

Sustainable Practises in Lean Manufacturing: A Critical Review

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ABSTRACT

The key to attain sustainable development lies in the customer gratification through improved quality, reduced cost, reduced delivery lead times and proper communication. Lean manufacturing philosophies help managers to identify and eliminate waste at every stage of operations in a systematic approach. The changes in culture have contributed to every lean failure. While prevailing research implies that successful lean implementations lead to a profitable organisation it focuses on the low numbers of successful lean conversions. The opulence of lean manufacturing will not be entirely based on application of appropriate tools and techniques alone but also on the participation of top management and their leadership, workers attitude, resources and the organizational culture.

Keywords: Sustainable development, lean manufacturing

INTRODUCTION:

The objective of lean manufacturing is to identify, eliminate the process resources which do not add value to the product. We cannot eliminate the complete waste through the modifications in manufacturing. It requires changes in other functions such as product design, materials section, and marketing. An integrated approach is needed for the process improvement and waste reduction. The flexibility or ability to change according to market demand is very important in the competitive market to maintain a sustainable development. Sustainable development is one of the most important factors for organizational successes as it enables companies to effectively achieve safety, hygiene, quality productivity, image, cost reduction, environmental protection and timely delivery. The aim of lean principles is to identify the unproductive from the system and achieve sustainable development through continuous economical, social and environmental improvements which lead to the increased operational performance.

LITERATURE REVIEW:

According to Simpson and Power (2005) the efforts to improve or influence a supplier's environmental management practice raises critical issues of transaction costs and efficacy of approach for the buyer. Herron and Braiden (2006) reported that the effective interaction between lean and sustainable efforts empowers the manufacturing organizations to avoid risks from non compliance with regulatory requirements and explore new ways of improving operational and environmental performances. Upadhyayae and Deshukh (2010) designed a system model to implement Lean manufacturing principles in Indian industries. Total employee participation, employee motivation well trained workforce, teamwork and coordination from the top management is necessary for achieving a truly lean organisation. The remaining part of the paper specifies on lean implementation issues, lean tools and the intended results. On the whole this model will help managers to identify and eliminate waste at every stage of operations.

Vinodet.al (2011) studied about the various issues of sustainability using lean strategies. The study highlighted about

the need of integrating lean techniques with sustainable principles. A cross functional team (CFT) is to be employed for the identification and elimination of environment waste and to track and prioritize goals. Further, Value Stream Mapping (VSM) is made effective by deputing EHS activities, material line, energy line and emission line. An eco-function matrix is designated to integrate with the VSM to prioritize the improvement proposals and wastes. There is emphasis on the adoption of 7S concept for improving the productivity of the organisation. The associated benefits include reduced costs and lead time, improved process flow, compliance with customers' expectations, improvement of environmental quality, as well as, employee morale, and commitment. Proven case studies of companies who have implemented lean principles give an insight that they are sustainable at nominal investment.

Corbett and Klassen (2012) evaluated that environmental issues can improve financial returns by opening up new customers, competitive differentiation (and increasing market share), reducing cost through waste reduction.

Kovacova (2013) studied and analysed the gradual extension of the lean orientation towards sustainability, distinguishing lean from sustainability and its interconnectivity. Lean tools have been revamped and extended for sustainability which includes value stream mapping, work teams and 5S. The study gives an understanding about the adoption of green practises in organisations to improve environmental performance. The process include Kanban (pull systems), cell based manufacturing, SMED (single minute exchange of dies) has significant role in reducing the wastage of inventory. In addition to the process eco efficient tools life cycle assessment, Eco design and environment management systems assists in implementing and managing environmental affairs and ensuring compliance with policies, standards, and stakeholders expectations. Evidence of Green management successfully "pulling" from the lean management toolkit is lacking. By sharing management attributes, Lean may help in boosting the efficacy of Green practices, and Green implementation may have a positive influence on sustaining existing Lean business practices (Dues et al. 2013)

Piercy and Rich (2014) evaluated the broader sustainability of lean operations using theatrical stage model. The model act as a guide for future managers for understanding the change and process taking place in organisations as they lean towards sustainable practises.

The major research gaps for integrating lean and sustainable manufacturing to improve performance business and modelling as a methodology approach were identified by Hartini and Ciptomulyono (2015). The research identified the interrelationships between lean and sustainable manufacturing and analysed on the three key dimensions of sustainability: environment, economy, and social and its impact on organisation performance. The lean companies which included green practices yielded better green results than those companies who didn't support. The gaps ascertained were to develop mathematical modelling for examining the impact of lean and sustainable manufacturing and about the exploration of social performance.

A case study of eco lean method gave insights about how to determine the economic and ecological wastage through visual testing and selective interrogation in a plant layout by mapping the areas of waste in a production and analysed whether the approach is value adding or the task is irrational. Four step optimisation procedure was introduced which aims at achieving transparency, data analysis regarding the performance, allocation of consumption data into divisions, prioritization, implementation and improvement. Eco Lean demands quickness, stability and resource efficiency. Improvement measures shall solely be implemented if the resource efficiency constraint is fulfilled. (Miehe et al 2016).

Hallam and Contreas (2016) conducted a study on 126 articles to analyse whether Lean implementation leads to Green outcomes, or Green objectives require Lean implementation. The green practises were capitalised on lean tools and with its implementation will showcase highly optimistic outcomes- lean push theory. There is a need for developing an integrated management model for exploring the correlation between lean management and green management.

FINDINGS AND SUGGESTIONS:

- Lean culture is a learning culture where we learn to solve problems permanently and every day we improve the business and maximise the value to the customers at the lowest possible total cost.
- For achieving sustainability and improvement, business problems should be linked to value streams. The benefit that comes from VSM comes from the process of mapping with other people which includes the right people to generate it as well as relevant feedback of customers and suppliers together to construct the map. Leadership qualities like scoping helps in identifying the gaps in linking the value streams and selecting those streams with priorities for improvement.
- Sustainability assessment technique is a valuable activity that provides a holistic view of operations bringing together efforts and focus. It values existing initiatives and combine it with new opportunities. It helps to

reduce cost, reduce carbon footprint and recommends the marketing of green and sustainability aspects of products and operations.

- Identifying the sources of waste is the first step in designing potential solutions and quantifying savings. Preventive maintenance is an integral part where performance is optimized
- Comprehensive programmes and policies for preventive maintenance is a key for maintaining performance and reduce the operating costs of an organisation. Incorporating policies such as a checklist and guidelines for preventive maintenance can be beneficial for managers.
- Developing a site specific sustainability team is another facet of sustainable operations such as conducting sustainable training and creating awareness among employees so that they will look forward to reduce impacts and emanate innovative solutions.

CONCLUSIONS:

Sustainability is most important challenge in the world today. The cost of materials and resources is driving the need of sustainable product development. Lean manufacturing and sustainability should go in hand in hand for an effective regulation of production of commodities in a rapidly growing business environment. Main focus should be on devising commitment to eliminate environmental waste through lean implementation, for example, avoiding over production and over processing so as to save time and resources. The process improvement tools such as VSM, 7S and eco lean techniques should be implemented to enhance a sustainable environment as a measure to eliminate the seventh waste, i.e. environment waste. Sustainable operations reduce the operational costs and help to identify opportunities in plans which help in improving the company's triple bottom line. A manager should be bent on towards improving quality at every stage with ease and efficiency. An open minded manager would have a higher understanding of lean culture and would always try to invent and execute strategies for a better working environment.

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