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REVIEW OF LEAN MANUFACTURING IN INDUSTRIES TO IMPROVE THE PRODUCTIVITY AND REDUCE THE HUMAN EFFORT

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ABSTRACT

Every industry must use lean manufacturing to be competitive. The 21st century's standard industrial style is lean production. "Lean manufacturing" refers to a wide range of concepts, including "lean management," "lean production," and "lean manufacturing." The goal of lean manufacturing is to shorten the time it takes for a customer's order to be fulfilled by reducing waste. Using this method, products and services may be produced with little buffering expenses. A literature review of many types of industries where lean manufacturing might be used is provided in this study. For example, it covers the automotive and pharmaceutical industries, cotton seed oil production, and health care facilities.

Keywords:lean manufacturing, kaizen, kanban, JIT, VSM, 5s

1. Introduction:

Krafcik (1988) coined the phrase "lean production" and drew from the book "The Machine That Changed the World: The Story of Lean Production" for its inspiration (Womack et al., 1990). Toyota's manufacturing method is the foundation of lean production, which focuses on reducing and eventually eliminating all forms of waste. In the dictionary, waste is something that consumes resources without producing anything of worth. There are several benefits to lean manufacturing, including reduced lead times and changes in product quality, as well as a more efficient use of human resources in the plant. As well as a 50 percent reduction in human labour.

Lean manufacturing tools:

Cellular manufacturing, JIT, continuous improvement, production smoothing, standardisation of work, total productive maintenance (TPM), SMED, and other lean technologies and principles are accessible. In a matter of minutes, we have a thorough understanding of the lean tool.

Cellular manufacturing: There is less transportation waste with cellular production. Reduce the stock as well. A procedure known as "one piece flow" is used in cellular manufacturing. Customer needs can't be met by utilising standard product lines; U-shaped product lines should be used instead.

Just in time (JIT): Lean manufacturing relies heavily on timely delivery. It's linked to the use of lean methodologies. A just-in-time production system ensures that the proper part is delivered at exactly the right moment.

Production Smoothing: Smoothing is the technique of distributing the workload over a period of time such that it is evenly distributed. It gives you the ability to respond quickly to urgent orders, and it reduces the risk of overproduction.

Total productive maintenance (TPM): The goal of total productive maintenance is to reduce downtime and remove defects and scrap by employing a variety of procedures. TPM is a cornerstone of the lean philosophy. Preventive machine maintenance and self-maintenance awareness are being introduced.

Continuous Improvement: Improve the product quality and the level of customer satisfaction as part of a never-ending process of improvement. Improvement is a part of Kaizen and 5s, a continual process of improvement.

Kaizen:A term in Japanese that implies "continuous improvement" is kaizen (kai means continuous and zen means improvement). In order to achieve its primary goal of making a better product and delighting customers.

5s: It goes through a five-step process of improvement. There are five "S" in all, and each "S" has a distinct meaning and function. Five S's are: Sort, Put (in place), Shine, Normative and Sustain (indefinitely).

2. LiteratureReview

Tomas Rohacet,al.[1]Value stream mapping may be used to demonstrate how lean methods, such as the 5-Why and Ishikawa chart, can be used to minimise lead time and inventory management for plastic products in health care.

Jafri MohdRohani et.al. [2]This article examines the colour industry's production line utilising value stream mapping to find and remove waste through the development of teams, product selection, conceptual design, and timeline formulation using takt time calculations.. Some lean strategies, such as changeover time and 5s, were used to reduce time from 8.5 days to 6 days and value-aided time from 68 minutes to 37 minutes, respectively, using these techniques.

Pravinshaswat at, el. [3]Value stream mapping may be applied to the bearing business in order to minimise inventory and lead time. Value stream mapping (VSM) is explained in this article, as well as the methods for implementing VSM. Using this case study, we'll show how to reduce the amount of work in process inventory and lead time by implementing 5s and kanban.

Taho yang yiyokag [4]The lean manufacturing process for fishing nets has been proposed and implemented, using different lean tools and simulation methods and the make to order (MTO) process for the regular shipment. Additionally, the VSM tool may be used to create a future state map and improve service levels while decreasing lead times, according to the statement that outlines how value stream mapping should be implemented. Lean manufacturing can be used successfully in every manufacturing business, and cutting costs through waste reduction is one of the primary ways it does so.

Santosh kumaret, al. [5]Reduce the cycle time in a truck body assembly line and boost productivity with the use of the lean tool, which can be applied through time measurement methods and line balance efficiency. Moreover, lean manufacturing is defined as a business strategy that aims to continually improve the production process.

K. Venkataraman [6]"Lean manufacturing" is being used by a number of enterprises in recent years to reduce and eliminate waste. In this post, we'll show you how to shorten the crank shaft's cycle time using value stream mapping. It is possible to construct a current state map of the crank shaft assembly line and a future state map for enhancing the process of crank shaft assembly, below is a three assembly options for crank shaft manufacturing. Three types of kaizen were used to improve the manufacturing process and reduce waste. Analytical Hierarchical Process (AHP) was used to make decisions about which processes to apply and which results to obtain, and single piece flow was used for crank shaft manufacturing to reduce inventory and respond quickly to customer demand.

P. Arunagiri et, al. [7]A weighted average technique was utilised to identify the most beneficial lean tools in the car sector, with 5s being the most popular way for eliminating waste. They studied 91 industries and employed 30 or more lean tools to come up with their findings**.**

Ratneshwarsinghet,al. [8]Implementing TPM in a machine shop may cut down on downtime and boost productivity. A variety of TPM components, such as 5s, jishu-hozen, scheduled maintenance, quality maintenance (QM), kaizen office, and SHE/SHE/ESH, are used sequentially to enhance product quality and overall equipment effectiveness (EHE/SHE/SHE).

Boppana v. chaudhary et, al. [9]a case study of the creams and ointments product line will be used to illustrate how lean manufacturing may be implemented in a pharmaceutical organisation. Fixed operational costs and the inability to deliver products were further issues in the sector. In this work, we apply lean manufacturing techniques to identify the source of waste and use VSM, a lean tool. Value-added and non-value-added processes may be identified with the use of VSM, a mapping approach. Use the 5-Why approach to gather information on the present state of affairs. After that, use the 5s tool to construct a future state map for

improvement. Cellular manufacturing was also employed, with the end result being a reduction in inventory, increased customer satisfaction, on-time delivery, a reduction in overall cycle time, and a drop in non-value-added time. Additionally, the amount of usable floor space was reduced.

Jennies angeliset, al. [10]When it comes to the assembling of discrete parts into finished products, Lean is the industry standard. The ability of employees to solve problems in an evolutionary fashion is essential to the success of a Lean implementation. In order for this to happen, employees must participate in improvement initiatives and put in place the proper processes.

Rachna shah et.al. [11]With lean manufacturing, the primary goal is to remove waste by simultaneously reducing and minimising variability in the supply chain as well as within the company. Aside from that, according to a 2001 study, lean manufacturing and lean production are essentially the same thing. It is not possible to adopt lean manufacturing as a quick fix to short-term competitive problems. Any sector may benefit from lean manufacturing. This article discusses how to implement lean management in a hospital to increase patient happiness and service quality. In this research, the lean tool kaizen was used to improve the service level, while 5s was used to clean and organise the workplace.

odineshsethat.el. [12]Identifying and removing waste via continuous improvement is the goal of lean manufacturing. Value stream mapping is used in this article to reduce waste in the cotton seed oil business. A survey of the Indian cotton oil seed business will be conducted in this study, and a sample of Indians will be selected and a questioner will be prepared to collect input by phone and email. After that, create a comprehensive supply chain map, identify inefficiencies, and, with little tinkering, fix them in order to boost productivity.

Alberto portioli-staudacher [13]has offered a concept of how lean manufacturing might be applied in various service industry contexts. The emphasis of the study was on back-office tasks in logistics and finance firms that conduct high volume, low diversity operations. When he saw how crucial it was for the lean implementation in service to be successful, the author decided to conduct a brainstorming session at a few service businesses that were about to implement lean. For a successful implementation, the author argues, it's crucial to look beyond industry differences and instead consider differences in procedure (value streams in the Lean terminology). When it comes to their process, organisations undergoing lean transformation are able to demonstrate.

Osama m. Erfan [14]is interested in doing a study on the use of lean tools in the medical field. The goal of this study is to remove waste in the healthcare business through the application of lean methodologies. To eliminate waste, the goal is to enhance capacity and efficiency. Data collected from patients who attend the emergency department (ED) on a regular basis is used in this study, which was conducted in a healthcare facility in Libya. Value stream mapping is a technique used in this study to determine the value contributed and non-value added activities.. The takt time analysis is where the investigation gets its start. A current state value stream mapping is done from the patient's registration through the assessment of the outcomes. Current state mapping shows that this treatment has an extremely long cycle time, making it a bottleneck process. The cycle time of therapy is reduced by drawing a future state map. In other words, the results of the implementation suggest that lean tools are highly effective in lowering the effect, and future state mapping helps to enhance the overall performance of the healthcare sector's emergency department in Libya.

Blecha et al. [15]The Georgia Tech Research Institute looked at the impact of flexible Team Work on Productivity in clothing when the modular manufacturing approach was implemented. The strategy that was discovered to be the most efficient and adaptable was put into practise after being tested in two separate areas. An effort was made to alleviate bottlenecks by employing groups of cross-trained personnel from other operations who conducted the whole assembly process. Because it provided easy and effective ways of producing garments on the floor, the significance of group effort, operator engagement, and quick throughput time was placed on quality assurance at the source. In the manufacturing area, it was discovered that using modular cells, which were created and put to use, increased productivity.

3. Conclusion

Increasingly, industrial businesses are focusing on Lean Manufacturing as a means of improving their competitiveness. Reduced manufacturing costs, improved productivity, and shorter production lead times are the primary advantages of this strategy. There are three key divisions in the economy. The primary, secondary, and tertiary sectors of the economy. To explain how lean manufacturing ideas and practises are applied in a service sector context, this article presents the bibliographic research of how lean manufacturing is employed in the third sector.

Manufacturing or production industry is a primary sector where lean manufacturing can apply. Lean manufacturing in manufacturing is basically used for continuous improvement, stopping losses, increasing rate of manufacturing, consuming time and also for improve quality of products. The practice of lean manufacturing is a necessary part of all types of small, medium and large industries. In this paper we discuss various researches implementation in industries.

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