMEs there are certain factors which are opposing the system to adopt lean manufacturing such as absence of top management commitment, financial constraints, bureaucracy in organization, fear to adopt new technology, workers resistance etc.

Balaji and Muniraju [31] analysed MSMEs in India are not financially sound and always adopt traditional methods in manufacturing. Individual challenges of Lean implementation has been identified and classified into three major categories such as management issues, organisational issues and financial issues. The awareness of barriers and the capability of overcoming them with the assistance of building organisational culture of persevering change and elimination of wastes, should serve as encouraging conditions for implementation of lean practices.

Sundareshan et al. [32] investigated that, lack of involvement of employee is the most commonly cited barriers in implementation of lean in organization. These parameters also constitute quality of work life, the conclusion is that QWL (Quality of Work Life) needs to be studied across the lean implemented organisation in order to identify and remove barriers in any organization.

Abdul et al. [33] studied that, non recognition of lean development can be overcome by imparting knowledge about advantages of Lean development through seminars and conferences to the construction practitioners. The government should introduce policies which encourage the firms to adopt Lean principles. Managers should advance lean construction, as it can bring considerable cost of manufacturing in the firm. Managers need to change with times and be innovative thinkers. This can be achieved by incorporating change in organisation culture by making the lean methods obligatory, by introducing new policies resulting in waste minimization, and by partnering with suppliers and subcontractors who follow Lean construction methods or at least willing to adopt lean methods.

3. Expected Outcomes

After going through all the papers mentioned above, some very important conclusions are drawn which are given below:

- i. Main objective is to develop and present a comparative concept between traditional and lean methodologies, which highlights their differences and is specifically referring for small and medium sized enterprises.
- ii. Implementation of lean manufacturing in organisation must strategize to make it main concern to confirm employees are provided adequate training in order to implement the lean successfully. Knowledge and information sharing challenge about lean required to be resolved as effective communication is a vital key for lean success.
- iii. Top management attributed the failure of lean manufacturing to various barriers. Workers primarily pointed out challenges related to management. Middle managers recognized many barriers, but primarily emphasized that roles and responsibilities were not delegated suitably and best tools were not chosen. To improve the outcome more research is required. To increase the accuracy of result, future research should include more organizations trying to implement lean principal and tools.
- iv. Implementation of lean system encounters various barriers such as, weak support from management, lack of skill of employees, human attitudinal issues, organisational culture, poor leadership and attitude of workers or resistance for successful implementation of lean in manufacturing industries.
- v. Lean implementation strategies can be developed after the identification of barriers. For successful and sustainable implementation of lean, tools such as failure mode and effect analysis, quality function deployment, balance score card etc... are used and the interaction among the barriers can be analyzed using modelling techniques such as interpretive structural modelling and analytical hierarchy process.

4. Conclusions

From this review paper it has been concluded that, lack of resources, poor management, poor training and technical knowledge, human attitudinal issues, lack of knowledge about lean philosophy, poor planning, lack of methodology and resistance to change by the employees are the main barriers which can be faced when implementing the lean manufacturing. This paper shows major barrier in organisation trying to apply lean is absence of knowledge about lean in the organisation, lack of recognition by the managers and not following a of lean culture. Some managers try to implement lean techniques by some tools and forget another basic lean principle "respect for people". To analyse and evaluate the barriers, top management needs basic decision making tools. To achieve this, a model of risk management by integrating the several tools is developed. SEM (structural equation modelling) can be used to statistically test the model developed with the ISM model. ISM (interpretive structural modelling) techniques are also used to analyze the complex relationships between various barriers in implementations of lean. A hierarchical relationship model (HRM) is developed to establish the relationship between the challenges faced in implementation of Lean. These tools are based on the studies which help the top management and decision makers to identify appropriate action plans, make policies and strategies to reduce vulnerability and risks in implementation of Lean manufacturing.

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