Impact of Quality in Project Management

By Shobhit Shrotriya

Abstract

Every organization faces the Herculean task of executing projects that meet or exceed the expectations of its customers. However, globally, numerous projects are unsuccessful and fail to get completed within budget and timelines. They do not meet quality standards and requirements as expected by the customer. One of the underlying causes for their failure can be attributed to unaligned and weak processes that result from a combination of problems such as feeble project management, poor cost estimation, poor planning and scheduling, inadequate requirements management, and inappropriate contingency planning, as well as many others.

To maximize a project’s performance and enhance the probability of its success, every organization needs to build a better project management process dedicated to meeting the customer’s most important needs. Application of Six Sigma together with robust and efficient project management can be considered an effective tool in driving and accelerating the development and delivery of a high-quality product within budget and timelines.

Six Sigma within organizations is primarily practiced as a process improvement methodology to drive operational and business excellence. Six Sigma is a disciplined, data-driven approach and methodology for eliminating defects in any process—from manufacturing to transactional and from product to service. The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction, thereby bringing about organizational change by aligning people and processes. This paper discusses and demonstrates the power of Six Sigma in achieving project management quality, and is particularly useful for project management and senior project and program managers.
causes and solutions, whereas project management’s tools and
techniques focus on attributes of a project such as initiation,
planning, execution, control, and closing. The integration of
these two approaches can assist an organization in creating
a robust, consistent, and controlled process improvement
system which would eventually lead to successful project
delivery with minimal or no defects.

Six Sigma is not simply another supplement to an
organization’s existing management methods. It is a
complementary management methodology that is integrated
into and replaces the existing ways of determining, analyzing,
and resolving/avoiding problems, as well as achieving business
and customer requirements objectively and methodically. Six
Sigma can be applied to operational management issues, or it
can directly support strategic management development and
implementation. By using Six Sigma, management can measure
the baseline performance of their processes and determine the
root causes of variations so they can improve their processes to
meet and exceed the desired performance levels.

Some Six Sigma Success Stories
Motorola saved US$17 billion from 1986 to 2004, reflecting
hundreds of individual successes in all Motorola business areas
including:
• Sales and marketing
• Product design
• Manufacturing
• Customer service
• Transactional processes
• Supply chain management

General Electric (GE)
• Saved US$750 million by the end of 1998
• Cut invoice defects and disputes by 98%, speeding
  payment and creating better productivity
• Streamlined contract review processes, leading to faster
  completion of deals and an annual savings of US$1
  million

Allied Signal/Honeywell
• Initiated Six Sigma efforts in 1992 and saved more than
  US$600 million a year by 1999
• Reduced time from design to certification of new projects
  such as aircraft engines from 42 to 33 months
• Increased market value by a compounded 27% per year
  through fiscal year 1998

Ford
• Added approximately US$52 million to the bottom line
  in 2000, and approximately US$300 million in 2001
• Waste elimination savings of more than US$350 million
  in 2002
• Was responsible for half of all TGW (“Things Gone
  Wrong”) improvements

Table 1 showcases various examples of Classical view of
Quality versus Six Sigma view of Quality. These examples
are really an eye-opener and emphasize the importance of
project management quality to be built in all operational
and business processes, thereby preventing the recurrence of
defects.

<table>
<thead>
<tr>
<th>The Classical View of Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>“99% Good” (3.8σ)</td>
</tr>
<tr>
<td>• 20,000 lost articles of mail per hour</td>
</tr>
<tr>
<td>• ~15 minutes each day of unsafe drinking water</td>
</tr>
<tr>
<td>• 5,000 incorrect surgical operations per week</td>
</tr>
<tr>
<td>• 2 short or long landings at most major airports daily</td>
</tr>
<tr>
<td>• 200,000 wrong drug prescriptions each year</td>
</tr>
<tr>
<td>• 7 hours without electricity each month</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Six Sigma View of Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>“99.99966% Good” (6σ)</td>
</tr>
<tr>
<td>• 7 lost articles of mail per hour</td>
</tr>
<tr>
<td>• 1 minute every 7 months of unsafe drinking water</td>
</tr>
<tr>
<td>• 1.7 incorrect surgical operations per week</td>
</tr>
<tr>
<td>• 1 short or long landing at most major airports every 5 years</td>
</tr>
<tr>
<td>• 68 wrong drug prescriptions each year</td>
</tr>
<tr>
<td>• 1 hour without electricity every 34 years</td>
</tr>
</tbody>
</table>

Table 1: Classical View of Quality Versus Six Sigma View of Quality
There are many facets of Six Sigma. Let us look at and understand a few of them:

- **Sigma (σ)** is a letter in the Greek alphabet.
- The term “sigma” is used to designate the distribution or spread (standard deviation) about the mean (average) of any process or product characteristic. Figure 1 emphasizes the importance of reducing the variation and centering the process that would lead to elimination of defects.

For a business or manufacturing process, the **sigma value** is a metric that indicates how well that process is performing compared with the benchmark of Six Sigma. The higher the sigma value, the better. Sigma measures the capability of the process to perform defect-free work. A defect is anything that results in customer dissatisfaction.

- **For a business or manufacturing process, the sigma value** is a metric that indicates how well that process is performing compared with the benchmark of Six Sigma. The higher the sigma value, the better. Sigma measures the capability of the process to perform defect-free work. A defect is anything that results in customer dissatisfaction.
- **The common measurement index is “defects-per-unit,” where a unit can be virtually anything—a component, a piece of material, a line of code, an administrative form, a time frame, a distance, etc. Another measurement is “defects per million opportunities (DPMO),” which is the average number of defects per unit.**
- **The sigma value** indicates how often defects are likely to occur. The higher the sigma value, the less likely a process will produce defects. As sigma increases, costs go down, cycle time goes down, and customer satisfaction goes up. Table 2 shows a direct reflection of the process sigma and DPMO. A world-class process with a process sigma of six would have only 3.4 defects per million opportunities.

**Dynamics of Six Sigma Methodology and the Funnel Effect**

Six Sigma has two key methodologies: DMAIC and DMADV, both inspired by Deming’s Plan-Do-Check-Act Cycle. DMAIC (Define, Measure, Analyze, Improve, Control) is used to improve an existing business process; DMADV (Define, Measure, Analyze, Design, Verify) is used to create a new product or process designs.

The DMAIC approach focuses on controls for the improvements to the process, and although the focus is not on the control of the project management process itself, it is the key to successfully driving and managing projects. From the project management quality perspective, the DMAIC approach can be mapped and integrated with the project management system, where the efforts can be streamlined to improve the project management system itself. This means that organizations would conduct improvement projects for their project management system and structure it to drive down defects, waste, and variation of performance.

The basic methodology consists of the following five steps:

- **Define** process improvement goals that are consistent with customer demands and the enterprise strategy. Tools that may help: stakeholder analysis, customer survey methods (focus groups, interviews, etc.), as-is process map.
- **Measure** key aspects of the current process and collect relevant data. Tools that may help: Pareto analysis, failure mode & effect analysis (FMEA), Gage R&R.
- **Analyze** the data to verify cause-and-effect relationships. Determine what the relationships are, and attempt to ensure that all factors have been considered. Tools that may help: benchmarking, cause & effect (C&E) diagram, hypothesis testing, regression analysis, Multi-Vari charts.
- **Improve** or optimize the process based on data analysis using techniques such as design of experiments. Tools that may help: design of experiments, to-be process map.
- **Control** to ensure that any deviations from target are corrected before they result in defects. Set up pilot runs to establish process capability, move on to production, set up control mechanisms, and continuously monitor the process. Tools that may help: control charts, control plan.

In the overall approach, the actual problem is converted into a statistical problem. This is done by mapping the...
process, defining key process input variables (KPIVs or “x’s”), and key process output variables (KPOVs or “y’s). The power of statistical tools is used to determine a statistical solution. This is then converted into a practical solution. The number of “x”s go on getting eliminated using various statistical and other tools. In this way, it is as if the variation is getting reduced as it passes through a funnel of the six sigma methodology. This is sometimes called the “funnel effect.”

The cause and effects relationship between the KPOVs (“y’s) and KPIVs (“x’s) gets clearer as the project goes through the phases. Control plans are documented before the closure of the project so that gains are sustained. The project leaders must demonstrate that the key deliverables of the project are achieved and demonstrated.

A focal point of the DMAIC methodology is to measure the actual performance of the projects against customer expectations. Therefore, selection of improvement areas should be targeted where highest financial gains are expected. Problems that result in a great deal of rework, where the results are not as expected and where standardization would help future projects, should be targeted in order to avoid recurring failures. Since every project is unique, the use of DMAIC methodology would help to determine root causes and high impact solutions. Most importantly, continuous measurement and monitoring of the performance of the project management system would determine if improvement goals have been met and sustained.

**Conclusion**

In the contemporary world of intense competition, the primary focus of all organizations is **customer satisfaction**. Therefore, it has become essential for an organization not only to complete a project within budget and timelines, but also to deliver it with world-class quality. The success of a project, consistent and sustainable processes, outcomes and results beyond expectations, and customer satisfaction are a handful of benefits gained by adopting and embedding the Six Sigma principles that top-notch organizations can use and improvise to improve their project management quality.

Six Sigma complements and extends professional project management, but does not replace it. Both disciplines make important contributions to successful business outcomes. As organizations continue to look for ways to improve their systems, cut costs, and develop new products for the benefit of profit, project systems will be continually refined. The time has come to combine project management and Six Sigma to accelerate development of quality product within budget and timelines. This integrated approach will
better define ways to accomplish cost reduction, process enhancement, faster implementation, and new product development. Six Sigma is already being used extensively, but with competition increasing by the minute, the need for integrating Six Sigma with project management will be felt even more in the days to come. Only those businesses that manage to accomplish this will then be able to do justice to voice of the customer (VOC), and as such, will be in a better position to increase their profits and market share.

**Bibliography**
Motorola University. http://www.motorola.com/

**About the Author**
Shobhit Shrotriya, 6σ Black Belt, PMP, is an engineer with a postgraduate degree in Industrial and Management Engineering from Indian Institute of Technology (IIT) Kanpur. He is currently working in the capacity of Associate Director, Clinical Data Management, Quintiles Bangalore. He has over seven years of experience in project management, quality management, statistical methods, manufacturing, reliability engineering, supply chain management, SAP functional modules, and clinical data management. In various roles across different companies, he has been responsible for overall project management, quality management, establishment and definition of development processes, metrics and standards, establishment of new product’s system, design, quality standards, and support in continuous improvement of quality management systems and processes. He has attained the Reliability Professional certification (CRP), Six Sigma Black Belt certification and Project Management Professional (PMP) certification.