

## **Six Sigma Implementation: - Some Issues**

By

Ashok Sarkar<sup>1</sup> & U H Acharya<sup>2</sup>

Indian Statistical Institute, India

### ***Abstract:***

*Organizations have been implementing various quality initiatives to improve business results. Six Sigma is the latest addition to these initiatives. All over the world including India, organizations have claimed that Six-Sigma implementation has resulted in savings of billions of rupees within few years of implementation. And this news has made all the Chief executives interested in implementing the Six Sigma – nothing wrong with their ambition. But everybody has not achieved success. Many of them are struggling to make progress. There are issues – some technical, some people side and some organizational. In this paper we present these issues and discuss the measures to overcome them.*

### **Six Sigma:**

Six Sigma is a top down, data driven disciplined approach to analyze the root/potential causes of problems of business process and prevent them from occurrence/ recurrence. It ties the output of a business process directly to customer requirements/ satisfaction. At the strategic planning level, the goal of Six Sigma is to align an organization to its market place and deliver real

---

<sup>1</sup> SQC & OR Unit, Indian Statistical Institute, Mumbai

<sup>2</sup> SQC & OR Unit, Indian Statistical Institute, Bangalore

improvement in the bottom line. At the operational level, the Six Sigma goal is to reduce process variation and thus prevent occurrence of defect.

Some of the typical issues that are encountered in it's implementation are;

- Lack of committed leadership
- Too many improvement initiatives- confused executives
- Resistance to change from event driven to process driven mindset
- Lack of standard training material including software
- Lack of systematic project selection, execution & review
- Lack of continuity/sustenance in implementation

### **Committed Leadership;**

Leadership is not lacking in the organisation ***but what is deficient is commitment level of the top management.*** Implementing Six-Sigma methodology requires a change of way in doing business. The top management needs to understand the changes required and demonstrate commitment through time, energy, resource allocation and behavior on the job. The message of “Implementing Six Sigma is for survival & growth” needs to be delivered across all level of organization. A compelling case for implementation must be made.

It has been noticed, wherever top management is involved, the success rate of implementation has improved dramatically. Hence it is essential, to 'buy in' the commitment of top management first either through awareness programme or pilot projects for initiating implementation. Some typical examples of desirable nature of leadership are;

1. CEO/MD her/himself undergoing the Black Belt training and executing improvement projects
2. Planned progress review of the projects by CEO/MD
3. CEO/MD involving in the identification of improvement projects.

### **Alignment to other existing initiatives:**

It is not uncommon to come across organizations implementing various initiatives like ISO 9000, ISO 14000, TQM, BPR, KAIZEN, TPM, SPC, Cost Reduction projects etc simultaneously to improve the business performance. As a result, the middle level executives who are the implementers, are becoming defocused and a confused lot, even frustrated sometimes.

It is suggested that Six Sigma initiatives be integrated with other initiatives. Strategy taken by few organizations is to ***link other initiative's goals with business process and improving the same through Six Sigma methodology***. In an organization, the quality objectives were taken as Six Sigma projects and automatically it ensured that quality objectives are measurable and improves continually. In another organization, the Six Sigma and ISO 9001 QMS are being implemented simultaneously and it's ensured that Six Sigma and ISO 9001 complement each other.

### **Change in mindset - from event driven to process driven:**

Everything occurs as an outcome of a process, but '**only few executives understand this**'. An event like late delivery or customer complaint is a outcome of a process not carried out either efficiently or properly. We need to identify the process steps, change them and thus eliminate the occurrences of the event. We need to understand, that unless we change the process we will continue to get the same output as before.

### **Training of Belts:**

In the nucleus of Six Sigma are Champions, Sponsors, Master Black Belts, Black Belts and Green Belts. Definition of these Belts itself is not clear to many. In some organisations, Green Belts are the leaders of the project whereas, in other organisations Black Belts are the leaders. These people play a major role in implementation of Six Sigma and it will not be successful unless we develop the knowledge and expertise level of these executives.

Broadly the curriculums of these Belts are known, but depth of teaching varies significantly, amongst the organisations - especially in Analyse phase. The reason for this is, perhaps, the statistical nature of topics to be discussed in this phase!! We suggest the standarisation of curriculum as presented in Annexure.

The certification of the 'Belts' is usually done through a formal examination and proof of at least 2 completed projects for Black Belts and only a formal examination for Green Belts. It is recommended that the Black Belts **undergo**

***an orientation programme on Statistical Methods prior to the main programme*** to prevent feeling of despair during Black Belt training.

### **Project selection**

One of the salient features of Six Sigma is carrying out project along with training. In order to ensure success of the projects, following points must be considered, during selection; the projects

- should be linked to a well-defined process and should not be a task. For example reducing non-moving items is a task and not a Six-Sigma project, however the process of generating non-moving items could be Six Sigma project.
- should be completable within short span, say 6-8 months of time. For this project has to be selected in 3<sup>rd</sup> or 4<sup>th</sup> level processes and not top level process. For example a project of improving 1<sup>st</sup> grade quality of a chemical process may take a longer time, instead it will be better to take up a project on reducing the highest nonconformance, contributing to 1<sup>st</sup> grade quality.
- should be clearly scoped out and the team members should represent the concerned processes. The team should have authority to modify/change the process if necessary.
- should result not only in customer satisfaction but also have high bottom line impact.
- Should be linked to organization vision/mission/strategy.

Here are few questions that may be used as check list during selection of projects;

- What are the improvement objectives for our business?
- What sources of improvement ideas are available? What additional considerations need to be made?
- Which approaches to project selection are best for us? How may this change over time?
- What processes do we focus on? Why?
- What criteria do we use to prioritize opportunities?
- To what extent do we rely on data to drive project selection?
- Who should be involved in project selection? How?
- How do we translate improvement ideas into defined, specific and chartered projects for Belts?

### **Project execution:**

Needless to say that this is the most critical phase in Six Sigma journey. Key issues that surface from time to time are;

- **Role of Champion**

Lack of involvement by the Champion during the project chartering stage and failure to take reviews, have been the major issues. In some cases the Champion comes to know of the project during the review with the top management or the consultant!

It is suggested that ***the champion is made accountable for the completion for the project*** and not merely lend his name.

- **Role of Belts**

**Black Belt:** Work pressure, wrong priorities, too many priorities, non-cooperation and attrition from the job have been the major issues in the role of Black Belt. There is no clear-cut criterion to decide who should be Black Belt in an organisation. In particular, should the educational qualification., is the prerequisite, is the central point of contention.

In view of these, we recommend the following attributes in a Black Belt – "Fire in the belly", high performer, respected in the organisation and knowledge of Statistics, preferably should have attended a basic course in Statistical Methods.

**Master Black Belt:** Lack of leadership skill, lack of subject knowledge especially statistical methods are the major issues. In many cases the Master Black Belt prescribes *the routine problem solving methodology as the Six Sigma road map!* This seriously jeopardises the depth of analysis of the problem and sometimes makes the Black Belts wonder how it is different from usual run of the mill problem solving exercise (Quality Circle).

It is recommended that the Master Black Belt has a sound background of Statistical method, and possesses good communication and managerial skill. Needless to stress that he should be a good trainer also. The Master Black Belt should be a Black Belt and having mentored at least 5 Six Sigma projects.

**Green Belt/Team Member:** Lack of cooperation, no involvement in the team meetings, are the basic issues here. Many times we hear that these people have not been explained about the basics of Six Sigma at all.

It is essential to conduct 5-8 days programme for them so as to **'buy in'** their commitment.

- **Role of Consultant**

Poor knowledge of Six Sigma philosophy specially process orientation, poor knowledge of statistical and analytical tools, lack of practical experience, too theoretical and/or importance to hi-fi statistical data analysis are some of the issues for consideration.

We recommend the organisation to select the Consultant carefully after a suitable evaluation on the above mentioned issues.

- **Role of Management:**

Ignoring the people side of Six Sigma and ignoring resistance are the major issues here. The implications of ignoring people side of Six Sigma can be some or all of the followings;

- change will fail to materialise; costs of training & consultancy will be lost
- some tactical results are seen but Six Sigma will probably die; we may only get our costs back.
- significant tactical results are seen, but Six Sigma remains just a “programme” with “normal” payback
- cultural transformation is beginning to happen but may take longer time to complete; payback is significant
- world-class; Six Sigma is in the DNA; it's the way we work; “X times” payback

We appeal to the management that they must not overlook these key issues in their Six Sigma journey.

It is natural that people resist implementation, because it's a universal reaction to change. ***There will be people who are going to refuse outright.***

One of the strategies could be to identify people who are going to resist and keep them aside at the beginning. Other way to overcome resistance is to build trust/relationship within the organisation.

### **Project review**

Both quantity and quality of project review are critical to the success of the project. A periodic review, say fortnightly, helps not only in tracking the progress but also helps to amplify the concern of the management on the projects. But the serious issue ***is the quality of the reviews***. There have been instances wherein, the conclusion, remedial action does not seem to be emerging from data oriented analysis. The ***'Pareto-CE Diagram-Action'*** syndrome is seen in many projects. Here is where, the role of the Master Black Belt is very important. He should cultivate the habit of seeking data before drawing inference, among the Black Belts & the team.

### **Sustenance of Implementation:**

The first year of implementation is always full of excitement and enthusiasm. It is noticed that enthusiasm level does not remain the same in the subsequent years, the reasons being numerous. The experience shows that, ***it has to do with motivational aspect of the employees***. A general prescription doesn't work in most organization. Each organization has to follow "stitch to the need" policy. Attributes such as ***visibility, publicity, rewards, and mileage points accruing to the Belts*** etc. are some of the methods implemented to sustain the enthusiasm and prevent the ***valley of despair creeping up beneath***.

### **Acknowledgement:**

Our profound thanks are due to Prof. A K Chaudhuri, our quality guru, who has been mentoring us in the field of quality management since last decade. We sincerely acknowledge his valuable comments in preparing this document.

### **About Authors:**

#### **Shri Ashok Sarkar**

Shri Ashok Sarkar is a specialist in the SQC & OR Unit of Indian Statistical Institute at Mumbai. He has a rich experience in implementation of Quality initiatives in various organisations over a period of last one decade. He has mentored over 200 improvement projects so far. He is an Engineer and speciallist in application of Statistical Quality Control & Operations Research methodology and also holds a Master in degree in it. He is a lead assessor for ISO 9001 systems.

#### **Shri U H Acharya**

Shri U H Acharya is a specialist in the SQC & OR Unit of Indian Statistical Institute at Bangalore. He has a rich experience in implementation of Quality initiatives in various organisations over a period of last two decades. He has mentored over 100 improvement projects so far. He is a speciallist in application of Statistical Quality Control & Operations Research methodology and holds a Master in degree in it. He is a lead assessor for ISO 9001 & ISO 14001 systems.

**Annexure: Course Curriculum of Various Belts**

<b>Phase</b>	<b><u>Champion</u></b> <b>(3-5 days)</b>	<b>Black Belt</b> <b>(12 -16 days)</b>	<b>Green Belt</b> <b>(6-8 days)</b>	<b>Master Black belt</b> <b>(5 days)</b>
<b>Define</b>	<ul style="list-style-type: none"> <li>• Overview of Six Sigma</li> <li>• Project selection</li> <li>• Project chartering</li> <li>• Dash board monitoring</li> <li>• Project review method</li> <li>• Process orientation</li> <li>• SIPOC</li> <li>• CTQ Tree</li> <li>• Defect definition</li> </ul>	<ul style="list-style-type: none"> <li>• Overview of Six Sigma</li> <li>• Project chartering</li> <li>• Process orientation</li> <li>• SIPOC</li> <li>• CTQ Tree</li> <li>• Kano status</li> <li>• Defect definition</li> <li>• Voice of Customer</li> <li>• Quality Function Deployment</li> </ul>	<ul style="list-style-type: none"> <li>• Overview of Six Sigma</li> <li>• Process orientation</li> <li>• SIPOC</li> <li>• CTQ Tree</li> <li>• Defect definition</li> <li>• Kano Status</li> </ul>	<p><b>For Master Black Belt, the curriculum can be as given in this column, in addition to proof of mentoring Black 5 Belt projects.</b></p> <ul style="list-style-type: none"> <li>• Review of Black Belt programme learning,</li> <li>• Advanced topics like transformation of data, Analysis of residuals, Model fitting,</li> <li>• Life testing and Reliability, Project management,</li> <li>• Concept of Lean Six Sigma, Concept of quality systems and their integration with Six Sigma, People side of Six Sigma, Change management.</li> </ul>
<b>Measure</b>	<ul style="list-style-type: none"> <li>• FMEA/Prioritisation analysis</li> <li>• Data collection and type of data</li> <li>• Six Sigma Level calculation</li> </ul>	<ul style="list-style-type: none"> <li>• FMEA</li> <li>• Prioritisation Matrix.</li> <li>• Data types</li> <li>• Data summarisation</li> <li>• Probability Models</li> <li>• Gage R&amp;R</li> <li>• Sampling theory</li> <li>• Process capabilities</li> <li>• Six Sigma level calculation</li> <li>• Uses of Statistical software.</li> </ul>	<ul style="list-style-type: none"> <li>• FMEA</li> <li>• Prioritisation matrix.</li> <li>• Data types</li> <li>• Data summarisation</li> <li>• Six Sigma level calculation</li> <li>• Uses of Statistical software</li> </ul>	
<b>Analyse</b>	<ul style="list-style-type: none"> <li>• Process analysis</li> <li>• Overview of Statistical Methods</li> <li>• Simple problem solving tools</li> <li>• Uses of Statistical software</li> </ul>	<ul style="list-style-type: none"> <li>• Process analysis</li> <li>• Simple problem solving tools</li> <li>• Estimation – Point &amp; Interval</li> <li>• Test of Hypothesis</li> <li>• Correlation &amp; Regression</li> <li>• Design of experiment</li> <li>• Uses of Statistical software</li> </ul>	<ul style="list-style-type: none"> <li>• Process analysis</li> <li>• Overview of Statistical Methods</li> <li>• Statistical software Demo</li> <li>• Simple problem solving tools</li> </ul>	
<b>Improve</b>	<ul style="list-style-type: none"> <li>• Solution prioritisation &amp; selection Methods</li> <li>• Risk Analysis</li> <li>• Pilot Plan &amp; Conduct of Pilot</li> <li>• Planning Tools</li> </ul>	<ul style="list-style-type: none"> <li>• Solution prioritisation &amp; selection</li> <li>• Risk Analysis</li> <li>• Pilot plan and conduct of pilot</li> <li>• Planning Tools</li> </ul>	<ul style="list-style-type: none"> <li>• Solution selection</li> <li>• Risk Analysis</li> <li>• Conduct of Pilot</li> <li>• Implementation planning</li> </ul>	
<b>Control</b>	<ul style="list-style-type: none"> <li>• Quality plan/Control plan</li> <li>• SPC implementation</li> <li>• Project closure</li> <li>• Gate review</li> </ul>	<ul style="list-style-type: none"> <li>• Quality plan/Control plan</li> <li>• SPC charts</li> <li>• Project closure</li> </ul>	<ul style="list-style-type: none"> <li>• SPC Charts</li> </ul>	