MANUFACTURING EXCELLENCE USING'LEAN SIX SIGMA' TECHNIQUESFOROPTIMIZATION LEVEL OF PRODUCTION IN AN ORGANIZATION

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Abstract

The operations of the organization are positively connected with the stream situated design. Since organizations need to rehash their production to ensure that their customers will be facilitated with same quality products, with each production. Notwithstanding they need to decrease the production time and lead time, without compromising over the quality and this should be possible by rehashing the production process and again and getting to be proficient. Subsequently it is suggested to the supply chain management that they must involve their production group for having redundancy in their work and wind up proficient in their production. They must be come to their optimization level, where they need to extricate less waste and have abnormal state of the production.Thus manufacturing or operations excellence is gaining importance for quite some time now. Manufacturing /Business Excellence has gained so much importance that it has become an independent management Function like any other in any good business organization.

1. INTRODUCTION

In the last 10 years, the economic environment of manufacturing Enterprises have changed drastically. Faster product development and shorter lead-time in procurement, production and distribution are the critical competitive factors of today. The integration of business within and even between industrial enterprises has much innovation potential in this respect. Through integration, business operations can be streamlined, which not only shortens lead times but also gives radically a new Lean options for the enterprise strategies and organizational structure.Six Sigma is a capable business strategy that helps in yielding a sensational lessening of defects, errors, or mistakes in service processes[1]. Six Sigma is an intense methodology which was created to accelerate quality improvement in service sectors by focusing relentlessly on reducing process variation and wiping out non-value added steps or tasks[2]. Six Sigma is not accepted to be something new by some people and it is accepted to be extremely remarkable in its approach and arrangement; it is a strategic business improvement approach that aids to increase both customer satisfaction and an organization's financial wellbeingSnee (1999)[3].

Six Sigma

The Introduction of Six Sigma into the manufacturing arena in the early 1980s by Motorola was a step in revolutionizing the scope and use of quality systems in business today. To determine Six Sigma in simple terms is not possible because it encompasses the methodology of problem solving and

focuses on optimization and cultural changes.

Over the past few years there has been a significant increase and development of Six Sigma technologies and methodology in mass manufacturing organizations. Six Sigma is increasingly being applied as a business improvement methodology rather than as technology based statistical measure. In the literature there are many examples quoted where the application of these methodologies has led to large-scale improvements in defect rates and productivity. Considering that many organizations are currently investing heavily in Six Sigma and that it significantly affects employees and working practices, it is argued that critically reflective studies are needed to gain a fuller and broader understanding.

Benefits of Six Sigma

Six Sigma accentuates financial returns to the balance sheet of an organization; it has been so successful in many organizations where performance is significantly improved beyond that which can be obtained through other means. The following are the key benefits gained by some of the companies/ working with Six Sigma

2.CHARACTERISTICS OF LEAN PRODUCTION:

The characteristic of a lean production model include:-.

- Team based work organization; this involves flexible multi skilled operators taking a high degree of responsibility for work within their areas.

- Active shop-floor problem selecting structures, central to kaizen or continuous improvement activities.

- Lean manufacturing operation, which forces producers to be surfaced and corrected, manifested by low inventories. The management of quality by prevention rather than diction and subsequent correction; small number of direct workers, and small batch, **Just in Time** production.

3.ELEMENTS OF LEAN PRODUCTION:

The essential elements of lean production are shown in Fig. below. A key feature is that fewer resources inputs are required by the manufacturing system (less material, fewer parts, shorter production operations, less unproductive time needed for set-ups) etc. At the same time there is pressure of higher output performance to be achieved (better quality, higher technical specifications, greater product variety) etc. This should result in greater customer satisfaction, which in turn provides the opportunity for the lean company to gain market share.

The model operationalizes the determinants of Lean Production System. Implicit in this is the motion that by introducing Lean production, performance can be enhanced. So Lean Production consist of a number of principles characterizing different functional areas and the overall strategy of lean company. These functional areas and further are summarized in the Table shown below.

Table 3.3 - Determinants of Lean Production

Lean Development	+	Lean Procurement Enterprises	+	Lean Manufacturing	+	Lean Distribution	=	Lean
Supplier Involvement				Elimination of Waste		Lean Buffers		Global
Gross Functional teams		Supplier Hierarchies		Continuous Improvement		Customer Involvement		Network
Simultaneous Engineering		Larger sub systems from Fewer Suppliers		Multifunctional Teams		Aggressive Marketing		Knowledge Structures
Integration Instead of Coordination		Supplier Involvement		Vertical Information System				
Strategic Management				Integrated Functions				
Black box Engineering				Pull Instead of Push				

4. PROJECT SHEDULE

To initiate the process of manufacturing excellence and prove the methodology of Lean Six Sigma, an experimental case study was conducted in a medium sized mass production manufacturing company **M/s Mehta Engineers Ltd**, Ludhiana, Punjab (A large Auto sector OEM supplier) , which utilized various tools in order to increase the productivity of one of its main product lines; reduce the cost of poor quality and reduce the die change over down time during production. After initial Assessment of the Factory Fundamentals (FFA), consecutive experimental datas were collected before and after the project implementation, to verify the results. This project helped in removing all the barriers to change that was brought in to achieve excellence in various operations of the Press and the Weld shops of MEL.

4.1Tools & Techniques of lean Manufacturing:

This section explains the role of various tools and techniques, which are the foundation of the lean manufacturing. For many quality control and improvement practitioners, the difference between tools and techniques of quality management are still not clear enough. A tool is very narrow in focus and has a clearly defined application to tackle a specific problem of specific kind and specific type e.g. 5S is a tool for maintaining the organization neat and clean. A technique is broader in scope and requires creativity and specific knowledge to tackle a practical problem e.g. statistical process control is a technique used for catch up special cause of variation in process. By utilizing lean tools and techniques, the waste can be reduced to a desirable level and a good quality product can be achieved by the various tools and technique used in the lean manufacturing.

The various tool and technique used in the lean manufacturing are as follows:-

Tools

Pull System (Kanban).

5-S Practice.

FFA ..Factory Fundamental Assessment

Value Steaming Mapping.

One-Piece Flow.

Waste Identification and Elimination (7 Elements of Waste)

Techniques

Set up Time Reduction (SMED)

Total Productive Maintenance (TPM)

Poka-Yoke (Mistake Proofing)

Just - in - Time (JIT)

Kaizen (Continuous Improvement)

Cellular Manufacturing

Daily Work Management.

Total Quality Management.

4.2 Techniques of Lean Manufacturing

Single Minute Exchange of Die (SMED)

Traditional set up operation involves several kind of waste and SMED technique was developed to eliminate waste and to reduce set up time from hours to minutes in single digit. It was developed by Shigeo Shingo of Toyota fame, for press machines. Activities are performed outside the press as a parallel operation, as a set of external activities, when the press is producing, instead as internal activities when the press is stopped for the set up. When set up is done in this way, it reduces the set up time from 4 hours to 3 minutes. So that concept brought out by him is known as SMED, which means" single minute exchange of die", meaning all die changes should be completed in a single digit number of minute (such as nine minutes, 5 minutes, 3 minutes)(Figure 1).

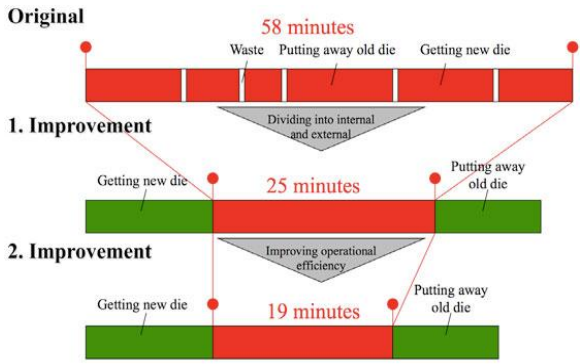

Figure 1 Set up time Reduction

5. CONCLUSION

Lean Six Sigma has been produced by combining the complementing aspects of Lean and Six Sigma into one methodology. The most essential characteristic of this new methodology is that it incorporates the speed increasing and waste reducing philosophy of Lean, as well as the statistical approach to process improvement and the quality standard from Six Sigma. Assist combination of the two methodologies can be perceived within Lean Six Sigma: Six Sigma's improvement specialist pecking order has a managerial and supportive capacity to improvement projects which are influencing the shop-floor employees' workflows. These shop-floor employees shape a significant source of information within Lean Six Sigma because they are process experts and can generate thoughts for improvement initiatives, this philosophy is obviously gotten from Lean.

Key Ingredients of Six Sigma Programs:

In order to manage and optimize the process output, it is important that we identify the Key input variables which influence the output. The key ingredients of Six Sigma play an identical role of input variables to any process. This section briefly reveals the key ingredients that are necessary for the effective implementation of Six Sigma program.The relative weightings of critical successes factors (CSFs) would assist people to understand what ingredients are essential for making Six Sigma process successful and what ingredients are not important to success. Few critical success factors (CSFs) can be identified as.

Management Involvement and Commitments

Any successful initiative like Six Sigma requires top management involvement and

provision of appropriate resources and training. Jack Welch, the CEO of G.E. has strongly influenced and enabled the restructuring of the business organization and change the attitude of the employees towards implementation of Six Sigma.

Cultural Change

A successful Introduction and Implementation of Six Sigma requires adjustments to the culture of the organization and a change in the attitude of employees.

Organization Infrastructure

In addition to top-management there also needs to be an effective organization infrastructure in place to support the Six Sigma introduction and developed program with in any organization.

Training

It is critical to communicate both the 'why' and the 'how' of Six Sigma as early as possible and provide the opportunity to people to improve their comfort level though training classes. For example the training for becoming a black belt with in Motorola is a minimum of one year.

Project Management Skills

As Six Sigma is a project driver methodology, it is good practice for the team member to have project management skills to meet the various deadlines during the course of the project.

Understanding the Six Sigma methodology, tools and techniques

A healthy portion of the Six Sigma training includes learning the principles behind the Six Sigma methodology, i.e. DMAIC methodology.

Linking Six Sigma to Business Strategy

The goal of every organization is to make profits; Six Sigma projects make business process profitable while attacking variability, which leads to high scrap rate, high rework rate, low productivity etc.

Linking Six Sigma to the Customer

Key elements of the success of Six Sigma program is its ability to links to the customers. Project should begin with the determination of customer requirements

Linking Six Sigma to Human Resource

Human resource based actions need to be put into effect to promote desired behavior and results.

Linking Six Sigma to suppliers

Many organizations that implement Six Sigma find it beneficial to extend the application of their Six Sigma principals to management of their Supply Chain.

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