

Applying Principles Of Lean In Academic Environments

S.Suguna Mallika

CVR College of Engineering, Department of CSE, Ibrahimpatan, R.R.District, A.P., India

Email: suguna.kishore@gmail.com

Abstract-“Lean is a philosophy that shortens the time line between the customer order and the shipment by eliminating waste.” Lean is principally associated with manufacturing industries but can be equally applicable to both service and administration processes. Business professionals from all over the world have been studying lean principles for many years and have enjoyed tremendous bottom-line improvements by adhering to them. From the production line worker to the board of directors, everyone in an organization can benefit. Generally associated with manufacturing environments, lean is much more than a manufacturing strategy. Although its roots lie in manufacturing operations, lean is a business philosophy that can be practiced in all disciplines of an organization. This philosophy offers powerful benefits to enterprise employees, upstream suppliers, and downstream customers. The need for external collaboration is absolutely vital to a lean enterprise because all activities must be viewed holistically for true success.

Lean manufacturing is underpinned by 5 principles: Specifying what creates value from the customer’s perspective, identifying all the steps along the process chain, making those processes flow, making only what is pulled by the customer, striving for perfection by continually removing wastes.

Index Terms-lean, lean in academic, principles of lean, TPS, and reduce waste.

I. INTRODUCTION

Quality in a software product can be improved by process improvement, because there is a correlation between processes and outcomes. As defined by IEEE, process is “a sequence of steps performed for a given purpose.” It provides project members a regular method of using the same way to do the same work. Process improvement focuses on defining and continually improving process. Defects found in previous efforts are fixed in the next efforts. There are many models and techniques for process improvement, such as CMMI, ISO9000 series, SPICE, Six Sigma, etc.

Lean philosophy is to maximize customer value by eliminating waste and optimizing the existing processes in all aspects of a firm’s production activities: human relations, vendor relations, technology, and the management of materials and inventory. Lean means doing more with less effort. Lean Organization understands customer value and focuses their key processes in meeting customer needs. Considers an ‘end to end’ value stream that delivers competitive advantage. Seeks fast flexible flow. Eliminates/prevents waste (Muda).Extends the Toyota Production System (TPS).

II. HISTORY

Toyota first caught the world’s attention in the 1980s, when it became clear that there was something special about Japanese quality and efficiency. Japanese cars were lasting longer than American cars and required much less repair. And by the 1990s it became apparent that there was something even more special about Toyota compared to other automakers in Japan (Womack, Jones, and Roos, 1991). It was not eye-popping car designs or performance—though the ride was smooth and the designs often very refined. It was the way Toyota engineered and manufactured the autos that led to unbelievable consistency in the process and product. Toyota designed autos faster, with more reliability, yet at a competitive cost, even when paying the relatively high wages of Japanese workers. Equally impressive was that every time Toyota showed an apparent weakness and seemed vulnerable to the competition, Toyota miraculously fixed the problem and came back even stronger. Today Toyota is the third-largest auto manufacturer in the world, behind General Motors and Ford, with global vehicle sales of over six million per year in 170 countries [2].

III. METHODOLOGY

Lean manufacturing is underpinned by 5 principles:

- Specify what creates value from the customers perspective.
- Identify all the steps along the process chain.
- Make those processes flow.
- Make only what is pulled by the customer.
- Strive for perfection by continually removing wastes.



The main driver for Lean is to compress the time period being consumed by a process. In a conventional supply chain and in individual businesses, there are potentially huge amounts of different wastes, known as The 7 Wastes. The 7 wastes are depicted in the above figure as Over Production, Bad Quality, Operator motion, Transport, Inventory, Processing, Idle time et.al.[1]

IV. TOOLS AND TECHNIQUES OF LEAN

A. 5-S principle: The Five S's of Lean

Lean is an approach to process improvement that is well-known in manufacturing, but which can be applied to any process. These "S's" originated in Japan, and help build an environment conducive to a smooth-running process [3].

B. Sort

Begin by eliminating unnecessary items from the work area. "Red Tagging" is an effective visual method used to identify unneeded items,

which can then either be moved to a central holding area or discarded completely. This step frees up valuable floor space, removes broken or obsolete tools and fixtures, and makes it easier to focus on the job.

C. Set in Order

The second S focuses on careful storage so the job can be carried on effectively. Some questions that must be posed are

- What do I need to do my job?
- Where should I locate this item?
- How many of this item do I need?

Other strategies for Set in Order are painting schemes that support the work, outlining work areas, shelving and cabinets for necessary items, and standard places for tools and materials needed every day. "A place for everything and everything in its place" is the essence of this 'S'.

D. Shine

Once the first two steps are completed, and the work space is clear with needed work items in their places, it's time to thoroughly clean the work area. Because a clean and orderly area makes work easier, raises morale, and really helps staff take pride and ownership in their work and work space. A clean area also makes it easier to spot leaks, deterioration of equipment, misalignments, and broken parts that ultimately lead to equipment failure and loss of production. The impact of the clean work space will show itself in several ways on the bottom line.

E. Standardize

This step should always involve the staff from the job or area. There are always best practices within a work function, and the first step is to find these practices and bring them to the table. The staff discusses these and come to agreement as to the best, making these the standard for all work in that particular area. But don't stop with internal best practices, encourage staff to look outside the company, even in other industries. Southwest Airlines benchmarked the Woods Brothers pit team in NASCAR to see how their fast, effective turnaround of vehicles might have application in the airlines.

F. Sustain

This last step aims at keeping the new changes in place, and it's the toughest to implement. Because people build habits, and even when those habits are tied to poor methods of work, they're used to them and find it hard to change. Find ways to reward maintenance of these new changes, especially during the first 3 months.

V. LEAN IN ACADEMIC ENVIRONMENTS

A. Case Study 1

Lean can also be applied in the academic environments. Consider taking the example of academic administration. There are many challenges faced by the academic administration like “absenteeism of students”. One of the tools of Lean can be used to mitigate this by the use of Visual Control Boards in the classrooms. This visual control boards should be placed for every class which is divided into parts specifying the names of the list of students who are below the threshold level of attendance and on the other side list of students who are holding the highest attendance. This certainly impacts the endangered students in correcting their attendance and motivates the regularly coming students to be more regular. This visual board could be updated monthly. A sample visual board could look like as follows:

Low Attendance(Danger)	Green Zone (Thumbs Up)
N.Abhishek-10B83S0213-35%	P.Sagar-10B83S0215-96%
S.Suma-10B83S0238-63%	K.Kamala-10B83S0217-93%

B. Case Study 2

The second case that has been taken into consideration is the process of conducting the internal and external examinations for the students during the academic year. Generally the process followed is the lab internal takes a print out of all the programs decided to be part of the exam and each of the question printout is manually placed in the answer scripts. The students are then instructed to come into the lab one at a time in a serial order and each student is asked to pick up one answer script at random which would be opened after occupying the designated seat. The student is instructed to copy the question into his paper and then supposed to proceed with the exam. The time duration for conducting a lab exam is typically 2.5 hours out of which it is to be understood that by the time all the students have completed picking up the answer scripts assuming 40sec for each student making it a total of 40*60 i.e. 24 minutes. So the average time allotted for the student to complete

the program is getting reduced by 20 minutes. After a series of discussions and understanding the flow of the process Lean has been applied to this process and it has been proposed that the lab questions should be fed into the server and randomly the selected question is displayed on the monitor of the system into which the student logs in directly. This reduces the typical 20 minute delay and thereby increases the productive utilization of the time slot available. At the same time stress management can be done more effectively. While the process was 87% effective after applying lean philosophy it becomes 97% effective with an absolute 10% more utilization and better productivity.

REFERENCES

- [1] David.P.Spencer, Gerhard Plenert LEAN on IT: Applying LEAN Manufacturing principles across the IT organization.
- [2] Jeffrey K. Liker, The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer.
- [3] David Black The 5-S's.
- [4] Womack JP, Jones DT. Lean Thinking: Banish Waste and Create Wealth in Your Corporation. New York: Simon and Schuster, Inc.; 1996, Second Edition 2003.