



OVERVIEW OF LEAN AND GREEN MANUFACTURING SYSTEM

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Abstract

Global warming is just one example of how the world's development is having a negative impact on the environment. Our future's sustainability depends increasingly on green manufacturing systems that aim to reduce the environmental impact of production processes and finished goods. Since many companies are prioritizing the implementation of Lean manufacturing in order to improve their operational efficiency, the adoption of green manufacturing technology has been sluggish. The term "green manufacturing" refers to a kind of production that is gentler on the planet. In order to maximize efficiency, the lean manufacturing method focuses on eliminating unnecessary steps and reducing waste wherever possible. This article presents an in-depth discussion of the research on lean green manufacturing systems.

Keywords: Green manufacturing, Lean manufacturing, Operations Management, and waste

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1. INTRODUCTION

Near the end of the twentieth century and the beginning of the twenty-first, two production methods, lean manufacturing and just-in-time, achieved widespread acceptance. Two distinct approaches to manufacturing exist, "Lean" and "Green," with the former emphasizing the elimination of non-value-adding processes and the latter emphasizing the same for those that have an unfavorable impact on the natural world. For the sake of a sustainable future, eco-friendly production must become the norm. The Toyota Production System in Japan was the inspiration for lean manufacturing practices across the world. Henry Ford's ideas inspired Toyota Motor Corp. of Japan to develop the lean manufacturing method. All proposed methods, strategies, and resources were thoroughly examined before being approved. The term "lean manufacturing" describes an approach to production that prioritizes cutting down on unnecessary steps. Finds of garbage may occur at any time and can take different shapes. It might be concealed in the intricacies of the design or construction of the object in question. Loss of quality and no increase in value are the results of waste. Lean manufacturing seeks to eliminate unnecessary steps and boost productivity without increasing costs. There are several types of waste, or muda, that the TPS aims to eradicate, including but not limited to: waiting, utilizing the wrong method of transportation, mistakes that need to be repaired, excess production, excessive motion or movement, excess inventory, and inefficient processing. Plant operations shouldn't produce any waste items.

TRADITIONAL MANUFACTURING VERSUS LEAN MANUFACTURING

Conceptually, the traditional method is different from the lean manufacturing processes. For instance, inventory is the

foundation of traditional manufacturing labour. Stockpiles, however, are seen as a weakness in the system and are disputed by Lean Manufacturing, which calls them unnecessary. Lean Manufacturing stands in stark contrast to conventional manufacturing methods that rely on small order sizes, high capacity utilisation, and high inventories.

Inevitably, cultural problems and resistance to change would surface throughout the transition from a traditional to a lean manufacturing setting. Along with the effort, a programme for managing change is required. It is beyond dispute that businesses who have mastered lean manufacturing techniques outperform those that continue to use conventional mass production in terms of costs and quality (Singh and Sharma, 2009).

Green Production

Through research and process design, green manufacturing reduces waste and pollution in the manufacturing process. A renewable approach of generating goods and/or services that don't hurt the environment or ourselves is also supported and maintained by this technique. In addition to reducing pollution, green production aims to protect the earth's natural resources for future generations. The elimination of unnecessary expenditures and the enhancement of design and research are only two of the many advantages of green manufacturing.

LITERATURE REVIEW

Angell et al., in their historical analysis of environmental operations management, also explore the integration of environmental and operations management in terms of present research and practice.

Research by Huiy et al case shows that the fuzzy set-based technique may be able to appropriately account for the ambiguity and uncertainty of data used to calculate the manufacturing process's environmental impact.

University of South Florida professor Gary G. Bergmiller suggests that leading Lean businesses might profit from becoming green. He argues that a sustainable future can only be achieved by recasting environmental preservation and industrial development as complementary rather than opposing goals. His concern over the depletion of natural resources is great. He is confident that we can create a single, integrated system for zero waste manufacturing that will mitigate the negative environmental effects of production while ensuring economic success, so achieving the key goals of industrial ecology and sustainable development.

Hosseini provides a conceptual model for implementing and maintaining a green management system, outlining its core components. Incorporating GM (green management) and GP into a company's operations is likely to be more fruitful if the management pays close attention to the aforementioned factors (green productivity).

Lean and green production ideas were compared by Glenn Johansson and Mats Winroth. They indicate that they overlap somewhat and are complementary to one another. Both ideas relate to the elimination of waste during production. Lean theory suggests that reducing wasteful practices like stockpiling and rework may boost output per unit of input. The "green" notion, in a similar vein, promotes minimizing inputs like energy and material waste while increasing outputs like useful products. Additionally, employee involvement and training are required due to the Lean concept's strong emphasis on continual improvement. Improving environmental performance also requires encouraging and facilitating staff engagement and training in accordance with the Green concept. Lean manufacturing is a method that tries to fix current production issues while preventing new ones from cropping up. That is, rather

than using "end-of-pipe" solutions when the consequences happen, effort should be made to avoiding negative environmental repercussions. As a result, the study reveals that the concepts share characteristics in terms of source reduction, organizational change, and resource productivity.

The issue of uneven output was studied by Oliveira et al. in Brazil's small and medium foundry sector. It demonstrates how pouring times were cut down by using a computer simulation model to enhance industrial structure and balance the workload of staff, taking into account their multi-skilled training.

On a harvester assembly line in Brazil, Saurin et al. present recommendations for evaluating the impacts of LP on the workplace environment at the plant or division level. Other businesses struggling to strike a balance between lean operations and productive workplaces may find some guidance from the impacts discovered in that line. It is a viable solution for businesses interested in investigating how LP is influencing their employees because the method used for analysing the impacts is pretty straightforward.

2. CONCLUSION

The goal of this essay is to examine lean and green approaches. The goal of the literature review is to learn more about lean and green methods. We found that the most frequently mentioned practise was waste minimization. Today, operational and service excellence may be most effectively achieved by using lean and green techniques. Using lean manufacturing concepts has the potential to increase productivity and revenue. This page provides a comprehensive literature analysis on the history, evolution, and application of lean manufacturing, green manufacturing, and related topics.

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