INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

**ISSN: 2454-132X**
**Impact factor: 4.295**
***(Volume 4, Issue 3)***
Available online at: www.ijariit.com

# A review on applications of lean manufacturing in the agricultural equipment's industry

*Ruchika Anil Adhau*
*ruchikaadhau@gmail.com*
*Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra*

*Dr. Javed .G Khan*
*itsjaweed@yahoo.co.in*
*Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra*

*Dr. S.P Trikal*
*sptrikal1971@gmail.com*
*Shri Sant Gajanan Maharaj College of Engineering, Shegaon, Maharashtra*

## ABSTRACT

***The main aim of this research paper is to find the advantages of Lean tools to an agricultural equipment industry. Every organization because of heavy global competition is constantly looking for more markets a working hard to reduce its cost. Lean Manufacturing is considered as the best cultural change any organization can adopt so that it can meet the global challenges and stay in the competition. So the lean survival of an organization depends on how quickly it can adapt to the lean manufacturing culture.***

***The term Lean in the manufacturing context implies identification and elimination of waste in all the processes involved. In our everyday conversation, we often used the word waste. Identification of waste is critical to every organization. Lean manufacturing can apply to every process and it can bring about great results. Lean manufacturing also means increasing the speed by reducing the process time. If there are wasteful activities in any process, then the process becomes time-consuming. If the manufacturers are able to identify those activities which do not add value and eliminate them, then undoubtedly the process time, they will be able to reduced and make the process faster. Lean manufacture has a comprehensive set of elements, rules, and tools that focus on the elimination of waste and the creation of value.it aggressively seeks to eliminate all non-value added activity and tries to instill the philosophy of continuous incremental improvement Lean manufacture, Also means speedy, smooth and economical manufacture.***

**Keyword-** *Using 5S, Kanban, Kaizen, Transportation and distance, Space saving, Quality Improvement, Health and safety, ERP, Manpower man-hour, Poka-yoke*

## 1. INTRODUCTION

To facilitate adapting to any concept, it is important that the correct tools be used to get maximum benefit for instance in the case of machining, for holding and cutting tools only that fixture should be used which will help in the same. Similarly, for implementing lean manufacturing it is necessary to use those tools which make it highly productive. But before implementing lean manufacturing, we need to understand each of these tools and how to use them. It is not necessary that all the tools should be used in every project. The use of the tools will greatly depend on the area of application. The tools should be selected which makes it convenient and economical for the implementation teams to achieve the goals of the teams. The tools are very simple, easy to understand and used by the shop floor personnel. No extraordinary talent is needed to make use of these tools. But it is necessary to understand the underlying principles of these tools and get the employees adequate training for all.

## 2. AGRICULTURAL EQUIPMENT INDUSTRY

Overview of the agricultural machinery market in IndiaAgriculture is a significant sector of the Indian economy and over 70% of the country depends on it as their major source of income. Farmers are adopting modern agricultural technologies to increase farm yield due to the increase in demand for food supply. The agricultural machinery market is predicted to grow at a CAGR of nearly 8% during the forecast period. Farm equipment manufacturers are concentrating on integrating technologies like robotic systems, GPS, and Google Earth navigation systems in the existing Indian agricultural machinery in the agriculture equipment market in India to improve productivity. Another major driver for the predicted growth in this market is the low rates and government subsidies offered to farmers to adopt agricultural machinery. [1]

## 3. AGRICULTURAL EQUIPMENT INDUSTRY PROBLEMS

 

Lack of manpower a skilled or learned worker is often immediately ready to assume the responsibilities of a new job. They typically have an educational background that matches the qualifications for the job. A learning curve will always exist as they become acclimated to company policies. Skilled workers will need to teach who to go to in the business for various functions. However, other than that, they generally are ready to start producing results. On the other hand, unlearned or unskilled employees are usually not yet trained to perform specific jobs. They might lack educational requirements, and some might have language barriers to overcome. Small business employers often need to spend extra time teaching unskilled workers basic job functions. [2]

Waste of time the reduction in stress level is main content of time management. If you follow time management properly then you will get better result. Even you can relax yourself while enjoying your work. Stress leads to spoiling of work schedule and disturbed work schedule can never provide best results. The result will come undoubtedly but no one can say it will be best or worst.

### 3.1 POOR HANDLING,

Factors that increase the risk of injury include the load being too heavy, large, difficult to grasp or unstable, the task being too strenuous or involving awkward postures or movements, and the working environment lacking sufficient space, having slippery, uneven or unstable floors, having extreme temperatures or poor lighting.

### 3.2 POOR PACKAGING,

An inconsistent and insufficient supply of raw material Seasonality of crops quality of raw material supply and high losses during transport from farm to factory Inappropriate or obsolete processing and ancillary equipment Poor and inconsistent quality of processed products Sub-optimal use of processing facilities and equipment Poorly trained personnel and a lack of qualified food technologists A lack of proper hygiene and sanitation practices Inappropriate packaging materials and high packaging cost Weak or non-existent market development A lack of technical support for the agro-industrial sector Absence of good management of the processing facility once commercialized.

Lack of proper instruments for handling and processing and lack of scientific techniques for packaging of agricultural produce results in heavy wastage and loss to the farmers. Poor handling and packaging expose the product to substantial physical damage and quality deterioration.

### 3.3 LACK OF WAREHOUSING AND STORAGE FACILITIES

Warehousing and storage facilities in India. It results in getting poor prices by the industry honor. Most of the existing storage facilities are having very poor quality (are in very poor condition) which also affects the quality of the agricultural equipment produces.

Due to improper arrangement 0f handling equipment ’s because numerous injuries can result from improperly handling and storing materials, workers should also be aware of accidents that may result from the unsafe or improper handling of equipment as well as from improper work practices. In addition, workers should be able to recognize industry honor have to sell out their produce as soon as it is ready because there is a lack of an adequate number of the methods for eliminating or at least minimizing the occurrence of such accidents. Employers and employees should examine their workplaces to detect any unsafe or unhealthful conditions, practices, or equipment and take corrective action.

Lack of improper fabrication processes Defects may be produced during the processing, fabrication, and use of metals in-service. Those that are introduced early in the processing chain may be carried forward to later stages where they can cause processing problems, or initiate failure. Some of these defects result from complex metallurgical, chemical and physical reactions that metals undergo during these processing operations and are difficult to avoid. They may also be inherent to the process. Whilst it is possible to minimize the effects of these reactions by applying knowledge about a materials behavior, good process, and procedural control, it is preferable not to introduce problems that can be avoided by good practice [3]

### 3.4 LACK OF ADVANCE MACHINERIES

Advance machines can be used continuously 24 hours a day, 365 days a year and only need to be switched off for occasional maintenance. Advance machines are programmed with a design which can then be manufactured hundreds or even thousands of. Each manufactured product will be exactly the same. Advance machines can be programmed by advanced times design software such as Pro/DESKTOP®, enabling the manufacture of products that cannot be made by manual machines, even those used by skilled designers/engineers. [4]

### 3.5 LACK OF ADVANCE SOFTWARES

The performance of all work units that make up their business because better use time is increased. If you previously had to make reports and take them from one place to another, now the time is spent on other activities. To improve performance and save time, optimize the control and analysis of management decisions there in the long term, reduced costs for the company. When a company has an ERP system is more competitive in the environment in which it operates. Elimination of unnecessary operations and data. Reduction of time and costs of litigation then, as each module of the ERP system enters the same real-time database, another advantage is that no duplicate records or playback operations, i.e., redundancy is avoided. [5]

## 4. LEAN TOOLS FOR AGRICULTURE EQUIPMENT INDUSTRIES

Lean Manufacturing tools are use for capacity utilization, based on a survey of manufacturing enterprises in the Great Poland. The aim of the study was to demonstrate what Lean Manufacturing tools are the most common implementation in manufacturing enterprises of various industries and the effects which brings their use. The article also attempts to demonstrate the influence of the enterprise on the use of the tools of Lean Manufacturing**.** Lean manufacturing is a management concept. It boils down to the fact that all employees continually strive to reduce costs, shorten the delivery cycle and increase the quality of products, and all this in order to meet customer expectations and become more competitive in the market. The concept of Lean Manufacturing focuses on eliminating waste, which is all that brings the cost, and brings no added value. Muda

 

appears in place of manufacture. Implementation of Lean enterprise is an efficient and effective way to reduce the cost of the enterprise without incurring high capital expenditures. Applying Lean also increases the competitive advantage while reducing the operating costs of the enterprise.

### 4.1 5s-

5S is a workplace organization method that uses a list of five Japanese words: seiri, seiton, seiso, seiketsu, and shitsuke. These have been translated as "Sort", "Set In Order", "Shine", "Standardize" and "Sustain". [1] The list describes how to organize a work space for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order. The decision-making process usually comes from a dialogue about standardization, which builds understanding among employees of how they should do the work. [6]

### 4.2 KANBAN

A goal of the kanban system is to limit the buildup of excess inventory at any point in production. Limits on the number of items waiting at supply points are established and then reduced as inefficiencies are identified and removed. Whenever a limit is exceeded, this points to an inefficiency that should be addressed. [4]

### 4.3 ERP SOFTWARE

ERP software is considered to be a type of enterprise application, that is software designed to be used by larger businesses and often requires dedicated teams to customize and analyze the data and to handle upgrades and deployment. In contrast, Small business ERP applications are lightweight business management software solutions, often customized for a specific business industry or vertical. [5]

### 4.4 CNC MACHINE

Computer numerical control (CNC) is the automation of machine tools by means of computers executing pre-programmed sequences of machine control commands. This is in contrast to machines that are manually controlled by hand wheels or levers, or mechanically automated by cams alone. In modern CNC systems, the design of a mechanical part and its manufacturing program is highly automated. The part's mechanical dimensions are defined using computer-aided design (CAD) software, and then translated into manufacturing directives by computer-aided manufacturing (CAM) software. The resulting directives are transformed (by "post processor" software) into the specific commands necessary for a particular machine to produce the component, and then are loaded into the CNC machine. [6]

## 5. METHODOLOGY FOR IMPLEMENTING LEAN

Study the production system of the industry Study the important process parameter for manufacturing agricultural equipment. Study of the input variable in process Collection of varies data such as take of speed temperature pressure raw material Data collection analysis Application of 5s and Kanban technique optimize the parameter and minimize defects as results.

Bucket elevator belt + hole mechanism before Holes are made manually after by using template holes are made on machine by special arrangement. Change the fabrication process of side panel before welding done on the overlapping of the sheet after inline welding done on the side panel. Change the location of store old store after open store at shop floor. Change the manufacturing process before taper collaring Ring Is made by hammering after Ring is made on a hydraulic press. Install CNC sheet metal cutting machine after sheet metal cutting with the help of a gas cutter CNC sheet metal cutting machine. Fixture for pulling screw before pulling the screw manually after using livers crane power used for pulling the screw. The fixture is made for upper part of elevator upper part of the elevator is made directly on machine upper part of the elevator is made on the floor with the help of fixture and assemble on top. Localizes store only main store in company localized store made for an individual section. Pneumatic pedal placed on bending machine pedal press by mechanical linkage pneumatic cylinder placed on bending machine pedal. Installation of ERP system register are maintaining for data ERP business software used for maintaining data.

## 6. BY USING LEAN TECHNIQUE BENEFITS ARE GIVEN BELLOW

The implementation of lean manufacturing through trying to make value flow at the pull of the customer (Just in Time) prevents and eliminates waste in processes. Waste being categorized as part of the seven wastes; Transport, Inventory, Motion, Waiting, Over-processing, Overproduction, and Defects.

All of these wastes have a direct impact on costs, they are all non-value adding operations, operations that customer would not be happy to pay for and add no value to the product or service that you provide.

Improved quality – A lot of the activity in a lean environment is geared towards improving quality. As quality issues arise, problem-solving techniques are used to root cause the problem. From there, mistake proofing is put in place to strengthen the process and prevent recurrence. As a result, the quality of the product will be improved.

Manpower reductions – One of the major benefits of lean is getting more done with fewer people. With standardized work and increased efficiencies, the ability to do the job with fewer people becomes a very real possibility. This does not mean you have to send these people to the unemployment line. The concept of lean would have these freed-up people utilized to perform further kaizen activity, training to enhance skill level, or maintenance of the system once it is implemented.

Easier to manage – The work instructions and standardized work let people know what they have to do and when. This makes managing an area much easier. And problems will still arise. But they will be much easier to deal with in a team environment where the support groups are eager to help solve problems.

Total Company Involvement – Lean is meant to involve the whole company. It is not intended to be put into action in only one area. It is a management philosophy which should include every part of your organization. This helps promote the concept that everyone in the company is part of the team.

Problem Elimination – Lean manufacturing forces you to attack an issue and continue to investigate it until it has been

 

eliminated. Root cause analysis and cross-functional teams are utilized to ensure a problem receives the level of attention it deserves to correct it.

Reduced Space – As part of the waste reduction process, space will be created. Reduction of finished and raw inventory will save space vertically in your racking as well as horizontally across your floor.

Safer Work Environment – Visual management and 5S will help identify when things are out of place. When unnecessary elements are removed from the operation, the workplace becomes much more organized. And an organized work environment is a safe work environment.

Improved employee morale – This is a benefit that may not be realized during the initial stages of implementation. But once the concept of lean starts to get accepted by the employees, Employee involvement and empowerment will make all members of the company feel like a contributing part of the team. And the reduction of uncertainty in the workplace, as a result of lean, will reduce stress in your team members and lead to improved employee morale.

Improved Customer Service; delivering exactly what the customer wants when they want it. Improved Productivity; Improvements in throughput and value-add per person. Quality; Reductions in defects and rework. Innovation; staff is fully involved so improved morale and participation in the business Reduced Waste; Less transport, moving, waiting, space, and physical waste. Improved Lead Times; Business able to respond quicker, quicker set ups, fewer delays. Improved Stock Turns; Less work in progress and Inventory, so less capital tied up.

All of the above have financial impacts on business, as well as helping become a business that can better react to and meet your customer's needs.

## 7. LIMITATIONS

Because only a small amount of inventory is kept on hand, lean manufacturing depends heavily on suppliers that can provide products for the manufacturing process dependably and without interruption. Problems like employee strikes, transportation delays and quality errors on the part of suppliers can create manufacturing holdups that can be fatal. Vendors may be unable or unwilling to supply parts or products on a tighter schedule or in smaller amounts. These needs can burden suppliers with unprofitable costs and create tensions that ultimately affect the manufacturing process and can cause frequent changes of suppliers, or even difficulties finding suppliers who can provide on the necessary schedule at all.

Implementing lean manufacturing often means completely dismantling previous physical plant setups and systems. Training employees can be lengthy and acquiring managers experienced in the lean manufacturing process can add considerably to company's payroll expenses. The purchase of machinery that increases efficiency and the setup of smaller work cells can add to the long-term debt. Small and medium-sized businesses, in particular, may find the cost of changeover to lean manufacturing processes prohibitive.

Lean manufacturing processes require a complete overhaul of manufacturing systems that may cause stress and rejection by employees who prefer old ways of doing things. Moreover, lean manufacturing requires constant employee input on quality control, which some employees may feel disinclined or unqualified to do. Older employees may prefer previous to methods and can cause resistance among others in the workgroup. This is where good managers become crucial the changeover lean manufacturing. There may also be some difficulty finding managers with sufficient leadership and persuasion skills to overcome this resistance.

Because lean manufacturing processes are so dependent on supplier efficiency, any disruption in the supply chain--and therefore, on production--can be a problem that adversely affects customers. Delivery delays can cause long-lasting marketing problems that can be difficult to overcome.

Directly tied to the lack of flexibility or margin for error is the potential for missed delivery deadlines. Breakdowns can cause to harm primary customer relationships if you don't deliver as promised. Wholesale or retail buyers need goods by deadlines to meet the demand from customers. If consistently fail to provide timely shipments, buyers look for suppliers that can. Sometimes, don't even get a second chance on a major miss.

## 8. CONCLUSION

Lean may offer an opportunity for industry honor to increase their level of competitiveness by reducing waste and improving the quality of agricultural equipment this strategy may certainly allow honors to differentiate their produce within the supply chain. However, for lean to be successfully applied workers need to be acquainted with the principles of lean. Work cost for them.rs may be able to bring in the required skills through a new manager or consultants although this would also present an extra.

The present study utilizes literature review, instrument reliability using factor analysis, descriptive statistics and inferential statistics to explore the dimension of Lean manufacturing, its constructs, the degree of association among constructs, their role and relationship with firm performance especially in context to Indian manufacturing industry. An exhaustive literature review was done through available secondary sources like books, journals, monographs, reports, magazines, newspapers, online sources. The aim of the literature review is to understand lean manufacturing, its origin, conceptual development, definition, its present status and the practices adopted. The various tools or dimensions of lean manufacturing were studied in detail to assess the dimensions that lead to effective implementation of lean manufacturing and its relationship with firm performance.

## 9. REFERENCE

[1] SIMPLIFIED LEAN MANUFACTURER: Elements, Rules, Tools, and Implementation N. Gopalakrishnan.
[2] Nadia Bhuiyan, Amit Baghel, An overview of continuous improvement: from the past to the present, Management Decision, 43 (5) (2005) 761 – 77.
[3] Graves, R., Konopka, J.M., Milne, R.J., 1995. Literature review of material flow control mechanisms. Production Planning and Control 6 (5), 395–403
[4] Rahani AR, Muhammad al-Ashraf, Production Flow Analysis through Value Stream Mapping: A Lean

 

Manufacturing Process Case Study, Procedia Engineering 41 (2012) 1727 – 1734.

[5] Monden Y, Toyota Production System. Industrial Engineering and Management Press, Norcross, GA 1983

[6] Rajesh Kumar Mehta, Dharmendra Mehta, Naveen K Mehta, An Exploratory study n employee's perception towards lean manufacturing systems, Management & marketing, Volume X (2012) issue 1/20

[7] Government of India, (2011), Department of Agriculture & Cooperation, Ministry of India, Government of India, New Delhi.

[8] Gopalakrishnan, N. (2010). Simplified Lean Manufacture: Elements, Rules, Tools, and Implementation. New Delhi: PHI Learning Private Limited.

 