

# Lean tools management



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Lean manufacturing refers to a manufacturing improvement process based on the fundamental goal of Toyota production system (TPS) in order to minimize or eliminate waste while maximizing production flow (Tapping, 2002). Many manufacturing organizations recognize the importance of applying lean techniques. However, few organizations apply lean techniques with the necessary knowledge and proven tools to achieve it.

Today, businesses around the world have a major opportunity to reduce their costs and customer lead-time and cycle time through the application of Lean Manufacturing processes. Its roots lie in the manufacturing industry and are strongly influenced by the production system principles originally developed by the lead automotive company called Toyota in Japan. These Lean Manufacturing technologies have been widely utilized and applied by numerous manufacturing companies worldwide.

The purpose of this project is to implement lean manufacturing tools and techniques in food industry with focus on delivery and takeaway restaurant. The first step is to identify the seven deadly wastes and implement the 5s, this ensure ease in implementing lean manufacturing tools and techniques. The next step was to develop value stream map for this restaurant. This particular tool allows company to capture processes, material flows, information flow and to document lead-time, inventory levels and cycle-times of a given product family and helps to identify waste in the system. After implementation of VSM the next step would be applying Just in time (JIT) and Single minute exchange of dies (SMED) to reduce setup- time. These lean manufacturing tools will help this company to achieve reduction

in inventory levels, reduction in manufacturing lead-time, and delivery lead-time.

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### CHAPTER 1

### INTRODUCTION

#### 1. 1 INTRODUCTION

In this competitive world manufacturing companies are continually striving to increase their productivity and output of their operation. Their goal is to satisfy customers with exact product, quality, quantity and price in the shortest amount of time.

Lean manufacturing is more than a cost reduction program or a problem solving approach (Tapping, 2002). The main idea is that an efficient production can be achieved by a comprehensive approach to minimize wastes. This means eliminating excess production and inventory, redundant movement of material, waiting and delays, over processing, excess worker motion, and the need for rework and corrections.

Part of lean manufacturing is reviewing operations for those components, processes or products that add cost rather than value (Tapping, 2002). Each step of the manufacturing process is monitored to determine if it adds value to the product. If it does not add value, the process could be delegated to a subcontractor or outsourcing company in order to focus the staff on value-added operations of its core business.

The purpose of this project is to implement lean manufacturing tools and techniques in Bombay Bicycle Club, which is a food industry in London, focusing on delivery and takeaway restaurant. The first step is to identify the seven deadly wastes and implement the 5s. The next step was to develop value stream map for this company. This particular tool allows company to capture processes, material flows, information flow and to document lead-time, inventory levels and cycle-times of a given product family and helps to identify waste in the system. These results can be used to map the future state and implement lean manufacturing. The main goal is to identify and eliminate the muda from the production process. After implementation of VSM the next step would be further reducing the inventory and setup time, well how this can be achieved? In order to achieve this I will use the two lean tools namely Just in time (JIT) and Single minute exchange of dies (SMED). These tools can reduce inventory, decrease manufacturing lead-time, and decrease setup time.

## 1. 2 COMPANY OVERVIEW

The Bombay Bicycle Club is known as the best Indian Cuisine in London and with both restaurants and delivery kitchens throughout London. [URL 1] The project scope is to improve in-house manufacturing and material flow by unique approach of Lean principles and using lean tools and techniques.

In my work with Bombay Bicycle Club, I have seen many problems existing in delivery shop, which can be eliminated by employing lean manufacturing tools and techniques.



The Bombay Bicycle Club name goes back to 20 years. They have reputation of providing a quality food that the customers are willing to pay premium.

This company relies on responsiveness rather on efficiency when it comes to customer satisfaction. They had been able to build a strong market presence in South-West London over the years through: (1) Good quality food, and (2) Customer satisfaction. These two elements allowed them to grow in a good reputable organization.

The turnover Bombay Bicycle Club in Fulham Broadway branch is around 10k per week and there are 15 employees including 5 drivers, which deliver in a radius of 4 miles. The maximum delivery time is said to be within an hour.

However, as time passed, the marketplace changed and competition had become fierce. With so many delivery and takeaway cuisines coming into play, which were also less expensive than the Bombay Bicycle Club, it was deriving fewer profits. In order to achieve higher profits this Club had to re-structure their management on technical grounds, which can be done with the help of lean manufacturing tools and techniques.

The Cuisine had to operate 8 hours a day and 7 days a week in order to meet customer demand, which did not allow any recovery time and did not leave any room for mistakes. Many customers also demanded for additional capacity and flexibility, which can be met but with heavy constraints and less efforts were made to improve it.

### 1. 3 STATEMENT OF PROBLEM

The operation managed in Bombay Bicycle Club (BBC) was exactly the same in all branches. This, in turn, meant that majority of their branches had long delivery lead-times compared to the marketplace requisite. The management also spent substantial amount of time hastening all products through the facility in order to satisfy customer demand, which resulted in high unit cost. This situation was stealing good chunk of profit as the customer's demand for discounts on delivered items. In addition, BBC was receiving unfavorable feedback from the customers.

Even though BBC had stable sales revenue at the time, it was becoming increasingly apparent that this situation was not going to last unless something is changed. There is an increment in the marketplace competition, which were trying to compete on price and delivery lead-time. In order to improve efficiency, BBC had to reduce lead-time and then effectively maintain on-time delivery reliability of 95% or better.

Moreover, BBC need a significant changes in shop floor layout, as well as traditional inventory management, and minor issues like equipments not maintained, direct labour piece work incentives and undisciplined housekeeping practices.

It was clear that this operation needed to make some substantial changes to compete in marketplace. With these identified issues as drivers for changes, it was not difficult to implement lean manufacturing principles within this organization.

#### 1. 4 PROJECT OBJECTIVES

- Reduce the Inventory levels by 10-20%.
- Achieve on-time delivery performance of 95% or better.
- Reduce manufacturing lead-time.
- Improve space utilization.
- Improve responsiveness through flexibility.

### 1. 5 PROJECT APPROACH

The first step required for this project is to identify and define the study of the lean manufacturing tools and techniques. This will be followed by carefully selecting the lean tools that are most appropriate for the implementation in the food retail outlet to achieve the given objectives.

The next step in this project required towards applying lean concepts is to analyze the current situation of the company and according to that develop the methodology to implement lean manufacturing tools and techniques.

First obstacle is to identify the wastes and then to implement 5s in the company. Value Stream Map is used to map the current state of the BBC. This will help to identify the source of waste then with its identification an appropriate lean tools can be use to reduce it. The future state map is designed for a company with lean tools applied to it.

### 1. 6 LITERATURE SURVEY

Feld (2001: 4) identifies five primary elements to present the various facets required to support a solid lean manufacturing programme, namely manufacturing flow, organization, process control, metrics and logistics. For

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each of these elements there are at least six tools for an organization to become and promote lean manufacturing

Bicheno (2000: 8) describes lean manufacturing as a philosophy, not a system or a technique. It is about simplicity, flow, visibility, partnership and value. He highlights five lean principles from Womack and Jones for the elimination of waste:

Specify value from the point of view of the customer.

Identify the value stream.

Make value flow.

Pull at the customer's rate of demand and seek perfection through continual improvement.

Seek perfection through continual improvement.

According to (Moore and Ron, 2007) One of the important strategy in employment of lean manufacturing is implementing Kaizen event based focused technique. Kaizen is a Japanese word meaning change for the better of continuous improvement. It is fundamental to lean manufacturing that we must continuously strive to get better.

Few of the Kaizen event outline are to identify the area (bite size), identify focus (changeover, one piece flow, kanban, quality), identify suitable times, gain management commitment, select team, establish TAKT time, preparation, training, general mapping, establish sub-teams, mapping & data

collection, initial analysis, initial changes & testing, further changes and standardization. (G. Baker, 2007)

A value stream is a collection of all actions (value added as well as non-value-added) that are required to bring a product (or a group of products that use the same resources) through the main flows, starting with raw material and ending with the customer (Rother and Shook, 1999). These actions consider the flow of both information and materials within the overall supply chain. The ultimate goal of VSM is to identify all types of waste in the value stream and to take steps to try and eliminate these (Rother and Shook, 1999). While researchers have developed a number of tools to optimise individual operations within a supply chain, most of these tools fall short in linking and visualizing the nature of the material and information flow throughout the company's entire supply chain. Taking the value stream viewpoint means working on the big picture and not individual processes. VSM creates a common basis for the production process, thus facilitating more thoughtful decisions to improve the value stream (McDonald et al., 2002).

Slack, Chambers and Johnston (2001: 482) describe lean manufacturing techniques under the heading of JIT (Just In Time). JIT aims to meet a demand instantaneously, with perfect quality and almost no waste. JIT is a disciplined approach to improving overall productivity and eliminating waste. It provides for cost-effective production and delivery of only the necessary quantity of parts at the right quality, at the right time and place, while using a minimum amount of facilities, equipment, materials and human resources. JIT is dependent on the balance between the supplier's flexibility and the

user's flexibility. It is accomplished through the application of elements that require total employee involvement and teamwork. A key philosophy of JIT is simplification (Slack et al., 2001: 482).

## CHAPTER 2

### LITERATURE REVIEW

#### 2. 1 Origin of LEAN

After World War II, Japanese manufacturers were facing the dilemma of insufficiency of materials, financial problems, and human resources (Ohno, 1988). The problems that the Japanese faced differed from those in America. For many decades America had cut costs by using the mass production system while producing fewer types of end items while for the Japanese the problem was how to cut costs while producing small numbers of many types of end items.

According to Ohno (1988),

Imitating America is not always bad. We have learned a lot from the U. S. automobile empire. America has generated wonderful production management techniques, business management techniques such as quality control (QC) total quality control (TQC) and industrial engineering (IE) methods. (p. 3)

In the 1940s a German worker could produce three times as much as a Japanese worker, and an American worker could produce three times as

much as a German worker (Ohno, 1988). Therefore, the ratio of production between American and Japanese work forces was nine to one. In order to make a move toward improvement, the Japanese leader Toyoda Kiichiro proposed to reduce the gap with America in three years, resulting in the birth of the lean manufacturing practices.

The term lean manufacturing was first used to describe the implementation of what is now considered to be part of lean manufacturing such as a Kanban or just-in-time (JIT). It began as a description of procedures used by the Toyota Motor Corporation from 1950 through the 1980s (Ohno, 1988). Now lean means much more. The Toyota production system started as part of a strategy to survive developed by Taiichi Ohno, presently vice president of the Toyota, in an effort to conserve capital, eliminate waste, reduce inventory, and reduce production times and operating expenses while increasing quality and production flexibility at the same time. The Toyota production system was proved to be successful and implemented throughout the entire company.

Toyota opened its first major operation in the United States in 1984 through a joint venture with General Motors in Fremont, CA (Ohno, 1988). Since then, Toyota has made continuous progress adapting its production system to a diverse workforce and a geographically spread supplier base. The reputation of the company has grown across the world. While most companies have suffered with enormous losses in business cycle decline, Toyota has not lost money since 1960. The major contributor to their success has been Toyota production system.

The Toyota production system has been created on the practice and evolution of one very useful technique that reduces cost and time while challenges every activity in the value stream (Ohno, 1988). It is applying a methodology known as the Five whys. By asking why an activity is performed and then asking why after each response, it is frequently possible to get to the origin of the problem. Understanding the root cause assists in successful redesign.

## 2. 2 What is LEAN

According to Womack, Jones, and Roos (1990), the term lean represents a system that utilizes fewer inputs in order to create the same outputs than those created by a traditional mass production system, while increasing the range of different finished goods for the end customer. The term lean manufacturing is synonymous with different names, such as agile manufacturing, just-in-time manufacturing, synchronous manufacturing, world class manufacturing, and continuous flow.

Lean manufacturing is an operational strategy oriented toward achieving the shortest possible cycle time by eliminating waste (Liker, 1997). It is derived from the Toyota production system and its objective is to increase the value-added work by eliminating wastes and reducing unnecessary work. The technique often decreases the time between a customer order and shipment, and it is designed to improve profitability, customer satisfaction, throughput time, and employee motivation.

The benefits of lean manufacturing generally are lower costs, higher quality, and shorter lead times (Liker, 1997). The term lean manufacturing is created

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to represent less human effort in the company, less manufacturing space, less investment in tools, less inventory in progress, and less engineering hours to develop a new product in less time.

## 2.3 Five Primary Elements for Lean Manufacturing

The five primary elements to consider when implementing lean manufacturing are manufacturing flow, organization, process control, metrics, and logistics (Feld, 2000). These elements represent the variety of aspects needed to sustain a successful lean manufacturing implementation program. Manufacturing flow addresses physical changes and design standards. Organization identifies people's roles/functions, training in new ways of working, and communication. Process control is directed at monitoring, controlling, stabilizing, and pursuing ways to improve the process. Metrics addresses visible results-based performance measures, targeted improvement, and team rewards/recognition. Logistics provide the definition for operating rules and mechanisms for planning and controlling the flow of material.

### Issues in Lean Manufacturing

Lean manufacturing is in direct opposition with traditional manufacturing approaches characterized by use of economic order quantities, high capacity utilization, and high inventory (Feld, 2000). In changing from a traditional environment to one of lean production, cultural issues will emerge quickly, as well as resistance to change. Implementing lean manufacturing techniques will change the organizational culture because everyone needs to be more involved and accountable and people may be laid off. A fast managing

change program is needed to accompany the effort. A slow approach generally does not work or achieve significant results.

Lean manufacturing is not a magical solution (Feld, 2000). It involves a change in leadership that requires considerable communication, coordination, and organization which results in a change in the company's culture. Just implementing one lean technique such as a Kanban system will not result in lean implementation. Positive employee reaction to lean manufacturing is essential to success, but does not always occur since becoming lean improves productivity and can reduce the number of workers needed. Laying people off and asking the remaining employees to become more involved may not work.

Feld (2000) stated that in order to create a lean manufacturing environment, the organization needs to be aware of where it is at that point. They must know why they need to change and why change is important. It is necessary to provide the answers to these questions to employees so they become more engaged in the process. Motivation, tenacity, leadership, and direction all play roles in the successful deployment of a lean program (p. 7). Feld also stated that roles within the team and the way in which team members interact with one another are important. All members must understand their roles and why they were selected for their assignment.

## 2. 4 Continuous Improvement

Continuous improvement is another fundamental principle of lean manufacturing. Kaizen, which is the Japanese word for a continuous endeavor for perfection, has become popular in the west as a paramount

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concept behind good management. Kaizen is a systematic approach to gradual, orderly, continuous improvement. In manufacturing settings improvements can take place in many forms such as reduction of inventory, and reduction of defective parts. One of the most effective tools of continuous improvement is 5S, which is the basis for an effective lean company. 5S is a first, modular step toward serious waste reduction. 5S consists of the Japanese words Seiri (Sort), Seiton (Straighten), Seiso (Sweep and Clean), Seiketsu (Systemize), and Shitsuke (Standardize). The underlying concept behind 5S is to look for waste and then to try to eliminate it. Waste could be in the form of scrap, defects, excess raw material, unneeded items, old broken tools, and obsolete jigs and fixtures (Monden, 1998).

The first S, Seiri, deals with moving those items that are not currently being used on a continuous basis (e. g., items that will not be used for the next month or so) away from those that are. Moving those items and tossing away needless items will make material flow smoothly; and workers move and work easily (Feld, 2000).

Seiton has to do with having the right items in the right area. Items that do not belong to a given area must not be in that area. For a given workplace area tools must be marked and arranged as belonging in that area. This will make it easier to move those items that are not labeled from that area. Arranging items in the right place will make tools, jigs, fixtures, and resources noticeable, detectable, and easy to use (Feld, 2000).

Seiso deals with cleaning and sweeping the work place methodically. The workplace should look neat and clean and ready to use for the next shift. The

work place should be maintained on a regular basis (e. g., daily). All tools and items should be in the right place and nothing should be missing. A well-maintained workplace creates a healthy environment to work with (Feld, 2000).

Seiketsu is maintaining a high standard of housekeeping and workplace arrangement. A regular audit should be run and scores should be assigned for areas of responsibilities. If every area has people assigned to it then everyone has responsibility to maintain a high standard of housekeeping and cleaning (Feld, 2000).

Shitsuke is management's accountability to train people to follow housekeeping rules. Management should implement the housekeeping rules in a practiced fashion so that their people can buy into it. Management should walk the shop floor, explain what they want from people, reward those who follow and instruct those who do not (Feld, 2000). Taken together, 5S means good housekeeping and better workplace organization.

Kaizen tools such as 5S are not only a means to increase profitability of a firm but also allow companies to reveal potential strengths and capabilities that were hidden before (Hirai, 2001). Sweeny (2003) and Cox (2002) have reported good results implementing 5S.

Everything has a place and everything in its place! If it does not warrant a label, it does not warrant a place in the area! These are words to live by in a lean manufacturing environment. So, what is so important about housekeeping? According to authors Henderson and Larco (Lean Transformation: How To Change Your Business into a Lean Enterprise), it is <https://assignbuster.com/lean-tools-management/>

very important: Most people underestimate the importance of safety, order, and cleanliness in the workplace. Our former colleagues at Toyota and Honda will tell you that 25 to 30% of all quality defects are directly related to this issue. (Henderson 1999)

## 2. 5 Value Creation and Waste

In Lean Manufacturing, the value of a product is defined solely based on what the customer actually requires and is willing to pay for. Production operations can be grouped into following three types of activities:

Value-added activities are those activities, which transform the materials into the exact product that the customer requires.

Non value-added activities are activities, which aren't required for transforming the materials into the product that the customer wants.

Anything, which is non-value-added, may be defined as waste. Anything that adds unnecessary time, effort or cost is considered non value-added.

Another way of looking at waste is that it is any material or activity for which the customer is not willing to pay. Testing or inspecting materials is also considered waste since this can be eliminated insofar as the production process can be improved to eliminate defects from occurring.

Research at the Lean Enterprise Research Center (LERC) in the United Kingdom indicated that for a typical manufacturing company the ratio of activities could be broken down as follows [Hines P. et al, (2000)].

Value -added activity 5%

Non value -added activity 60%

Necessary non value -added activity 35%

Total activity 100%

## 2. 5. 1 Main Kinds of Waste

Originally seven main types of waste were identified as part of the Toyota Production System [Sullivan et al, (2002)].

a) Over production - Producing too soon, resulting in poor flow of information or goods and excess inventory.

b) Defects - Frequent errors in paperwork or material/ product quality problems resulting in scrap and / or rework, as well as poor delivery performance.

c) Unnecessary inventory - Excessive storage and delay of information or products, resulting in excess inventory and cost, leading to poor customer service.

d) Inappropriate processing - Going about work processes using the wrong set of tools, procedures or systems, often when a simpler approach may be more effective.

e) Excessive transportation - Excessive movement of people, information or goods, resulting in wasted time and cost.

f) Waiting - Long periods of inactivity for people, information or goods, resulting in poor flow and long lead times.

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g) Unnecessary motion - Poor workplace organization, resulting in poor ergonomics, e. g., excessive bending or stretching and frequently lost items.

## 2. 6 Value stream

A value stream is the set of processes, including value-added and non-value-added activities, required to transform raw materials into finished goods that the customers value (Womack & Jones, 1996). Value streams bring a specific good or service through three critical management tasks: problem solving (figuring out what needs to be changed), information management (improving information flow), and physical transformation (implementing changes). Tapping (2002) stated that, There are many value streams within an organization, just as there are many rivers flowing into the ocean (p. 27).

### 2. 6. 1 Value Stream Mapping

Value stream management is a management tool for planning, managing, implementing, sustaining and linking lean-manufacturing improvements to daily work (Tapping, 2002). Value stream management consists of eight steps: committing to lean, choosing the value stream, learning about lean, mapping the current state, determining lean metrics, mapping the future state, creating Kaizen plans, and implementing Kaizen.

A value stream is a collection of all actions (value added as well as non-value-added) that are required to bring a product (or a group of products that use the same resources) through the main flows, starting with raw material and ending with the customer (Rother and Shook, 1999). These actions consider the flow of both information and materials within the overall

supply chain. The ultimate goal of VSM is to identify all types of waste in the value stream and to take steps to try and eliminate these (Rother and Shook, 1999). While researchers have developed a number of tools to optimise individual operations within a supply chain, most of these tools fall short in linking and visualizing the nature of the material and information flow throughout the company's entire supply chain. Taking the value stream viewpoint means working on the big picture and not individual processes. VSM creates a common basis for the production process, thus facilitating more thoughtful decisions to improve the value stream (McDonald et al., 2002).

VSM gives you a big picture of the operating functions of the organization and helps you understand the business as a whole. Identifying the sources of waste becomes much easier. The map shows a link between the information and material flow, which will help to create and improve on the material flow and create a futuristic map with less waste.

Value stream mapping is a visual representation of all the specific activities, including the flow of material and information, which occurs along the value stream selected for a product or family (Tapping, 2002). The value stream mapping process will likely reveal that a significant amount of non-value-added activities are present in your current processes. These activities consume financial and human resources and make longer lead-time without adding value.

However, some of these activities are really necessary in the process; therefore the idea is to minimize