The Literature Review of Lean and Green Manufacturing System

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Abstract

The global development of the world has an adverse affect on the natural environment, such as global warming, is continuing to mount. Green manufacturing systems that focus on minimizing environmental impact of manufacturing processes and products are ever more important to sustain our future. Green manufacturing systems are slow to gain acceptance as manufacturers are focusing more on implementing Lean manufacturing systems to improve operational performances. Green manufacturing is a method of manufacturing that minimizes waste and pollution. Lean manufacturing is the system which aims in elimination of the waste from the system with a systematic and continuous approach. In this ressearch paper the literature review of lean green manufacturing systems has studied.

Keywords: Lean Manufacturing; Green Manufacturing; Operations Management; Waste.

INTRODUCTION:

During the end of the twentieth century and into the twenty-first century two types of manufacturing systems that emphasize waste minimization have gained in popularity. They are "Lean" manufacturing systems that reduce waste defined as non-value added activity, and "Green" manufacturing systems that reduce waste defined as having adverse environmental impact. Green manufacturing is an essential part of sustainable

development. The concept of Lean Manufacturing was first seen in Japan particularly in Toyota Production System. Lean manufacturing was originally developed by the Toyota Motor Co. in Japan based on concepts given by Henry Ford. The concepts, tools and techniques had gone through a lot of testing before they were accepted. Lean manufacturing means manufacturing without waste. Waste can take many forms and can be found at any time and in any place. It may be found hidden in policies, procedures, processes and product designs, and in operations. Waste consumes resources but does not add any value to the product value.The aim of lean manufacturing should be to eliminate waste from their systems and operations and extract maximum output from minimum inputs. There are seven kinds of muda i.e., waste, that is addressed in the TPS are Waiting, improper Transport or Conveyance, Defects or Correction, Over-production, Unnecessary Motion or Movement, Unnecessary Inventory, Inappropriate processing. The ultimate goal is to have a minimum waste in the operations of the plant.

1.1.2 Lean manufacturing and traditional manufacturing

The lean manufacturing techniques are conceptually different from the traditional process. For example, the traditional manufacturing work is based on inventory. But Lean Manufacturing questions the role of inventory and defines it as a waste and reflects the imperfections that the system has. Lean Manufacturing is in direct opposition with traditional manufacturing approaches characterized by use of economic order quantities, high capacity utilization, and high inventory.

In changing from a traditional environment to one of lean production, cultural issues will emerge quickly, as well as resistance to change. A managing change program is needed to accompany the effort. It has been established beyond doubt that the organizations that have mastered lean manufacturing methods have substantial cost and quality advantages over those which are still practicing traditional mass production **(Singh and Sharma, 2009).**

1.2 Green Manufacturing

Green Manufacturing is a method of manufacturing that minimizes waste and pollution achieved through research and process design. It is also a method that supports and sustains a renewable way of producing products and/or services that do not harm us or the environment. Green Manufacturing goals are also to conserve natural resources for future generations. The benefit of Green Manufacturing is to saves useless cost, and promotes research and design.

2. LITERATURE REVIEW

Angell et al. (1999) outlines the development of environmental operations management, and discusses the integration of environmental and operations management in terms of both practice and recent research.

Huiy et al. (2002) presents a case study demonstrates that the fuzzy set-based model can effectively account for the vagueness and uncertainty of information being used for environmental impact of a manufacturing process.

Gary G. Bergmiller, University of South Florida(2006) tells us how leading Lean manufacturers are benefited from Green manufacturing. He tells us that the key to our sustainable future is that industrial and environmental efficiency does not have opposing objectives, rather, they should have the same objectives.

He is very worried about dwindling of natural resources. He beleives that we will be able to produce a single integrated Zero Waste Manufacturing system whichwill simultaneously reduce the environmental impact of manufacturing while assuring economic success, thus fulfilling the main objectives of Industrial Ecology and Sustainable Development.

Hosseini (2007) discusses the basic factors and a conceptual model in the adoption and maintenance of green management system. It is anticipated that if organizations ensure these factors, they will experience less resistance from their stakeholders and consequently they will have a successful GM (green management) and GP (green productivity) implementation.

Glenn Johansson, Mats Winroth(2008) made comparison between the Lean and the Green manufacturing concepts. They tells us that they are complementary and to some extant overlapping. Both concepts deals with the removal of waste while manufacturing. Reduction of waste in terms of inventory, rework, etc as augmented by the Lean concept contributes to resource productivity. Similarly, the Green concept asserts reduction of material waste and emissions, fewer production steps which also support high resource productivity. Furthermore, the strong focus on continuous improvement in the Lean concept needs employee involvement and training. Improvements of environmental performance, as advocated by the Green concept, also require employee involvement and training. Another feature of the Lean concept is not only to solve any problem that occurs in manufacturing, but also to avoid occurrence in the future. That is, attention should be paid to avoidance of negative environmental impacts rather than use of "end-of-pipe" solutions when the impacts occur. Hence, the analysis shows that the concepts display similarities at the level of resource productivity, organizational change, and source reduction.

Oliveira et al. (2008) studied the leveling production problem at a small to medium foundry industry in Brazil. It presents a computer simulation model that has been used to balance the workflow of production operations to reduce the time of pouring times through an improvement in industrial layout and workload balancing including worker's multi skilling training

Saurin et al. (2009) presents guidelines for assessing lean production (LP) impacts on working conditions on employees either at a plant or departmental level, which were tested on a harvester assembly line in Brazil. The impacts detected in that line may

provide insights for other companies concerned with balancing lean and good working conditions. Since the method adopted for assessing the impacts is fairly simple, it is a workable alternative for companies interested in surveying how LP is affecting their workforce.

3. CONCLUSION

This paper aims to study the lean and green practices. The objective is know more about lean and green practices from literature review. Our study show that waste reduction was the most cited practice. Lean and Green are the two powerful strategies for achieving operational and service excellence in any organization today. It is clear that lean manufacturing is a powerful tool that when adopted can create superior financial and operational outcomes. Literature discussed in this paper covers all the facts of lean and green manufacturing including background and origin of the lean manufacturing and green manufacturing.

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