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The Lean Six Sigma (LSS) Continuous Improvement Tool in Organizations

Majed A. Al-Amiri*

Mailing Address: Saudi Aramco, NGL Admin Building#31, PMT Offices, 1st floor, R-26, Yanbu, Saudi Arabia

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Abstract: **The objective of this article is to give you information about on of the most effective tools for Continuous Improvement (CI) in organizations and industries, which is Lean Six Sigma (LSS) methodology. It is also to present the mainlines of Lean Six Sigma (LSS), implementations and benefits by using DMAIC approach (Define, Measure, Analyze, Improve, Control). The LSS is a systematic method aims to improve organizational performance by eliminating waste while improving the quality of organizational processes in order to achieve process excellence, enhance customer satisfaction, quality and productivity, improve reliability and results in business growth. Moreover, the objective of LSS is to deliver quality with speed by eliminating process waste and reduce defects. In sum, this article aims to explain the LSS methodology, benefits and its key effects on organizations or industries.**

Keywords: **Lean Six Sigma, Lean Management, Continuous Improvement, DMAIC approach**.

1. INTRODUCTION

The Lean Six Sigma is one of the most effective technique to identify opportunities and it plays and an important and vital role in continuous improvement of any organization. It also helps organization to reduce process variation, number of defects and eliminate waste through lean and Six Sigma. Many organizations in the world are financially suffering from the lost that occurs by high number of defects in process or product and wastage of time. There are few organizations excel at continuous improvement, but Toyota Motor Corporation is the best-known organization for the highly effective production system and become the world largest industrial enterprise due to their successful implementation of lean production and part of continuous improvement [1]. Therefore, Toyota is a real example of how is the continuous improvement culture can positively impact any organization. Nowadays, the business world is moving very fast, and organizations strive to achieve their operation targets in order to keeping up with global competition forces by reducing costs of defects while increasing the speed and maintaining high level of quality. The implementation of LSS when supported by the right performance improvement infrastructure can make remarkable results, and LSS works not by speeding up the machines or people, but by reducing unnecessary wait time between value-add processes [2].

2. THE LEAN SIX SIGMA (LSS)

The LSS is a continuous improvement method that systematically improve organization performance by eliminating waste (speed) and reducing variances & defects (quality) in order to achieve process excellence and faster rate of improvement in customer or proponent satisfaction, productivity, quality, cost and improves reliability and results in business growth [3]. It combines lean management and six sigma statistical method in order to increase the velocity of value creation in organization processes. Below figure 1 illustrates the LSS definition:

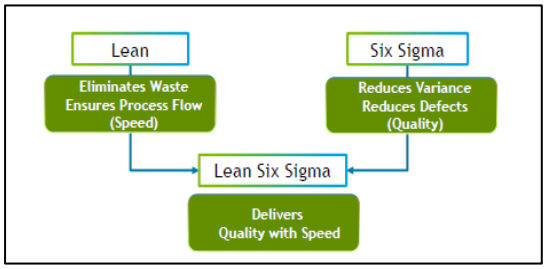

Figure 1: LSS definition

In LSS, there are eight kinds of waste known as DOWNTIME and LSS focuses on the reduction and elimination of those process wastes, an acronym formed by the words Over Processing, Waiting, Over Inventory, Defects, Unnecessary Transport, Unused Employee Creativity, Unnecessary Movement and Overproduction.

2.1 LSS Competency Levels

The LSS training and certifications level was established to allow different titles for expertise levels as follow [4]:

- ***Yellow Belts:*** **"**Individuals who are trained to perform as members of six sigma teams. They are used to collect data, participate in problem solving, and assist in the implementation of individual improvement activities."
- ***Green Belts:*** "Individuals who have completed six sigma training, are capable of serving on six sigma project teams, and managing simple six sigma projects."
- ***Black Belts:*** "Individuals who have had advanced training with specific emphasis on statistical applications and problem-solving approaches. These individuals are highly competent to serve as on-site consultants and trainers for application of six sigma methodologies."
- ***Master Black Belts:*** "Individuals who have had extensive experience in applying six sigma and who have mastered the six sigma methodology. In addition, these individuals should be capable of teaching the six sigma methodology to all levels of personnel and to deal with executive management in coaching them on culture change within the organization."

2.2 Continuous Improvement (CI) DMAIC Approach

The CI process of LSS uses five phases of problem solving, which is known as DMAIC and it stands for Define-Measure-Analyze-Improve-Control. DMAIC is used when the project goal can be achieved by enhancing an existing process, service or product. DMAIC is very useful CI tool, and it provides a framework for performing a lean six sigma organized projects. TABLE 1 below summarizes major details of how DMAIC works [5]:

TABLE 1: Definition of DMAIC Works

The Phase	Phase Definition	Tools / Techniques
Define **(D)**	A problem has to be well defined. Identifying the issue or problem should include the following: • What is wrong or not meeting your customer needs? ✓ Quantified metric (KPI) that describes current performance as baseline. ✓ Compare the baseline with a benchmark. • When and Where do the problem occur? ✓ When: include the time period of data taken to arrive at the baseline. ✓ Where: location in organization, department, section, etc. • How big the problem and the negative impact of the problem? *Remember that a problem well defined is a problem half-solved.*	Project Charter, Voice of Customer (VOC), Supplier, Input, Process, Outputs, Customer (SIPOC) Pareto Analysis
Measure **(M)**	In this phase, a problem is well defined and the current state or process has to be examined to see how it contributes to the problem, and to determine if the current state meet the defined quality expectations. Also, the measurement has to be supported with actual performance data using data collection plan in order to measure and prioritize potential causes.	Process Map, Fishbone Diagram, Prioritization Tools (Cause & Effect Matrix), Failure Mode & Effect Analysis (FMEA), Data Collection Template
Analyze **(A)**	All collected data will be examined in this phase in order to determine and identify the root-causes of the problem and the relation between cause and effect.	Graphical & Statistical Analysis Tools (Ex. Minitab Software, excel, etc.) 5-Whys Analysis

Improve **(I)**	The purpose of improve phase is to develop and select the optimum solutions. Also, to test the solutions and execute the implementation plan after secure management acceptance of the implementation plan.	Brainstorming, To-Be Process Map, Value Stream Map (VSM), Implementation Plan Template, Solution evaluation (Payoff Matrix)
Control **(C)**	Sustain the improvements by monitoring and continue improving where possible and establish a control plan in order to prevent reoccurrence of the original problem.	Control Charts, Visual Control, Standard Operating Procedures (SOPs), Control Plan Template, Project Closure Template

2.3 Benefits of LSS Implementation

There are many benefits to LSS methodology including but not limited to, organization's employees, proponent, customers, suppliers or vendors, and organization. The organization can benefit by increasing the value creation of processes, and companies can develop and enhance the skills and experience of their employees. The improvement in organization will be reflected with customers and buyers, which will build a mutual loyalty and trust inside and outside the organization or companies and also increase the revenue and sales. In addition, the employees feel that they are adding a valuable contribution to the company as well as company invest in employee's development and growth opportunities.

3. CONCLUSION

The LSS methodology its DMAIC approach is very systematic and useful tool for organization wide continuous improvement. It is a management approach and creates a roadmap during implementation of DMAIC by documenting the current and future states for the problem. In addition, it is very effective improvement tool that helps organization to eliminate wastes and defects in processes in order to improve organization performance and employees' skills plus creating a positive environment between organization and its employees. Also, this article provides the basic knowledge of lean six sigma and its benefits in organizations in order to provide awareness about the effectiveness and positive impact of LSS thinking as one kind of continuous improvement.

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