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A Review on Lean Manufacturing: A Feasible Solution to Industrial Objectives

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ABSTRACT

In the recent years the manufacturing objectives are very competitive and rapid technological developed process to fulfill the demands of customers and profit objective of an organization. This leads to produce special manufacturing techniques and emerging concept of technology. Earlier high quality and efficiency were the necessary and sufficient conditions for staying in the business. In the past year, the manufacturing industries are to fulfill the customs orders. In the current paper the role of lean manufacturing and its development has been discussed with its objectives and other essential parameters. In the present situation the manufactures must be able to rapidly develop and produce customized products to fulfill the customer requirements. Lean is viewed by many as the latest improvement in the tradition of cost reduction to increase the profit. It has the advantage of a very descriptive active name and has been, in many cases, used like any other cost-reduction approach. This means that the Lean word can be found in many places, projects and proposals. This means that it applies to the same implementation problems as those other approaches which have created a level of cynicism in some quarters about its effectiveness. To achieve all objective the use of lean manufacturing is excellent solution.

I. INTRODUCTION

Lean manufacturing is the production of goods using less of everything compared to mass production: less human effort, less manufacturing space, less investment in tools, and less engineering time to develop a new product. The Toyota Production System is developer of the philosophy of lean manufacturing and logistics at Toyota, including the interaction with suppliers and customers. The TPS is a major part of the more generic Lean manufacturing. Toyota was able to greatly reduce lead-time and cost using the TPS, while improving quality at the same time. This enabled it to become one of the tenth largest companies in the world. It is currently as profitable as all the other car companies *combined* and became the largest car manufacturer in 2007. It has been proposed that the TPS is the most prominent example of the correlation[5], or middle, stage in a science, with material requirements planning and other data gathering systems representing the classification or first stage. A science in this stage can see correlations between events and can propose some procedures that allow some predictions of the future. Many industries have realized the capability of producing high quality products more economically even in lower volume and if half the time and use of space is only a fraction of space required for mass production. The lean mainly roles with determination of value for which the customer is willing to pay. The four area drives are there in which lean manufacturing can play a leading role:-

1. Cost
2. Quality
3. Delivery
4. Safety

II. LEAN MANUFACTIRING

Lean manufacturing is defined as to produce same and more than the mass production using less effort, lesser space, without any new inventory, better quality and lesser defects. There are different objectives and essentials for implementation of lean manufacturing which are discussed as below[l]

2.1. Objectives of Lean Manufacturing

1. Highest satisfaction of customers needs
2. Total elimination of waste
3. Respect of human dignity
4. Use of less effort with same production rate

2.2. Essentials of Lean Manufacturing

Lean manufacturing uses a process layout in which the manufacturing cells are arranged in parallel. In every cell there should be no storage of materials, rather there is single piece of flow. Lean manufacturing aims at minimizing waste of following type:-

1. Correction and repair of any damaged tool etc.
2. Use of any waste motion for transportation purposes
3. Over production or producing more then needed

4. Wasted effort to transport any kind of goods
5. Maintaining excess inventory of raw material and finished products

III. ROLE OF LEAN MANUFACTURING FOR ORGANIZATION

Lean manufacturing techniques are beneficial to increase the profitability by reducing the production cost. Industrial major objective is profit which should be maximized. To under stand the relation between cost, profit and sale we will briefly study the following diagram:-

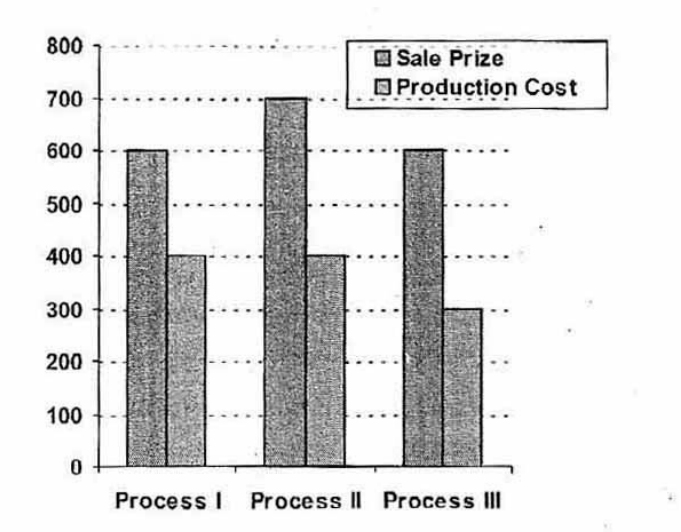

Fig. 1 Distribution of Profit in Various Processes

In the above diagram the sale prize and production cost with profit is presented with respect to traditional process flow and lean manufacturing process flow. In the process I and process II the traditional manufacturing techniques are used and in the process ID the lean manufacturing approach is used. Let, we discuss the profit and satisfactions of customers and industry organizers.

Process I

Profit = Sale Prize - Production Cost
= 600-400=200Rs.

Customers satisfied but industry organizers will not.

Process II

Profit = Sale Prize - Production Cost
= 700-400=300Rs.

Industry organizers satisfied but Customers will not.

Process III

Profit = Sale Prize - Production Cost
= 600-300=300Rs.

Both customers and industry organizers satisfied.

When you implement and fellow a lean path you should see direct cost savings by driving out the waste. Lean manufacturing is customers focused. Since the success of your business due to in large part of satisfying customer demands. Lean allows your manufacturing activities to become more closely aligned with other company goals and activities.

IV. LEAN MANUFACTURING TECHNIQUES

Lean manufacturing as discussed above is not easy to achieve. It requires all round improvements in almost every aspect of function of an organization. There are the number of techniques and parameters which help to maintain the lean manufacturing system for an organization. Some of these are listed as below[l] :-

1. *Value Mapping*
2. *Single Minute Exchange of Dies*
3. *Single Piece Flow*
4. *Inventory Control via Card System*
5. *Concept (Separate, Self discipline, Simplify, Standardize, Sustain)*
6. *Total Productive Maintenance*
7. *Visual Management*
8. *Production Line Optimization*

V. BENEFITS OF LEAN MANUFACTURING

It is very clear from the above discussion that lean manufacturing has a lot of benefits for the growth of country. The establishment of lean manufacturing will provide the following benefits for a particular organization [3]:-

1. Waste reduction by 75%-80%
2. Production cost reduction by 30%-40%
3. Manufacturing cycle time reduction by 60%-70%
4. Labor reduction by 55%-65%
5. Inventory reduction by 40%
6. Capacity increase by 40%-50%
7. Production of better quality

VI. INTRODUCTION TO SIX SIGMA

The Six Sigma approach, which many industries aim to practice today institutionalizes a statistically rigorous, disciplined, fact-based way to deliver better quality resulting into more money to the bottom line through process improvement and process design projects, which may be selected by the top leadership and led by trained employees as Black Belts or Master Black Belts in Six Sigma. The approach aims to create near-perfect processes, products, and services all aligned to deliver what the customer wants. In this sense the approach is a step ahead of conventional TQM approach. It is not only

an objective, but also a set of tools, which need to be deployed for long before results become obvious. The people involved are better trained in process improvement tools and understand that success of six sigma projects, which may be delivered in two to six months are the best career accelerator for them. Thus, six-sigma approach serves many purposes[2].

1. It deploys a set of powerful tools for improving processes and products.
2. It provides an approach for improving both the process and people related aspects of business performance.
3. It involves projects aiming at near elimination of defects from every products, processes and transactions.
4. It incorporates strategic initiatives to boost profitability, increase market share, and improve customer satisfaction through statistical tools that can lead to breakthrough quantum gain in quality.
5. It ensures that top management is actively committed to continuous improvement programmed.
6. It creates a favorable environment for involvement through employee participation in effective teamwork.
7. It ensures that those involved are familiar with the methodology of quality improvement.
8. It recognizes the contribution that all members of the organization can make to the success of the organization and provides the means by which this can be achieved.
9. It would involve a significant investment and therefore, it need to be a very serious activity driven by goals. It require significant involvement and time from senior management. Therefore, management should carefully prioritize business processes and functional areas to improve through this program.
10. It demands a clear linkage with an incentive program. Collaborative effort as well as individual high performance should be encouraged and rewarded through promotion and compensation mechanisms.

VII. SIX SIGMA STRATEGY

The six sigma strategy and the seven Ishikawa tools have shown their success for many manufacturing firms. Figure.2 shows the performance of six sigma pictorially. Six sigma approach is customer driven. For a manufacturing process, the sigma is a metric that indicates how well the process is being performed. The higher the sigma capability, the better, as it measures the capability of the process to achieve defect-free-work. The six sigma approach is also data driven. It focuses on reducing process variation, centering the process and on optimizing the process. The emphasis is on the capability rather than the control of product quality, which includes the improvement of quality and reduction of cost of quality. Six sigma projects are chosen based on the customers' feedback and analysis of the process metrics. Projects having significant customer impact are given priority[4].

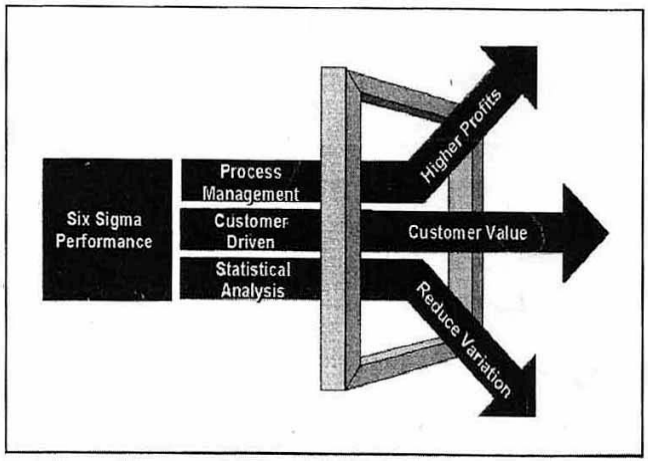

Fig.2 : The six sigma performance flow

VIII. CONCLUSION

Techniques of all sorts have transferred the way for facilities to manufacture products. The way of producing the lean is to minimize all the wastage from the production line with use of various techniques. The idea of lean manufacturing is firstly generated by Toyota Production System, but now it is necessary for all the organization to stay in business at the present level. Role of lean manufacturing is beneficial for the both customers and industry organizers. Also, Six Sigma is a continuous improvement program that should be led and nurtured by both management and employees who have deep and hands-on knowledge of their business processes and customers. Six-sigma is the least used approach in the automobile sector and this fact is quite alarming. The implication of particularly not using Six Sigma quality tool is that Indian automobile sector. Today Lean Thinking is being used world-wide in a growing number of organizations. It is applied at the point of contact with customers, as well as back room work. It is being applied at everywhere like in engineering as well as traffic flow in urban areas. A continuous improvement by a shortest and fastest way is possible to cross the goal. Lean manufacturing is present and Future of the every industry.

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