

## ATTAINING QUALITY IN BUSINESS PROCESSES USING NEW DERIVED APPROACH OF STACKED LEAN SIX SIGMA

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### ABSTRACT

*This paper emphasizes the concept of achieving the company's process improvement through quality management tool, 'lean six sigma'. For which, the integrated and separate view of lean and six sigma has been studied with reference to implementation side of the two concepts. The study observes DMAIC in connection with the key factors influencing success of Lean six sigma projects. A new stacked - 7 steps model of P-DMAICQ is proposed within the context of study, which eliminates the causes of lean six sigma project failures. The paper includes analytical reasoning for successful integration of the two concepts when other methodologies for process improvement are also there.*

**Keywords:** DMAIC, Lean Six sigma, Planning, Process, Quality

## 1. INTRODUCTION

Globalization era of 21<sup>st</sup> Century where technology is radically changing the horizons around, pace of change and need for improvements have also become inevitable. Globalization has made the competitive environment more challenging for businesses by changing customer preferences, increased alternatives available, advancement in customer service concepts etc. In order to meet new challenges of diversifying business practices the businesses need not only to review their existing processes and point out the areas where improvements are required but also has to make effective strategies to adopt new practices in order to satisfy the customers that will result in increased revenues, the ultimate goal of any business. Same is also true and applicable in service sector, where “services” is to sell the product and profit is the ‘customer satisfaction’. For the purpose to add quality in the business processes new concept introduced i.e., ‘Quality Management’.

*“Quality management can be described as a management revolution and a philosophy of management, a new way of thinking about the management of organizations, a paradigm shift, a comprehensive way to improve total organizational performance, an alternative to management by control or as a framework for competitive management”* (Foley, 2004)[1].

Various types of quality management tools and transformation strategies are available which may include six sigma, lean, Lean Six Sigma, Agile Management, Re-engineering, Total Quality Management, Just-In-Time, Kaizen, Hoshin Planning, Poka-Yoka, Design of Experiments, and Process Excellence, etc. “Lean Six Sigma” is the novel concept. Although a lot of articles, books and papers have been written on the concept from various perspectives and a lot of attempts have been made to introduce the concepts that are proposed to be a step ahead of ‘lean six sigma’, one of a major objective of this paper is to introduce a new approach in this aspect but from the implementation point of view we stacked two new elements in the traditional DMAIC process of six sigma i.e., planning and quality. The paper clearly demonstrates the benefits of adding these two elements into DMAIC by giving specific attention to the ‘key success factors’, which are required for a successful lean six sigma project.

Here key terms; six sigma, lean & lean six sigma need to be explained to develop better understanding.

## 2. SIX SIGMA

The basic theme of six sigma is reducing “variations”. Six sigma is a metric, a symbol, a value. But it is also a philosophy, a methodology, a tool, goal and a vision. It is a statistical measure of variations, and an organizational mindset and a structured process for analysis of data [2].

### 2.1 SIX SIGMA-A STATISTICAL CONCEPT

#### 2.1.1 SIGMA

Sigma,  $\sigma$ , is a Greek alphabet, used statistically to measure the standard deviation i.e., variability in any process when in business, it is an indication of defects in the outputs of a process and how far these outputs deviate from perfection.

#### 2.1.2 SIX SIGMA – a Metric

As a metric,  $6\sigma$  is equal to 3.4 defects per million opportunities (DPMO). For example if a company is operating at a 3 sigma level, then it is producing 66,800 defects per million opportunities.

## 2.2 COMPONENTS OF SIX SIGMA

Basic components of six sigma are:

- Process: Any repetitive steps in any kind of business, i.e, Transactional, Manufacturing or Service to achieve some results.
- Defects: A measurable characteristics of any process that is away from the required specifications.
- Variations: Any measurable difference between the set standards and the real output of the process [3].

## 2.3 ORIGIN OF SIX SIGMA

Motorola Company was the first one who introduced the concept of Six Sigma in mid 1980s and after that in early 1900s it got fame after Jack Welch, the CEO from General Electric, who made it a central focus of his business strategy in 1995 [4].

## 2.4 TOOLS/TECHNIQUES FOR SIX SIGMA

The basic tool for six sigma implementation is the five step process called “DMAIC” implemented under the close supervision of a corps of trained “black belts, yellow belts”, etc.

## 2. LEAN

The basic theme of Lean is ‘speed’ or in simple words lean is the processes of placing right thing at right place. Lean can be defined as a management approach that seeks to maximize value to customers, both internal and external, while simultaneously removing wasteful activities and practices. US department of Commerce’s National Institute of Standards & Technology Manufacturing Extension Partnership defines lean as, “a systematic approach to identify & eliminate waste (non-value added activities) through continuous improvement by flowing the product only when the customer needs it in pursuit of perfection” [5].

### 3.1 TOOLS/TECHNIQUES OF LEAN

Tools and techniques of Lean include Five S, Visual Control, Poka Yoke, Cellular Design, Quick Change over, Pull Scheduling & Kaizen [5].

### 3.2 ORIGIN OF LEAN

In US the origin of lean manufacturing is linked to Henry Ford - the assembly line, Fredrick Taylor - industrial engineering and Dr. Deming- father of quality management and the concepts were refined by Taiichi Ohno, Eliji Toyoda and Shingeo Shingo to create what is now known as the Toyota Production System (TPS), in Japan [6].

### 3.3 ELIMINATION OF MUDA

(Ohno 1988, 9) Ohno identified “7 deadly types of waste“, *muda*. The most common are: Over production, Waiting, Transportation, Inventory, Motion, Over Processing, Defects, Recently an 8th waste has become very common and that is the waste of not tapping into human creativity [6].

## 3. LEAN SIX SIGMA (LSS)

The amalgamation of lean and six sigma is the concept of lean six sigma which reap the benefit of both of the methodologies at the same time. Lean Six Sigma encompasses many common features of Lean and Six Sigma,

such as an emphasis on customer satisfaction, a culture of continuous improvement, the search for root causes, and comprehensive employee involvement. In each case, a high degree of training and education takes place, from upper management to the shop floor [7].



**Fig. 1 Integration of Lean & Six sigma**

Main Points	Lean	Six Sigma
<b>Similarities</b>		
<b>Goal</b>	Organizational growth and survival by enhancing customer satisfaction.	
<b>Executive involvement</b>	Executive Management be committed and actively involved.	
<b>Tools and Techniques</b>	Include basic analysis techniques like root cause analysis, problem solving etc.	
<b>Employee involvement</b>	Employees are trained and bucked up to contribute to identify and solve troubles as they occur.	
<b>Scope of Application</b>	Scope is widening from manufacturing to service sector, from private to public sector and from financial to environmental sector etc.	
<b>Potential Differences</b>		
<b>Duration of Project</b>	Project completion time is not more than few days	Project completion time normally consumes multiple months using a disciplined structure.
<b>Project focus</b>	Reduces wasteful practices and enhance customer satisfaction	Reduces errors and variation and improve customer satisfaction.
<b>Analysis techniques</b>	Involves process maps, root cause analysis, and mistake proofing.	Involves statistical data analysis, controlled experimentation, and optimization.

**Table-1** Comparison of Lean & Six Sigma

Source: *Improving Service Delivery in Government with Lean Six Sigma* [7]

## 5. SCOPE OF LEAN SIX SIGMA

Being an effective tool of quality management the scope of LSS is widening from manufacturing to service sector, from private to public sector and from financial to environmental sector etc.

## 6. SUCCESSFUL FUSION OF LEAN & SIX SIGMA

The major reason of successful combination of Lean and Six sigma concepts are the fusion of negatives of six sigma and positives of lean.

### Negatives of Six sigma are;

1. Size and number of roles in the Six Sigma structure
2. Amount of training involved
3. Time it takes to yield results
4. Cultural change required to make it work
5. Cost factor-cost of training

### Positives of Lean are;

1. No infrastructure requirement
2. Lean is cheap as no training sessions are required, only there is a need to set up a few improvement teams
3. Faster results, as projects and results are targeted and within a month or two can show savings or improvement to a process

Companies are adopting LSS because of two main attractive reasons. Firstly, of being cheap, as no training sessions are required and secondly, to generate faster results.

## 7. DO ALWAYS LEAN SIX SIGMA PROJECTS MEET SUCCESS?

If LSS is a complete and flawless quality tool then, every LSS project must be a success but surprisingly the answer is 'no'.

According to Bain & Company management survey of 184 companies, out of which 80 percent of the companies were failing to drive the anticipated value out of their Lean Six sigma projects, and 74 percent were not gaining the expected competitive edge because they hadn't achieved their savings targets [8]. The major causes of Lean Six sigma project failure, found in literature are;

- The cost of the project exceeds the expected saving targets
- The processes are not prioritized before deploying Lean six sigma teams
- Direct supervision of improvement projects by the champions is required to sustain the improvement, that's why when LSS team leaves after completion of project the employees revert back to their old ways
- Companies need to deploy LSS expert which is required to motivate and supervise employees which companies often avoid to save costs of doing so
- Wrong and misleading reports about the failing projects to top executive level by the directors/managers who are directly supervising the projects in order to show 'everything is going on well'.

### 7.1 Key Success Factors for LSS projects

It is enlighten from above points that no doubt LSS is most acceptable quality management tool but at the same time without identifying some critical factors that are necessary for success of any LSS project, the desirable results can't be achieved. In the same context, various CSF are identified by various authors in literature like; Coronado and Antony [9] identified 11 CSF, Burton & Sams identified 16 CSF [10] and Hayes [11] identified 04 CSF. By having reviewed all these critical success factors following CSF can be extracted from the literature which is common in findings of all the authors and it is observed in paragraph No. 7 above, that absence of these basic factors play major role in failure of most of the LSS projects.

#### 7.1.1 Project selection and cost analysis

Strong emphasis must be given to the selection of project and deployment of the LSS team on specific process improvement. As deploying LSS teams for process improvement involves heavy investment of resources therefore it is very much necessary that before deploying the LSS teams to any process, organization's processes comprehensive X-ray must be done so that the processes may be prioritized keeping in mind the expected gains and costs expected to be involved.

#### 7.1.2 Role of Executive management

Top management direct involvement and commitment right from start till end is the prerequisite for success of any LSS project. Moreover, sustainability of the improvement made is also dependent on the continuous involvement and interest of the top executive management. Implementation and success of LSS projects require money, effort, strong urge for process improvement/change, resources and time which is ensured only when the executive management is directly involved and committed in this regard. Direct involvement of the executive management in training process is more advisable than limiting to support.

#### 7.1.3 Employee's Training & Education

The training and education of well informed, active, knowledgeable employees as nominated by the executive management about tools and techniques of LSS is a factor that is critical to the success of any LSS project. The employee's awareness & training of six sigma will generate Black Belts and champions from inside the organization which will not only be the source of employee's motivation but also the direct supervision by trained BBs and champions from within the organization will help the improvement processes to sustain after completion of LSS project.

#### 7.1.4 Effective communication plan and Culture change

Effective communication plan in the form of meetings, written messages, and direct lectures by the executive management is required to let people know about the aim of introducing LSS into the organization, the expected outcomes, knowledge of tools & techniques to be used which will help in reducing fear of change as is done in Xerox, one of the known successful example of Lean six sigma. **Xerox** established an intranet site that provides reference information, deployment details, project successes and answers to frequently asked questions. In addition to this, leaders also communicate via speeches, meetings and newsletters [12].

## 8. PROPOSED APPROACH OF STACKED LEAN SIX SIGMA (LSS)

In the light of the literature review, critical success factor for LSS projects and causes of LSS project failures let's have a look on the implementation plan of LSS. The study reveals that DMAIC, the six sigma process is used to implement LSS as well with only change of insertion or use of Lean tools & techniques in the same stages of DMAIC process. At the same time it is pointed out that the Critical Success Factors, having great importance are not made the part of implementation process of LSS projects.

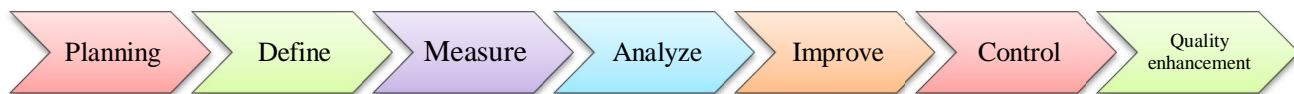
### 8.1 The 'DMAIC' PROCESS

DMAIC is an acronym for “Define, Measure, Analyze, Improve and Control” refers to a systematic five-step approach to running a process improvement project; its origin found in early quality programs such as the Plan-Do-Study-Act structure developed by Walter Shewhart in the 1930s [13].

### 8.2 PROPOSED 'PDMAICQ' PROCESS FOR 'LSS' IMPLEMENTATION

It is proposed that by having 7 phase implementation process i.e, P-DMAICQ, for LSS instead of adopting traditional 5 phase DMAIC process of Six sigma, the cases of LSS failure can be minimized. To take “**Planning**” as 1<sup>st</sup> phase of the process instead of “Define” and by ending on “**Quality enhancement**” than “Control” will make the process more accreditation.

*New Proposed model of LSS implementation process is presented in figure-2 below*



**Fig. 2- P-DMAICQ - Lean Six sigma Implementation Process**

#### 8.2.1 PLANNING

In order to curtail the chances of LSS project failures, it is suggested that following elements should be taken into consideration during “Planning” phase:

1. Project selection and cost analysis
2. Plan to Train & Educate executive management & selected employees in order to ensure commitment & involvement
3. Effective communication plan and Culture change
4. To set & ensure definite & assessable Quality Objectives

Although some Companies, like Xerox, are already working on the same concept but they are doing this as a preliminary process before deploying LSS teams where the Black Belts apply DMAIC. But in our suggestion it would be better and more advisable if working on these points is made part of implementation process of LSS i.e., in planning phase.

## 8.2.2 QUALITY ENHANCEMENT

The Second suggested modification in DMAIC process for Lean six sigma implementation is stacking “Quality enhancement” as another element after Control phase.

The philosophy behind this is, if quality is something like attaining competitive advantage, customer satisfaction and reducing costs then it is an ongoing process. Therefore, it should be a distinctive feature of LSS that it moves a step ahead to Control phase to ensure continued enhancement in quality according to requirements of environmental changes. Day to day revolutions in technology may be taken as an important example.

**Table-2** P-DMAICQ process with two stacked elements i.e., Planning & Quality

Lean Six sigma Steps	Key Processes
<b>Planning</b>	Project selection and cost analysis Plan to Train & Educate executive management & selected employees in order to ensure commitment & involvement Effective communication plan and Culture change To set & ensure definite & assessable Quality Objectives
<b>Define</b>	Defining the details of process by making clear diagram of business process and fixing of project limitations.
<b>Measure</b>	Measuring the process by effective data collection and comparison plan with aim of finding out the deviations.
<b>Improve</b>	Introducing the improvement in processes to reduce/eliminate the variations.
<b>Analyze</b>	Analyzing the situation and determination of origin of the variations. These findings help in implementation of effective improvement procedures.
<b>Control</b>	Monitoring and control of improvement procedures implemented so far.
<b>Quality</b>	Setting up benchmarks to attain quality objectives Adopting new philosophy of quality according to customer requirements Use latest technology as necessary to attain quality objectives



## 9. CONCLUSION

The paper described that negatives of six sigma & positives of lean serve as an important cause for successful integration of lean & six sigma. But Lean six sigma is not a miracle and there are some critical success factors which are required to be taken into consideration for longterm positive results from any LSS project. Being very important, it is suggested that the key success factors & 'Quality enhancement', should be made part of LSS implementation process and 7 phase stacked approach i.e., P-DMAICQ is proposed with 'Planning' stacked before 'Define' and 'Quality enhancement' after 'Control' phase in traditional DMAIC process.

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