

Review on Implementation of Lean Tools and Impact of Ethnographic Factors on 5S

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Abstract— This review focuses on the methods and techniques of lean manufacturing used to increase the efficiency of all processes in the company. Emphasis is given on implementation of 5S, role of workers in the success of 5S and ethnographic effect on the growth of company. Result of review shows that, the lean tools lead to process improvement by costs reduction, increasing of effectiveness and efficiency in the processes, maintenance and improvement of the machines efficiency, safety, security, quality and reduction of the industry pollution, proceedings according to decisions. It deals with the labour issues and how it leads towards the failure of 5S. Lean techniques can be used to organized workplaces.

Key words: 5S Implementation, Lean Tools, Ethnographic, Labour Issues

I. INTRODUCTION

The 5S system is a lean system used for organizing and managing manufacturing operations so that they require less human effort, space, capital, and time to make products with fewer defects.

All these benefits result in greater productivity, better quality, less cost, workplace safety, and high morale. 5Ss lays the foundation for the company’s overall lean production system, and lack of a robust 5S system will make other lean tools ineffective. Implementing 5Ss alone may not bring the desired results, unless it is followed by educating the target work group on the corporate objective and soliciting its support and participation.

Lean manufacturing is the step by step elimination of the waste. Waste in this sense is define as any activity that adds cost but not value to the end product such as excess production, idle work in progress, stock, unnecessary movement and scarp.

Worker teams who participate in a Lean Manufacturing project are trained in the use of statistical and problem solving tools as well as project management techniques to define, measure, analyze, and make improvement in the operation of organization by eliminating defects and variability in its processes. The main concept of lean manufacturing is that defects in a given process can be measured and quantified.

A. Lean Manufacturing Principles

Lean manufacturing uses the various tools of Production and industrial engineering and implementation of these tools have certain working principle as shown in Figure no.1, which shows the rule to for selection and implementation of lean manufacturing tools.

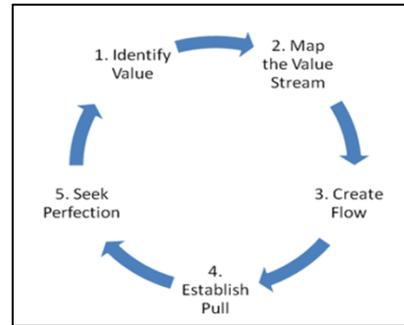


Fig. 1: Implementation principle of lean tools

- 1) Elimination of Waste
- 2) Continuous Improvement
- 3) Respect for Humanity
- 4) Levelized Production
- 5) Just In Time Production

B. Creating Lean Culture

Sustaining a culture of Lean or continuous improvement can be difficult after the enthusiasm of the transformation fades. The real gain which had to be from Lean process improvement comes from ensuring that it becomes everybody's job to find opportunities for improvement rather than the domain of a specialized few.

C. The 5S System

Hiroyuki Hirano a JIT expert developed 5S. The 5Ss comprises of five Japanese words Seiri, Seiton, Seiso, Seiketsu and Shitsuke. It is a tool developed to remove the inefficiencies from the process and system. Inefficiency of 5S leads to failure of other lean tool. Basic principle is that cluttered and untidy area is productive. Junk gets away people work in clean and untidy environment delightfully. Table 1 shows the English meaning of S associated with the 5S.

S.no.	5S	English meaning
1	Seiri	Sort
2	Seiton	Straighten
3	Seiso	Shine
4	Seiketsu	Standardize
5	Shitsuke	Sustain

Table 1: English meaning of different ‘S’

One more S i.e. 6th S is used for safety. This also plays a major role during the implementation of 5S.

D. 5S Deployment Model

A 5S is broadly classified into two categories:

- 1) Department-specific wherein each department manages the 5S initiatives specific to the department.
- 2) Corporate-wide wherein designated teams independent of the departments deploy and manage the 5S initiatives. A successful 5S deployment path is one that

is aligned with a company's strategic plan and priorities, optimizing resources to add value.

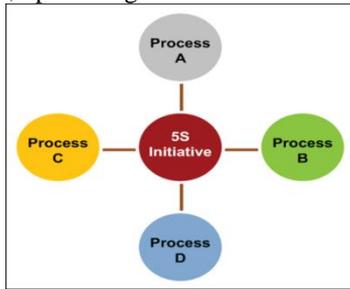


Fig. 1(a): 5S Integrated-with-process Model

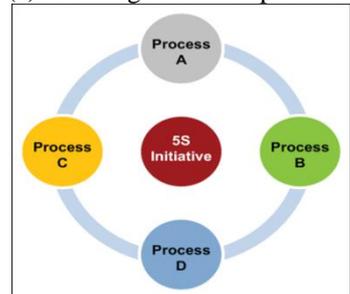


Fig. 1(b): 5S Stand-alone 5S Model

E. Advantages of Implementing 5S

The successful implementation and execution of the 5S principles in various organizations result several advantages as mentioned following.

- 1) It concept is very simple and easily understood by everyone.
- 2) It will foster teamwork, discipline and will increase the sense of responsibility and compassion for company.
- 3) It will create clean, productive work environments and secure the delivery system towards a world-class.
- 4) It is an on-going need to maintain excellent service delivery performance.
- 5) Assessment of Internal audit.

II. LITERATURE REVIEW OF PAPER

Techniques of lean manufacturing and 5S implementation in any type of industry have become the topic of research in the recent period. Many researchers investigated and formulated the different methodologies of lean manufacturing which has helped in optimizing production and management in modern industries. Research and development efforts over the last decade have resulted in improvement and increased effectiveness of processes.

A. Literature on 5S

Shraddha et al. (2006) demonstrated the application of implementing 5S technology in one of the MNC of South Asia, which is the leading manufacturer of the luggage bags in the world. The aim of the implementation of 5S in the organization was to enhance the production rate, safety, efficiency through effective workplace management. The need for the implementation of 5S in the organization came into existence due to unorganized workstation, uncomfortable working environment and excessive wastes in the organization.

Michalska and Szewieczck (2007) demonstrate the 5S methodology and introduce the way of implementing the 5S methodology in the company. During the research it had

been observed the effect of implementing the 5S rules in the production process. On the basis of the research it can be said that implementing the 5S tool as a lean management brought the great changes in the company such as reduction in the cost, increase in the quality and efficiency, reduction in the industry pollution and increase the safety condition. The research showed that training of workers and knowledge about 5S rules is very essential.

Dulhai et al. (2008) concluded the 5S strategy for continuous improvement of the manufacturing process in auto car exhaust. The aim of the research was to improvement in strategy, process oriented and improves manufacturing at auto car exhaust. The improvement of auto car exhausts quality using the "5S" rules was accomplished at the initiative of the inferior levels of the organization coordinated and helped by the superior management. The effective Implementation of the "5S" strategy leads to a subsequent improvement of the exhausts quality.

Korkut et al. (2009) demonstrated the 5S activities and its application at a sample company. The study involved 5S system for ensuring order and discipline in the organization and ensuring the supervision of both simple and even the smallest details, has been reviewed carefully. Assembly department was selected as pilot department for 5S activities which is applied at a yacht manufacturing company. 5S activities have been conducted during 28 weeks in the assembly department of the survey subject company. The results obtained were evaluated and it has been observed that the company came to a point better than the initial status. All people played an efficient role and involvement in the successful implementation of 5S activities.

Chitre (2010) implemented 5S methodology for lab management, in the quality assurance lab of a flexible packing converter. The research approach recommends alternative strategies for this project in future and makes recommendations for expanding the scope of this exercise to other area of the company and serve as a platform for achieving tangible and quantifiable gains in productivity. The purpose of this study was to work with QA technicians and the quality process manager to identify the areas for improvement in laboratory management. It aims at improving the efficiency of movement and work.

Rosas et al. (2010) demonstrated the quality improvement supported by the 5S. The research was an empirical study applied to some Mexican organizations with the aim of understanding their implementing experience, empirical relationships, and ongoing challenges associated with the 5S practise am was elaborated. The 5S techniques were used as the basis for advanced quality and continuous improvement philosophies. The organization observed the benefits from 5S implementation such as quality improvement. The 5S technique is worthwhile for production and service organizations and is universal to all organizations.

Salunkhe et al. (2011) demonstrated about the inventory control and spare part Management through 5S. The objective of spare part management is to ensure the availability of spares for maintenance in minimum time with the help of different management techniques like 5S system, Kanban system and Kaizens. The 5S technique helps to understand the actual condition of spares in store

department. It also helps to manage the spare parts effectively giving satisfactory results. The result showed that the improvement in reduction of searching time and also control the cost of inventory significantly accomplished through 5S, Kanban and Kaizen systems. The searching time was reduced from 10-15 min to 6-8 min.

Kumar et al. (2012) explained the steps undertaken for the implementation of the 5S emphasising on the benefits to the organization. The successful implementation of 5S requires that everyone has knowledge about 5S and understanding why it is being used and what the expected results was. 5S requires involvement of everyone from the top management to the workers in the organization. 5S technique involve removal of familiar (although unneeded) items, increase the workspace, improves the quality, working conditions and the reorganization of processes can be extremely unsettling.

Panchal et al. (2012) explained the improvement occur in the organization through 5S methodology. This paper focused on the methodology adopted in 5S and implementation of the same in the production industry. The study showed the great changes bring by the implementation of 5S in the company, for example process improvement by costs reduction, increasing of effectiveness and efficiency in the processes, maintenance and improvement of machines efficiency, increasing safety condition and reduction of industry pollution and wastes.

Rojasra et al. (2012) explained the implementation of 5S methodology in the Krishna plastic company, Udhoygnagar, Amreli, Gujarat. Out if the available various lean manufacturing techniques, 5S offers good potential for the desired improvement. Ten week study was carried out in the company. And after the implementation of 5S techniques the result observed was very impressive. The result showed that the production system efficiency was improved from 67% to 88.8% in the successive week. The workspace also increased and work flow improved. It creates healthy environment for working.

Milosevic et al. (2013) explained the factor for improving the quality management through implementation of 5S system. The research showed the methods and techniques of lean concept which used to increase the efficiency of all processes in the company. Also the results show the level of implementation this method in international and domestic production companies. It was observed that large number of companies pay much attention to "lean" concept, because both of the production rate and satisfaction of their employees.

Dizali et al. (2013) demonstrated the relation of 5S principles and Human factors Engineering (Ergonomics) in possibility of TPM implementation. The research conducted at Tabriz- IDEM Company in the Iran. Data was collected using questionnaires. The questionnaires used were of three kinds that each one investigates the related area. The result shows that the company has successful actions in employing and implementation of 5S, Ergonomics and executing TPM and also their relations are meaningful.

Gupta (2013) demonstrated the shortage of skilled manpower a major threat in India. Increasing demands requires increased staffing levels at a time when the labour pool is shrinking. The reason of research is, like all the other industries, Tourism and Hospitality industry also facing the

problem of talent crunch and high attrition rate. The objective of the study is of employee retention with special reference to Indian tourism and to identify the reason as to why the talented Lot is not attracted toward opting tourism as a career. This paper showed the reason behind the high attrition rate in tourism industry on the basis of survey among the employees of travel agencies and tour operators to overcome by the problem.

Kumar and Hemant (2014) concluded the implementation of 5S techniques in ceramics manufacturing industry. The research aimed to increase the efficiency of all process and elimination of losses in the company. The main objective of the research work is to reduce the process wastes, smooth the process flow and maintain proper quality control, improve storage facilities, security, safety and cost saving in the company. 5S technique had been implemented in the storage department and insulator department. The result observed after the successful implementation of the 5S technique showed the effective Increase in the work space, elimination of the waste and improve in the flow of the work.

Agrahari et al. (2015) explained the implementation of 5S methodology in the V.M Auto Pvt. Ltd. A small scale industry situated at Satpur (M.I.D.C) Nasik. The implementation of the 5S tool impacts the instructors and workman of industry that work within the selected place. Due to the implementation of the 5S techniques the research showed significant improvement such as safety, security, efficiency, quality, morale and housekeeping. Also increase in the workspace and improves the relation among the workers. During the study it was executed that selection of process parameter/ procedure in chosen production process on each workplace. 5S methodology was introduced to workers and control questions were asked.

B. Literature on Lean Manufacturing

Baghban et al. (2008) established a real example and a simulation study How to test normality distribution for a variable. In this paper, they were using the one-sample Kolmogorov-Smirnov (with estimated population mean and variance) and Lilliefors tests. They explained the method of computing this test with some common statistical software such as SPSS, S-PLUS, R and StatXact and utilize a dermatology dataset from Skin Research Center of Shohada-e-Tajrish hospital to show how the use of the one-sample K-S (with the mean and SD estimated from the sample) instead of its variation can be deceptive in practice. They also use Monte Carlo simulation to evaluate the approximate power of the one-sample K-S test with Lilliefors test in some general specified continuous distributions.

Sokovic et al. (2009) explained the need to use suitable selection of quality tools and techniques to attain continuous quality improvement. In this paper a review of possibilities of the systematic use of seven basic quality tools (7QC tools) was presented. It was exposed that 7QC tools can be used in all process phases, from the beginning of a product development up to management of a production process and delivery. It is additional shown how to involve 7QC tools in some phases of continuous improvement process (PDCA-cycle), Six Sigma (DMAIC) and Design for Six Sigma (DMADV) methodologies, and Lean Six Sigma.

Joshi et al. (2010) concluded the through-Put Time Reduction by Lean Manufacturing. Lean manufacturing is the systematic elimination of waste. Lean is focused at cutting non value-added activities from production. This Case Study addresses the application of lean manufacturing concepts to the uninterrupted production sector with a focus on the Pump manufacturing industry. This Study Showed that 35% reduction in Through-Put Time is achieved to increase the productivity. The objective of the study was to find ways to reduce Production time and cost in order to improve operating performance and Product quality.

Dighe and Kakirde (2012) demonstrated a case study of implementation of Lean Manufacturing using Value Stream Mapping at Pumps Manufacturing Company. The objective of the research was to know the 'current state' manufacturing process for the pump family selected and to spot the key areas of waste, problem and opportunity across the process and develop a 'future state vision' of process and reduce waste, inventory and Production Lead-time. The goal is to identify and eliminate the waste, which is any activity that does not add value to the final product, in the production process.

Kovacs (2012) explained the philosophy of Lean Manufacturing for productivity improvement. The paper summarises the advantages of implementation of lean philosophy in the manufacturing and service sectors, which focuses on value-added flow and the effectiveness of the overall system. He had experienced of implementing lean philosophy and paper involved presentation of a case study, specifically the influence of lean philosophy on some basic work environment condition and waste problems such as over production; waiting; motion; transportation; inventories; over-processing; defects; others.

Tamizharasi and Kathiresan (2012) illustrated the total Productive Maintenance (TPM) is a key business process strategy which is engaged by companies to boost their manufacturing performance. The main objective of this study was to Optimize the Overall Equipment Effectiveness of the High Precision Special Purpose Machine i.e. CNC Surface Wheel Lathe by successfully implementing the Total Productive Maintenance system. A case study approach has been used. The paper focused on recovering the maintenance practice using an innovative maintenance regime mix to optimize the Overall Equipment Effectiveness. Interviews, reviewing documentation and historical records, machine break down registers, direct and participatory observations were used as data collection methods during the research.

Aomar (2012) concluded the testing of lean construction practices at Abu Dhabi construction industry. The intention of this paper was to develop a realistic framework for adopting lean construction techniques and measuring lean performance. An industry survey was used to collect information and data from local construction companies in Abu Dhabi area. Collected data and information was organized, analyzed, and used to answer research questions. This research recognized current construction wastes and their causes, analyzed the current uses of lean techniques, and developed a practical framework for effectively adopting lean techniques in AD construction industry.

Chandra (2013) illustrated the approach to Lean Leadership through creating a Lean Culture. This paper focuses on the critical aspects cultural changes that need to be imbibed within the organization. The main objective was to place organization tactically from competitive to leadership positions. The goals was to cut unit cost by 50% or attaining six-sigma quality or growing productivity by 40% without adding staff, equipment or space. The major role of senior management on key issues that sets an example to the bottom line for giving a boost up to 80% and rest only 20% tools are needed for implementation of a lean manufacturing system effectively in any organization.

Hassan (2013) concluded the implementation of Lean Six Sigma for Waste Reduction in a Manufacturing Environment. This research study was implemented in a welding wire manufacturing plant to get better quality of the manufactured welding wires, reduce the manufacturing waste and enhance the yield of the manufacturing process, by applying the Lean Six Sigma (LSS) methodology and waste management. The performance of the plant before and after the implementation of the proposed solutions for waste reduction was observed and the causes were analyzed. The objective was to use an analytical method in judging the influence of the waste causes to enrich the methodology effectiveness and facilitate some ease of use in the practical field.

Romano and Dicmapi (2013) concluded the implementation of lean maintenance in power cables factory. The aim of this research was to build up an innovative Lean Maintenance model in order to optimize the process flow and diminish or eliminate scraps and work-in-progress (WIP) in a manufacturing context. To achieve these objectives a new method, called Lean Root Cause & Defect Analysis (LRCDA), which merges the process steps of the existing Root Cause & Failure Analysis (RCFA) technique and basic principles of Lean Maintenance and Total Productive Maintenance (TPM). The LRCDA is a logical sequence of phases that leads the researcher through the process of isolating the facts surrounding the event or the fault. After the problem defining, the analysis determines the best activities, corrective and preventive, to will resolve the difficulty and its recurrence.

Chakraborty et al. (2013) concluded the reducing process variability. In this paper, the six sigma approach has been used to shrink variation of a food processing industry in Bangladesh. DMAIC (Define, Measure, Analyze, and Improve & Control) model has been used to implement the six sigma philosophies. The model has been structured in five phases step by step respectively. Various tool of total quality management, statistical quality control and lean manufacturing concepts such as quality function deployment, p control chart, fish-bone diagram, analytical hierarchy process, Pareto analysis has been used in different phases of the DMAIC model. The main goal of this research was to make the process lean and increase the level of sigma.

Ozcelik and Giieryiiz (2013) demonstrated the implementation of Lean Service and Application of MRI. In this study Magnetic Resonance (MRI) and Tomography Imaging Center of an Education and Research hospital was investigated from a system improvement point of view and processes causing waste were recognized. During analysis

phase, it was found that waste-causing processes occur from waiting of patients due to deficiencies of the appointment system. Starting with the lean management philosophy and using tools and techniques of lean service notion, these processes were redesigned and waste was prohibited by also taking the resistance and critical success factors encountered during lean application process into consideration.

Koripadu and Subbaiah (2014) explained the Problem Solving Management using Six Sigma Tools & Techniques. Problem management ensures to streamline and identify the root causes and give permanent and temporary solutions to recurring incidents there by reducing the infrastructure downtime/productivity loss. Proactive problem solving management can eliminate reducing incidents from occurring. This paper explains how Lean and six sigma tools and techniques can be effectively used for doing a proactive problem solving management with higher benefits along with improved efficiency and effectiveness. In this paper one IT IS environment of incident management problem has been resolved using problem solving management tools.

Rahman and Hoque (2014) explained the Evaluation of Total Productive Maintenance performance. This research work has been conducted in a selected semi-automated manufacturing industry to study and evaluate the implementation of autonomous maintenance and planned maintenance pillars of TPM. In this study they focused on machine maintenance and implementing an appropriate maintenance strategy that has become progressively more important for manufacturing companies to enhance the productivity, instead of buying a new equipment. Total productive maintenance (TPM) has become one of the most admired maintenance strategies to ensure high machine reliability since it is regarded as an integral part of Lean Manufacturing.

Arunagiri and Gnanavelbabu (2014) explained the role of lean manufacturing in industrial environment. This research aimed at Identification of High Impact Lean Production Tools in Automobile Industries using Weighted Average Method. A survey had been conducted in 91 automobile industries to find out the most significant lean tools based on the ranking. The survey was based on the 5 point likerts scale to find the greatly impacted lean tools. The survey results showed that around 5 tools out of 30 were highly efficient. The main purpose of the research was to focus on ranking of lean tools, its positive impact towards the automobile industries. It also focuses on the flexibility of tools and how these lean tools can be effectively utilized to increase the production rate of the manufacturing industries.

Solanki et al. (2014) demonstrated the different tool of lean manufacturing such as 5S, TPM, Poka yoke, Process mapping and Kaizen to improve the efficiency of manufacturing companies. For implementing Lean Manufacturing Process they use Demming Cycle/PDCA Cycle. The main objective of the study was to reduce the waste and defects on one hand and to raise the productivity, quality, create good management system and continuous improvement system on the other hand. Results recorded before and after the execution of lean manufacturing techniques and it was observed that 60% welding defect or decline in Cost due to elimination of reworking of jobs and

other waste were eliminated after the successful implementation of the lean manufacturing tools.

Jagtap et al. (2015) explained the setup time reduction of machine using SMED technique and Lean Manufacturing. SMED can be successfully implemented with the help of further tools like ECRS (Eliminate, Combine, Reduce and Simplify). This paper presents a method for organizing and implementing SMED along with other useful tools. It is based on teamwork which allows a gradual reduction of machine setup time to less than 10 minutes accompanied by continuous improvement system. This paper also presents the case study of bearing manufacturing industry suggesting improvements that will considerably reduce machine setup time by 30%-35%. The methodology explained in this paper is applicable to most of the batch manufacturing industries.

Hossain (2015) explained the outcome of reduction of the Lead Time of a Bakery Factory by Using Lean Tools. This study was carried out in a Bread production floor of Z Bakery factory in Bangladesh. The fundamental target of this study was to diminish the lead time of the observed Bread production floor. The primary data were collected and recognized by the direct observation of set up time, machine function, material and labour flow at each and every processing stages of the production line. The observed time was recorded by a stopwatch. The secondary data were collected through the internet, books, journals, related studies and other sources of information. To find out and to eliminate the manufacturing wastes and unnecessary non value adding performance lean tools like VSM, PCE and Pareto analysis were used.

III. REVIEW REMARKS

- Top management support for successful implementation.
- Better environment to the workers.
- Employee involvement.
- Use of ethnographic feelings as tool of motivation and efficiency.

IV. CONCLUSION

The study of different research papers demonstrated and guided a path towards the successful and efficient implementation of 5S technique which leads to subsequent improvement in productivity of the manufacturing company. Lean tools promote conformity of finished products and less number of rejections.

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