
ASSESSMENT OF IMPACT OF LEAN SIX SIGMA FRAMEWORK IN A MANUFACTURING INDUSTRY

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ABSTRACT

Currently there is need to implement various tools which can improve production to cutback in improving quality of the product overall outlay of the product. There are two dominant tools which are regularly used by for quality improvement of the product by dropping the non-value adding activities and wastage known. There are two different tools which are joined together in to a commanding tool known as lean six sigma tool which shows results in a much better way. Lean tools reduce the non-value adding activities and enhance the effectiveness of equipment, tools and machines and six sigma tools helps in decision making based data which finally reduce the variability in the process. DMAIC model is used to execute the lean six sigma methodology along with lean principles and techniques to identify the origin of the problems, mitigate defects and rejected products. the model which is framed, provides a way out for controlling the process and some fresh processes are introduced to attain better results.

Keywords

Lean, Six Sigma, Variability, Waste, DMAIC (Define, Measure, Analyze, Improve & Control), Framed Model

INTRODUCTION

At present to carry out the dominance in Operations a lot of organizations have adopted lean and six sigma tools. The concept of six sigma & lean manufacturing grabs the change and improve the process or work. The fusion of lean and six sigma methodology is known as Lean Six Sigma or Lean Sigma.

Six sigma is a methodology which is used in the manufacturing company to the systematic improvement in the process by reducing the variation. Lean manufacturing aim to reduce the waste by eliminating the non-value adding activities and provide the optimal quality. "Lean Six Sigma is the combination of both lean manufacturing and six sigma methodology. Lean six sigma is a powerful tool which enhances the good will of the company by improving the product

quality, productivity and reducing the cost of the product (Cudney et al., 2006). Lean and Six Sigma are two different powerful tools which implemented in an organization work culture to enhance the quality of product, increase the profit of company by reducing the various unwanted costs associated with product. Last two decades has testified an escalating pressure from the customer for getting good value for their money in terms of quality of product, good services and low cost (Basu 2001, George 2002). This stimulates many organizations to use either lean tools (for improving their services of goods, reducing overall product cost, reducing waste) and six sigma (improve the process and reduce the variation in the process) approaches as management strategies to increase the good will of the company and improve the organization profit (Kumar et al. 2007). Organizations must improve their product quality and services offered to remain in the competitive in the market because customer expectations are not static; it changes with time (Flynn et al. 1995: Reed et al. 2000).

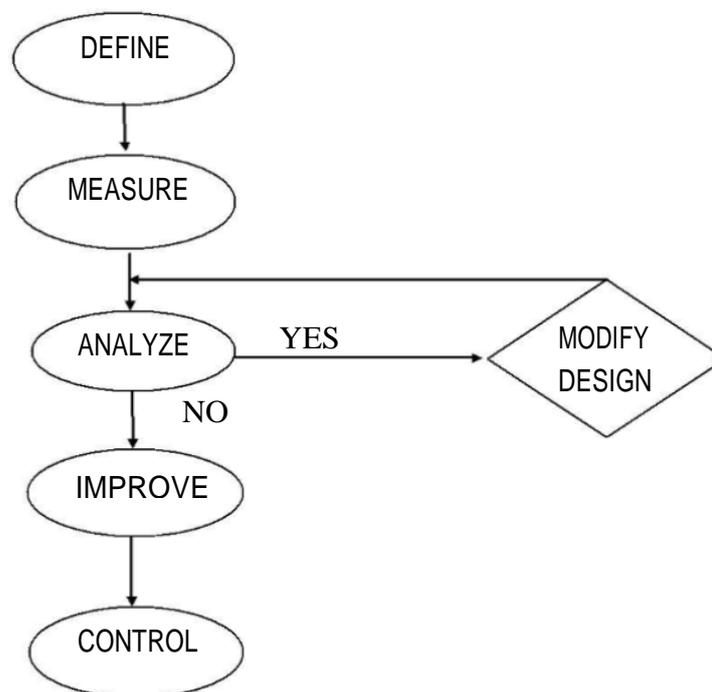
Reducing or eliminating various defects associated with the products is the key thing to differentiate an organization from its competitors (Hunckley and Barkan 1996: National Institute of standard and technology 2011). Various companies like G. E, Honey well and many others, use lean or six sigma

methodologies in their companies to achieve highly effective outcomes (Womack and Jones 1996; Harry 1998, Sharma 2003, Murman et al. 2002).

Lean manufacturing deals with performing in such a way that finished products are completed with minimum waste and at a pace equal to demand of consumer. Lean manufacturing comprises a set of principles, tools and techniques which are used to mitigate machine downtime, inventories, scrap, rework and other hidden wastes. On the other hand, six sigma techniques are based on the statistical methodology for solving problems related to production and enhance the overall quality of the product. Also, they work to develop an idea of continuous improvement (Smith 2003). The integration of two tools (i.e. lean and six sigma) helps to achieve better results than achieved by any of these individually.

As lean tools work to get rid of the misuse and non-value adding actions in a route throughout the organization. While, in six sigma methodology DMAIC (Define-Measure-Analyze-Improve- Control) technique is used to improve the process capability. This approach also helps to enhance the quality of the product. Lean six sigma is the combination of waste elimination and production process improvement techniques. To make these techniques an integral part of work culture of an organization, the commitment of top management is must and the top management has to motivate its employees at all levels to actively participate in the implementation of this methodology to enhance the quality of production process in their organization. Layout of DMAIC model is shown below in figure 1.

Figure 1: - DMAIC model's phases and work layout.



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LITERATURE REVIEW

Youssouf Ayadi et al., (2014) described that maintenance is very important part of the organization. In the organization where machine plays important role in the production process, the poor maintenance may lead to ineffectiveness in the process. Authors use lean six sigma methodology to enhance the maintenance service of the organization. LSS (Lean six sigma) methodology improves the quality of the product by use of some statistical tools. This method is based on five steps Define-Measure-Analyze-Improve-Control (DMAIC). This implementation leads to improve the process and reduce waste, cost, and losses. Rusko et al., (2011) state that six sigma Methodology enhances the business success. Six sigma process is simple and based on the facts and statistical analysis, which improves the manufacturing process. They conclude that after the successful implementation of six sigma tends to improve the quality of the product, working environment, cycle time, inventory at all levels and also mitigate the non-value adding activities. Filardi Fernando et al., (2015) described the impact on the cost and time allocation processes, by the implementation of lean six sigma in a multinational oil company (in Brazil). LSS improves the IT application but, people participation and intangible put low adherence in LSS methodology and has great influence.

Choomlucksona juthamas et al., (2015) described that to achieve good competitive advantages, companies use some tools and techniques to improve the quality of product and increase the productivity. At present lean concept is popular which increases the productivity by eliminating waste. The study was conducted in sheet metal stamping organization. The results show that polishing time reduced by 62.5% after implementing the lean tools. Also, non-value added activities reduced up to 66.53% which reduced the overtime cost by \$1,764.

Krogsgate Lars et al., (2013) described that it is essential to use process improvement tools to get good value products and reduction in the cost of the product. Lean and six sigma tool's possibilities and limitations are explained in this research paper. Lean six sigma is used in industry for last three decades but there is a gap to be filled on tolerance and variation management. They conclude that tolerance and variation are present in all engineering work and they cause variation in the process. So, by implementing six sigma model such variation can be reduced. Zhang Lianying et al., (2016) described that implementation of the lean concept depends upon the organization employees and creation. The author demonstrates that how lean concept can be fit into the organization work culture. Results show that lean tools improve the process. To improve the productivity, organizations promote the lean concept in their work culture. They conclude that lean tools solve problems related to production and make improvements. Jie et al., (2014) described that large scale industries provide the products at less rate with greater value than compared to SME (Small Medium Enterprise). So, SME faces the pressure of competitiveness. In this paper, the author described the implementation of the integrated quality concept that is lean six sigma frame work in the SME Company. They concluded that the lean six sigma methodology helps to identify the problem, also provide the solution and hence, improve the process. Improvement in all machines was observed. Moreover, the yield in the productivity increases up to 21.93%. Pugna Adrian et al., (2016) described that one possible way to enhance the work operation is by implementing the quality improvement tool like six sigma. Implementation of six sigma methodology was proven to raise the quality of the product in short period of time.

They use six sigma tool in the automotive company in Romania. DMAIC model was used to improve the quality. It was observed that DMAIC model helps to smoother handling, improve process capability from 0.96 to 1.72 and sigma level rose from 2.9 to 5.2 and 1.42 to 6.7 in short term and long term respectively. Ciarniene Ramune et al., (2015) state that lean concept is a philosophy that takes care of all expenditure to mitigate the waste. This shall be achieved by using some sets of principles, tools and techniques, performance improvement and inventory reduction. They concluded that the barrier behind the implementation of the lean concept is the lack of support of top management, lack of knowledge in employees and resistance to change. Erturk Muzaffer et al., (2016) described that now a day's global competition is escalating in the world which forces the organization to use some business improvement tools to improve their processes.

This can be achieved by using six sigma methodology. Six sigma comprises of tools which strike the target

and improve the process. They concluded that implementation of six sigma methodology on white goods organization helps to improve the process and escalate the productivity. Also, with the implementation of six sigma, the organization increased their competitiveness, got a reduction in cost. Six sigma improves this in a sustainable manner.

CONCLUSION

Any manufacturing organization can adopt lean six sigma methodology and there will be lack in defective products in the production, Which results in the reduction of overall cost of the product & in reduction in non- value adding actions too. Booming performance of lean six sigma improves the employment ethnicity of the picky organization which leads to improved co- ordination of management and the employees resulting in enhanced outputs. Overall, it reflects that lean six sigma approaches improve the quality of the product & reduce the wastage.

FUTURE SCOPE

In the foreseeable future, the level of competition will be very high as the world is getting globalized in the contemporary time. Many organizations are continuously working on this business improving tools to achieve good competitive advantages. Better results can be achieved by Combination of Six sigma & lean than using a single tool. Moreover, lean six sigma tool plays an important role as customer demand is not static it changes continuously so to meet the requirements. These tools can be implemented in various sectors like Chemical processing industries, education sector, automobile fabrication, pharmacy & medicine, Information Technology industry etc.

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