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Improving Operations Performance of Lean Manufacturing in Small Scale Industries for Maximizing Productivity

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ABSTRACT

In today's manufacturing environment, assembly work is routinely characterized by short production cycles and constantly diminishing batch sizes, while the variety of product types and models continues to increase. Constant pressure to shorten lead times adds to these demands and makes the mix truly challenging, even for the most innovative manufacturers. The difficulties that companies face in today's marketplace are shifting customer demand, increased variation in products and demands for perfect quality. The way to escape this pitfall requires redefinition of inventory level and new production philosophy. As global competition is becoming more intense, competition has increased among lean producers. This has been quite evident as more and more mergers have been taking place among major companies. Competition among the lean manufacturers is based upon the assumption that; sustainable product related competitive advantages are unlikely to be developed

Keywords: Lean Manufacturing, Small Scale Industries, Maximizing Productivity etc.1. **Introduction**

In today's competition everyone is behind to increase the business. Customers are expecting more for the quality in product so that, standing with other competitors; it is needed to implement the lean manufacturing technique. Lean implementation gives the better quality of product and customer satisfaction without any investment. It reduces excess of inventory and reduce the cost or non-value added activity with the help various lean tools. Lean manufacturing also reduce the seven type waste occurring in industry. Like (1) Transport (2) Inventory (3) Motion (4) waiting (5) over processing (6) Over production (7) Defect.

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 [6].

2. Lean Manufacturing

Lean manufacturing is a system that integrates the daily work of producing and delivering products, services, and information of the problem identification and process improvement to eliminate waste and reduce production lot sizes. Lean manufacturing is the main aim of the high quality, low cost, and just in time delivery by shortening the production flow by eliminating waste. Lean manufacturing is a team base structure. It breaks down organizational barrier and develops highly trained and motivated employees who investigate problems and find solutions as a part of their job. Lean manufacturing is an integrated socio technical system whose main objective is to eliminate waste by concurrently reducing and minimizing supplier, customer, and internal variability. [7]

Lean manufacturing is an approach that depends greatly on flexibility and workplace organization. Lean manufacturing frequently utilizes techniques such as Just-in-Time (JIT) production, total quality management (TQM), Kaizen, 5S, total cost management, group technology (GT), concurrent engineering etc. In the following section literature reviews carried out to suggest area of research for lean implementation.

I. 3. Literature review

Martin Pech et. al. [1] studied methods of lean manufacturing to improve quality. Traditional and modern lean methods and their use in different organization are discussed. Statistical tools were used to determine the differences in use of lean production methods. The research results show a large

potential of lean introduction in small and medium sized organizations. This can help these non engineering organizations to improve their production quality.

Guilherme Luz Tortorella et. al. [2] stated that implementation of lean is a systematic approach of various management methods and practices. Researcher studied socio technical and ergonomics factors related with lean implementation. The methodology proposed in this research included combined techniques allowing identification of deficiencies related to adaption of lean technology. The outcomes of the study allow identification of implementation gaps in lean that are related to socio technical and ergonomic status of company. This will help in problem identification and developing a practice to convert them.

Saumyarajan Sahoo et. al. [3] have stated that Indian manufacturing firms have embraced organization wide transformation to achieve cultural and operational excellence. In recent years vast approaches have been proposed to improve business performance through implementation of lean. TPM and TQM have received considerable attention for adoption. The study of contribution of TPM-TQM implementation on business performance is carried out. The results from 160 manufacturing firms show that implementation of TPM & TQM over a long period of time contributes to improved business performance.

J. Hill et. al. [4] state that lean six sigma has rapidly established itself as key business process improvement strategy. It provides significant benefits to companies by focusing on waste reduction. The implementation of this strategy is finding wider applications in different environments. The study of application of this framework to maintenance repair and overhauling facility is done. The results show that continuous training and development of staff is necessary for successful implementation of lean six sigma. Strong leadership and knowledgeable, motivated and experience staff are important for effective implementation of this methodology.

Andrea Bellisario et.al. [5] Provides overview of existing research on performance management practices employed in lean manufacturing organizations. The results suggest that the performance management practices those are closest to front line action are most prominent. The results also show the limitations of accounting based performance management systems in lean manufacturing organizations.

Morriel Kasher et. al. [6] state that manufacturing firms value effective utilization of man, machine and material. The research was carried out on implementation of 5S system in window screen production process to improve manufacturing capacity per minute. The transportation waste was eliminated by identifying the material transportation inside the facility. Shelves were created nearest to operator to reduce time wasted in travelling.

Mehul Mayatra et. al. [7] reviewed literature on implementation of lean manufacturing techniques. It is states that Lean manufacturing is a philosophy to reduce the time between customer order and products are ready for the delivery by eliminating waste. Literature shows survey on various type of industry to apply the lean manufacturing, like apply in to automobile industry, and pharmaceutical company, cotton seed oil industry, health care hospital. It concludes that lean tool apply in different industry as per requirement but Value stream mapping techniques and 5s tool are much effective and use full tool for the detection of waste and improvement of the process.

Bikash Marasini et. al. [8] developed a model for implementation of lean in small scale industries in India. Small scale industries lack sufficient resources as compared to large scale industries. Implementing lean manufacturing has still become as an option for small scale industries to improve productivity. During this study fundamental method is studied which is relevant to all kind small scale industries. The methodology includes assessment of current state, problem identification and analysis, selection of lean alternative, implementation and monitoring. It is stated that this model is cheap and easy to adopt.

Mudhfar Alefari et. al [9] discuss about the role of management in implementation of lean manufacturing in industries. In this research it is stated that for successful implementation of lean manufacturing, proper support from management is necessary because lean implementation is a long term process during which management commitment creeps. The key expectations from management include top management commitment, leadership styles engaging and developing employees and setting a lean strategy. In a survey conducted during the research; management support for successful implementation of lean in SME is a key factor.

Anupama sing et. al. [10] presented a research on application of value stream mapping in small scale industries. In value stream mapping elimination of wastes and improvement in productivity is achieved. The non value added actions are identified during each step of operation. The process involves preparation of current state map and its analysis, implementation of suggested solution, preparation of future map and analysis of the future map. The results indicated effectiveness of value stream mapping by eliminating waste in cycle time. This lean tool is able to highlights process inefficiencies, transactional and communication mismatches, also it guides about the improvement areas.

Raghunath A et. al. [11] have given primary focus of the study on building a model for implementation of Six Sigma and lean manufacturing in SME sector in simple way which will ultimately lead to Lean Six Sigma Companies. The small and medium enterprises, especially component manufacturing industries, need to supply large variety and quantities of parts with the changing demands of their customers. The traditional mass production systems find hard to match high product variety and demand issue. Six sigma and lean offers solutions to these problems improving the product quality to a level that traditional manufacturing methods cannot easily match. Lean production also significantly lowers the amount of high skills and efforts needed to make a product with given specification. It also reduces the cost of production through continuous improvement, thus it compensates the low cost advantage of mass production system.

Anand H. Mishrikoti et. al. [12] discussed issues and expectations in implementation of lean manufacturing technique in SSI units. In this study it is observed that lean tools assist in the identification and elimination of lean waste. As waste is eliminated; product quality is improved while production

time and cost are reduced. Thus improvement in productivity leads to energy conservation. It is also stated that appropriate application of lean philosophy helps companies increase their performance considerably. Productivity has a major impact on energy use and conservation in manufacturing plants. It was observed during the study that there exists a strong relationship between energy efficiency improvement measures and productivity in industry and there is need for transformations and changes by adopting LEAN manufacturing.

M. Shabeena Begam et. al. [13] examines the feasibility of practical implementation of lean within various manufacturing industries. The challenges faced in the process of implementing and to sustain lean is a tedious job. Lean as a concept relates to time, cost, interest, and involvement, and together support the new change for development of a firm. The study reveals that new firms introduce and accept lean manufacturing along with other innovative concepts than the old and existing firms. Study concludes that manufacturers are under intense pressure to find a new ways to reduce production cost, elimination of waste, enhance quality of product, and better customer satisfaction. The research summarized major reasons for the low level of lean management as anxiety in changing the attitude of workers, lack of awareness, and training about the lean management concepts, cost and time involved in lean implementation. The results of the study show that the manufacturing industry must give more attention to implement lean management in all the key areas.

P.M. Rojasra et. .al.[14] give details of implementation of 5S methodology in Krishna Plastic Company, Udhyognagar (Gujarat). In this study it is the need to deliver high quality product through continuous improvement at reduced the cost to meet the challenge of maintaining global quality standards with competitors is emphasized. The author states that all Lean manufacturing tools cannot be implemented in small scale industry because of limited resources, i.e. finance, infrastructure, work force etc. The model of implementation of 5s is proposed and its outputs are analyzed. The efficient implementation of 5S technique has lead to subsequent improvement in productivity of the manufacturing unit under study. The 5S improves environmental performance and thus helped in reduction of manufacturing wastes. It also promoted neatness in storage of raw material and finished products. The results after the 5S implementations states that production system efficiency is improved from 67% to 88.8% in the successive week. The 5S implementation has lead to the improvement of the industry in many ways such as (1) Better usage of working area, (2) Work environment improvement (3) Prevention of tools losing. (4) Reduction in accidents. (5) Reduction in accidents.

S. Krishna Kumari, et. .al.[15] presented a case study of lean implementation in a small scale industries. During this study Single Piece Demand driven system is implemented for the semi- process industry. It is stated that the large scale industries have successfully implemented lean in order to sustain in a dynamic environment but the small scale industries are reluctant to implement lean due to economic factor. The benefits of lean implementation in large scale sector have encouraged the small sector to positively implement lean manufacturing principles. The use of line balancing technique and cellular manufacturing layout to reduce station time is done in this study. This resulted in lower inventories, less material movement, reduction in total number of machines, less number of operators to meet the varying demand.

Jukka Majava et.al. [16] discussed case study for lean manufacturing implementations in European economy. It is stated that despite the increased interest in empirical lean research, the body of knowledge about lean manufacturing development in SMEs is currently insufficient. The framework developed during this research can be adopted by other SMEs can utilize in identifying their problem areas and creating development proposals for their production activities.

Concluding Remarks-

The literature review has been studied from implementation of lean manufacturing principles in small scale organizations. It briefs the contribution and scope of lean manufacturing implementation in small scale industries. From the literature review it is understood that there is a large scope for introducing lean manufacturing concepts in Indian SSI units as they contribute to majority of manufacturing activities. The concepts of lean manufacturing can be applied to any type of industry by adopting right methodology and model in the context of seven wastes.

REFERENCES

1. Pech, M., Vrchota, J., & Bednář, J. (2021). Predictive maintenance and intelligent sensors in smart factory. Sensors, 21(4), 1470.
2. Tortorella, G. L., & Fettermann, D. (2018). Implementation of Industry 4.0 and lean production in Brazilian manufacturing companies. International Journal of Production Research, 56(8), 2975-2987.
3. Kumar, S., Sahoo, S., Lim, W. M., Kraus, S., & Bamel, U. (2022). Fuzzy-set qualitative comparative analysis (fsQCA) in business and management research: A contemporary overview. Technological Forecasting and Social Change, 178, 121599.
4. Burrows, D. N., Hill, J. E., Nousek, J., Kennea, J. A., Wells, A., Osborne, J. P., ... & Hartner, G. D. (2005). The Swift X-ray telescope. Space science reviews, 120, 165-195.
5. Bellisario, A., & Pavlov, A. (2018). Performance management practices in lean manufacturing organizations: a systematic review of research evidence. Production Planning & Control, 29(5), 367-385..
6. Kasher, M., Zhao, M., Greenberg, A., Gulati, D., Kokalj-Filipovic, S., & Spasojevic, P. (2021, June). Inaudible Manipulation of Voice-Enabled Devices Through BackDoor Using Robust Adversarial Audio Attacks. In Proceedings of the 3rd ACM Workshop on Wireless Security and Machine Learning (pp. 37-42)..

7. Mayatra, M., Chauhan, N. D., & Trivedi, P. (2015). A literature review on implementation of Lean Manufacturing Techniques. International Journal of advance research, ideas and innovations in technology, 1(4), 4-10.
8. Alam Md Tawqueer and Gangil Manish cc Employees Skills Inventory using Deep Learning for Human Resource Management" Research Journal of Engineering Technology and Management (ISSN: 2582-0028) Volume 2, Issue 4, December 2019.
9. Shantilal Sonar Prashant and Gangil Manish "Warehouse Sales Forecasting using Ensemble Techniques" Research Journal of Engineering Technology and Management (ISSN: 2582-0028) Volume 2, Issue 4, December 2019.
10. Shantilal Sonar Prashant and Gangil Manish "A Review of Optimization-associated examine of Electrical Discharge Machining Aluminum Metal Matrix Composites" Research Journal of Engineering Technology and Management (ISSN: 2582-0028) Volume 2, Issue 3, September 2019.
11. Kumar Hemant Dave Kush and Gangil Manish "An Approach to Design of Conveyor Belt using Natural Fibres Composite" Research Journal of Engineering Technology and Management (ISSN:2582-0028) Volume 2, Issue 3, September 2019.
12. Kumar Hemant Dave Kush and Gangil Manish "An Assessment of Duplex stainless Steel pipe for Oil and Gas Application" Research Journal of Engineering Technology and Management (ISSN:2582-0028) Volume 2, Issue 3, September 2019.
13. Sah Ram Balak and Gangil Manish "Optimization Design of EDM Machining Parameter for Carbon Fibre Nano Composite" Research Journal of Engineering Technology and Management (ISSN: 2582-0028) Volume 2, Issue 3, September 2019.
14. Kantilal Patel Bhaumik and Gangil Manish "Scope for Structural Strength Improvement of Compressor Base Frame Skid" Research Journal of Encoineerinc Technology and Management (ISSN: 2582-0028) Volume 2, Issue 2, June 2019.
15. Kantilal Patel Bhaurnik and Gangil Manish "Recent Innovations for Structural Performance Improvement of Cotter Joint" Research Journal of Engineering Technology and Management (ISSN: 2582-0028) Volume 2, Issue 2, June 2019.
16. Tanel Hirenkumar Vishnubhai and Gangil Manish "Recent Innovations for Structural Performance Improvement of Plummer Block" Research Journal of Engineering Technology and Management (ISSN: 2582-0028) Volume 2, Issue 2, June 2019.