Current Trends on Lean Management – A review

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A B S T R A C T

All manufacturing industry has put in continuous efforts for its survival in the current impulsive and competitive economy. In order to handle the critical situation, manufacturers are trying to implement new and innovative techniques in their manufacturing process by making it more effective and efficient. A detailed literature survey has been conducted to identify the lean practices in various manufacturing industry. The results revealed that the status of Lean Manufacturing (LM) implementation in still in thriving stage. This paper will further assist the organizations to improve its process, align it to the requirements of its customers and relentless contribution to manufacturing sector to enhance productivity, quality and competitiveness is immense.

1. INTRODUCTION

In the current era of globalization, industries are adopting new tools and techniques to produce goods to compete and survive in the market. The most daunting issue faced by manufacturers today is how to deliver their products or materials quickly at low cost and good quality. One promising method for addressing this issue is the application of lean management principles and techniques. Lean management simply known as lean is production practice, which regards the use of resources for any work other than the creation of value for the end customer, is waste, and thus a target for elimination. Though there had been numerous claims on the real origin of Lean Manufacturing principles, it was generally accepted that the concept With this back ground, business needs to compete with efficiency and quickly respond to market needs and niches.

There is no doubt that the manufacturing industry are confronted with challenges and looking to implement improvements in their key activities or processes to cope with the market fluctuations and increasing customer demands. Applying lean management philosophy is one of the most important concepts that help businesses to complete. In this paper, the literature survey findings such as existing level of lean practices, types of lean tools employed, and perceived level of different encountered by the various manufacturing industries are discussed.

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2. RESEARCH OBJECTIVE AND METHODOLOGY
The primary aim of this study is to find out the needs and examine the degree to which the concepts of lean management are put into practice within various manufacturing industry.

(i) This is an overview for finding the current situation of lean management practices in manufacturing industries.

(ii) It is a measure to identify the constrains that retains lean manufacturing in the infant stage in manufacturing firms and helps to identify the muda (waste) that evolves in an processing unit and gives out supporting measures to remove the same. The constraint that predict the implementation and sustainability of lean manufacturing tools and techniques are also discussed.

3. LITERATURE REVIEW
A detailed review of research in current trend of lean management in various manufacturing industry like automotive industry, machine tool industry, semi-process industry, electronics manufacturing industry, steel industry, pump industry and furnishing industry has been discussed. Lean manufacturing is a multi-dimensional management practice including just in time - quality systems, work teams, cellular manufacturing, supplier management etc. the popular definition of Lean Manufacturing and the Toyota Production System usually consists of the following, Wilson (2009).

- It is a comprehensive set of techniques which when combined allows you to reduce and eliminate the wastes. This will make the company leaner, more flexible and more responsive by reducing waste.
- Lean is the systematic approach to identifying and eliminating waste through continuous improvement by flowing the product or service at the pull of your customer in pursuit of perfection.

3.1 LEAN PRODUCTION SYSTEM
Lander and Liker (2007) discussed the performance benefits of lean systems are often remarkable, greatly improving quality, cost, and delivery and studied the fundamental misunderstanding of TPS, viewing it as a specific tool kit technically implemented in a formulaic way to achieve pre-specified results. According to Shah and Ward (2007) lean production is a multi-dimensional approach that encompasses a wide variety of management practices, including just in time, quality system, work teams, cellular manufacturing and supplier management in an integrated system. Petersen (2003) in his article made the analysis of the lean literature and concluded that among the authors dominates a view that lean is more than a set of tools, since it is a philosophical approach to lean. Therefore, lean production is also considered as a philosophy of continuous improvements and respect to people.

3.2 HOUSE OF LEAN
Liker (2003) illustrated the most common lean tools in the form of house as shown in Figure 1. The goal of lean production is set in the roof and consists of reaching for the best quality, lowest costs, shortest lead-time, highest safety and high morale. The left pillar encloses Just-in-Time principle that consists of production planning and leveling tools like takt time, continuous flow, pull system, quick changeover and integrated logistics. The right pillar deals with Jidoka, which prevents a defective part from proceeding into the next workstation as well as insists on separating people from machines. People are in the center of the lean house concept since people see waste and solve problems that lead to continuously improvement of the processes. In addition, it is important to consider the characteristic of a lean work organization since the responsibilities are decentralized to multifunctional teams. The foundation of the house has to be stable for the pillars to stand steadily and consists of the tools like 5S, standardized work and leveled production.
3.3 LEAN WASTES
According to David Magee (2007), different kinds of wastes in a process are categorized in following categories.

1. Overproduction – Producing items more than required at given point of time i.e. producing items without actual orders creating the excess of inventories, which needs excess staffs, storage area as well as transportation etc.
2. Waiting – Workers waiting for raw material, the machine or information etc. are known as waiting and is the waste of productive time.
3. Unnecessary Transport – Carrying of Work in Process Inventory (WIP) a long distance, insufficient transport, moving material from one place to another place is known as the unnecessary transport.
4. Over processing – working on a product, more than the actual requirements is termed as over processing.
5. Excess Inventory - This includes excess raw material, WIP or finished goods causing longer lead times, obsolescence, damaged goods, transportation and storage costs, and delay. In addition, the extra inventory hides problems such as production imbalances, late deliveries from suppliers, defects, equipment downtime, and long setup times.
6. Unnecessary Motion – Any wasted motion that the workers have to perform during their work is termed as unnecessary movement.
7. Defects – Defects in the processed parts is termed as waste. Repairing defective parts or producing defective parts or replacing the parts due to poor quality etc. is the waste of time and effort.
8. Unused Employee Creativity – Loosing of getting better ideas, improvement, skills and learning opportunities by avoiding the presence of employee is termed as unused employee creativity.
3.4 ESSENTIAL LEAN MANAGEMENT TOOLS
Vorne (2012) discussed the most important lean management tools such as 5S, Andon, Bottleneck Analysis, Continuous Flow, Gemba, Heijunka, Hoshin Kanri, Jidoka, Just-In-Time, Kaizen, Kanban, KPI, Overall Equipment Effectiveness, PDCA, Poka-Yoke, Root Cause Analysis, Single Minute Exchange of Die (SMED), Six Big Losses, SMART Goals, Standardized Work, Takt Time, Total Productive Maintenance, Value Stream Mapping and Visual Factory used for productivity improvement in manufacturing industries.

3.5 LEAN PRACTICES IN VARIOUS MANUFACTURING INDUSTRY
In recent years, a plethora of literature has extensively documented the successful implementation of lean philosophy into various manufacturing sectors. Eswaramoorthi et al, (2011) discussed the current status of lean implementation in Indian machine tool industries as well as tinted some allied issues. The survey has attempted to formulate simple questionnaire based tool to identify the existing level of lean practices, reasons for inadequate priority to lean concepts, type of lean tools employed, perceived level of different wastes, and the common difficulties encountered by the Indian Machine tool Manufacturers. The survey results revealed that 31.6% of the companies have implemented different lean tools and techniques in selected areas. The remaining 68.4% of the companies have not yet taken up the lean initiatives.

Implementation is also snail-paced, and it has a further scope to develop focused lean concepts, which could be implemented in other kind of manufacturing environment like low volume and high variety. It is concluded that the major reasons for low level of lean implementation are anxiety in changing the mind-set of workers, lack of awareness and training about the lean concepts and cost and time involved in lean management implementation. Therefore, the machine tool manufacturing companies need to give attention to implement lean in all the key areas from a holistic perspective.

Ajith kumar sahoo et al (2008) suggested a systematic approach for the implementation of lean principles and also describes an application of Value Stream Mapping (VSM). Consequently, the present and future states of value stream maps are constructed to improve the production process by identifying waste and its sources. Furthermore, Taguchi’s method of design of experiments is pursued here to minimize the forging defects produced due to imperfect operating conditions. A noticeable reduction in set-up time and Work-in-Process (WIP) inventory level is substantiated.

Nitin Upadhye et al, (2010) desiried major actions taken by the company to implement lean philosophy to improve its efficiency and effectiveness. This study attempted to point out various wastages and issues to implement the lean manufacturing systems in MSME. It is observed that Lean Manufacturing Systems (LMS) helps to identify and minimize waste. Lean tools like kaizen, JIT, VSM, 5S, SQC, preventive maintenance, total employee involvement, and SMED were used to find and eliminate the wastages in a MSME. The implementation of lean tools and techniques will be successful only if these are used wisely. The MSMEs have to go a long way to achieve lean status with the use of proper lean tools and techniques, which are suitable to their work culture, conditions and available infrastructure. It is tedious job but not difficult. Lean tools and techniques will help MSMEs to overcome their weaknesses and utilize their strength. It is recommended that organization irrespective of its status should adopt lean philosophy as an improvement strategy. Lean management is the most suitable improvement strategy for all manufacturing industries like OEMs and component manufacturing industries.

Pool et al, (2011) al studied the principal of flow and pull production suggesting a regular demand driven product flow in semi-process industry by introducing cyclic schedules for improving production quality and supply-chain coordination. Demeter et al, (2011) found a significant relationship between lean management practices and inventory turnover and found the different
types of inventories are sensitive to different contingency factors. WIPs affected strongly by the production system, while the type of order affects raw material and finished goods and further emphasis the important of the proper decoupling point placement in the supply chain.

Behrouzi et al, (2011) presents an innovative approach to measure the lean performance of manufacturing systems by using fuzzy membership function. Rubio et al 2008 has implemented a reverse logistics system for remanufacturing end-of-life products in a lean production environment. Rachna Shah et al,(2007) mapped the operational space corresponding to the conceptual space surrounding lean production also identified the critical factor of lean production, how are the various factors of lean production related to each other and why they are related. Fawaz et al, (2007) described a case where lean principles were adapted for the process sector for application at a large integrated steel mill. They have used value steam mapping as a lean tools to identify the opportunities for various lean techniques and described a simulation model to contract before and after scenarios in detail to reduce production lead-time and to lower work in process inventory.

Doolean et al, (2005) found that while electronic manufacturers have implemented a broad range of lean practices, the level of implementation thus vary and may be related to economic, operational or organizational factors.

Ramesh et al, (2009) discussed the lacuna in the existing flow line and has suggested a new one piece lean line design using the simulation software in pump manufacturing industry. Lluis et al, (2011) identify the key performance metrics of the system and the effects of design parameters on system performance. Kuhlang et al,(2011) identified the productivity potentials is realized by the joint application of VSM and Method Time Measurement (MTM) to reduce lead time and increase productivity based on lean principles and standardized processes. John (2009) argues how return on investment can be achieved by implementing a new scheduling system that assisted implementation of lean manufacturing.

Marksberry et al, (2011) looks a common approaches, theories and problems concerning the role of the executive and how it can affect companies in their efforts to adopt lean tool and principles. Deros et al, (2011) aimed to reduce the setup time by exploring the efforts on assembly line improvements, and factors that can contribute to further reducing setup time in battery assembly by SMED lean techniques. Roberto et al, (2009) studied a case illustrate VSM use, as well as kanban and milkrun systems application on an assembly line. The results obtained showed that the path of improvement, measured through the Lean Rate (LR) and Dock-to-Dock time (DtD). Jennifer et al,( 2009 ) studied 51 events in six manufacturing organization to identify the set of input and process factors that most strongly relate to the development of employee attitudinal outcomes and problem-solving capabilities in kaizen events of lean production. Jayaram et al,(2010)found a positive interaction effect between the TPS practice of preventive maintenance and the TPS rule of decentralized decision making on all performance measures i.e. manufacturing cycle time, quality, cost and delivery speed. The numerous literature researches works shows the effectiveness of lean practices that have been published in various journals. This will further assist all manufacturing sector to gauge their level of leanness, continuously improve their productivity, better customer satisfaction and will serve as a foundation for future research work.

4. CHALLENGES IN LEAN IMPLEMENTATION AND SUSTAINABILITY

The challenges faced in the process of implementing and sustain lean is a tedious job as the concept relates to time, cost, interest, and involvement, the concepts that together support the new change for development in an firm. The study tells that new firms introduce and accept lean manufacturing and other innovative concepts than the old and existing firms. The forces opposing and driving a change to lean is shown in Figure 2. The following important factor of resistance to change in manufacturing sectors is
• Fear to change the legacy system with the new successful trends and methodologies
• Not utilizing the opportunities and advantages of the new policies
• Market destabilization will lead to force the change, which will be in a non-standard format.

Fig. 2 The forces opposing and driving a change to ‘lean’ (T. Melton 2005)

5. CONCLUSIONS
Manufacturers are under intense, remorseless pressure to find a new ways to reduce production cost, elimination of waste, enhance high quality of product, increase the productivity, and better customer satisfaction. These parameters are usually achieved through the implementation of lean management practices in their industries. The traditional manufacturing practices are indicated inadequate representation in lean management. This paper presented an important imminent into the status of lean manufacturing implementation in manufacturing industries. The progress in lean implementation is snail-paced and needs to be augmented. It has a further scope to develop focused lean concepts, which could be implemented in other kind of manufacturing environment like low volume, high variety and high volume and low variety. The major reasons for the low level of lean management were anxiety in changing the attitude of workers, lack of awareness, and training about the lean management concepts, cost and time involved in lean implementation. Therefore, it can be concluded that the manufacturing industry needs to give more attention to implement lean management in all the key areas. Hence, appropriate lean education, training, and research setup in association with manufacturing industries are to stimulate the lean awareness and technological development in all type of manufacturing industries. This helps to industries and researchers create awareness about Lean Managements Tools, and techniques, so as it could be supportive to opt suitable lean practices for implementation, continuous development and for sustaining leanness in the competitive environment of current scenarios.
REFERENCES


Vorne, 2012 [Available at: http://www.leanproduction.com]
