



Book Implementing Six Sigma and Lean

A Practical Guide to Tools and Techniques

Ron Basu
Butterworth-Heinemann, 2008

Recommendation

Experienced manager and lecturer Ron Basu lists tools and techniques you can implement to make the best use of Six Sigma and Lean Manufacturing, two major quality-control programs. He covers the basics for each phase of quality control and defines ongoing measurements you can use to sustain your improvements. Basu provides a good catalog of tactics, including definitions, instructions, training requirements and precautions. He also cites case studies and a useful history of quality programs. Basu emphasizes his own “Fit Sigma” technique, more as a supercharger for Six Sigma than as a replacement. As helpful as the book is, its list-oriented structure and poor editing create stumbling blocks. You may need to reread some passages to figure out the meaning (not that this is a book you would speed read anyway). Still, *BooksInShort* finds that it is a useful background directory – and could be far more than that for Six Sigma and Lean specialists, who will find it more accessible.

Take-Aways

- Six Sigma controls quality by reducing variation in your manufacturing processes.
- Lean Manufacturing creates flow by pulling inventory into a process as needed.
- Six Sigma and Lean blend well because they both emphasize quality and flexibility.
- “Fit Sigma,” which mixes Six Sigma and Lean, combines elements of both quality methods. It focuses on training, and maintaining quality gains.
- Take time to define your project despite any pressure you are under to start immediately.
- Applying a new quality method involves many steps: Define and measure your goal, analyze your quality level, and implement and maintain improvement.
- Use measuring tools and techniques that count or evaluate various aspects of your work to make it quantifiable, visible and replicable.
- “Quantitative tools” can help you control and manage your operations. “Qualitative tools” support training and enable better communication.
- Applying new quality methods can fail due to poor training, a lack of management commitment, employee indifference or a mismatch between the work and the new tools.
- If you are successful before implementing Fit Sigma, anticipate employee resistance. However, if your firm is failing, don’t expect Fit Sigma to be a quick fix solution.

Summary

Connecting Excellence and Quality

Today’s leading quality-management methods focus on continuous improvement. They combine employee input with technical experts’ sophisticated tools and methods. Six Sigma, for example, emphasizes managing processes to yield high-quality goods by eliminating defects. Fast, flexible Lean Manufacturing, which creates flow by pulling inventory into a process as needed, is also popular. Now, quality control managers can combine Six Sigma’s precision with Lean’s agility in an improvement initiative called “Fit Sigma,” which focuses on maintaining quality gains.

The Development of the Quality Movement

Four goals push the quality movement in manufacturing: meeting operational expectations, developing competitive advantage, taking the lead in your industry and

sustaining excellent operations. This emphasis on quality and efficiency dates back only to the post-World War II period when Japan's business leaders realized that their country had to manufacture superior products to rebuild its economy. The Japanese turned to U.S. quality expert Dr. W. Edwards Deming, who emphasized creating a continuous cycle of quality through employee training.

“Managers who have steered...through the challenges of a Six Sigma or a Lean Sigma program [have] only just embarked upon the path of success.”

Most people now point to Toyota as the leading user of high-quality processes and Lean Manufacturing. Americans and Europeans also have developed ways to build quality into their manufacturing processes by striving for ongoing improvement. Most quality leaders have changed from push manufacturing to pull manufacturing and Just-in-Time inventory. Fit Sigma, a new program, works with these practices. It ensures that products achieve their purpose by eliminating variations, and using sustainable processes and continuous learning.

How Quality Control Measures Can Fail

You may have run into difficulty instituting quality initiatives that use fresh “tools” and “techniques” (tools have a specific, limited scope; techniques are broader, require more training and may incorporate several tools). New quality-control efforts can fail for four basic reasons:

1. **Poor quantity or quality of training** – An improvement program needs sufficient, appropriate resources, including training, so people learn to use new tools and methods.
2. **Lack of management commitment** – Implementing a quality program requires top executives’ steadfast backing.
3. **Employee indifference or antagonism** – Employees need training that creates true behavioral change, not programs that just hand out information.
4. **Mismatch between new tools or methods and the work** – Apply professional project management techniques to direct your initiative’s scope, calendar, standards and levels of risk. Start with a project brief. Use careful structuring and scrutiny.

Define and Measure

Once your new improvement project wins executive approval, you will feel tremendous pressure to begin. Resist. Fit Sigma suggests taking the time to define your project carefully so you build a solid foundation. Diagram the project’s inputs and outputs. Use a “SIPOC (supplier-input-process-output-customer) diagram” to show the flow of materials from your suppliers through your processes to your customer. This will help you think through your supply chain. A “Flow Diagram” can display each process and its major steps. If you use Six Sigma, create a “Critical-to-Quality (CTQ) Tree” that trained practitioners, like those at the black or green belt level, can use to depict and satisfy customer needs at the required level of quality. A well-written project charter gives project managers authority. Continue to emphasize training and spell out your quality goals so no one can redefine them later. Fixed data tools you can use to track your progress include:

- **“Cause and Effect Diagrams”** – Attack problems by seeking root causes and brainstorming solutions.
- **“Histograms”** – Since most people understand pictures much more easily than raw numbers, use visual depictions to present statistical analyses and numeric data.
- **“Pareto Analysis”** – Rank histograms to visualize the impact of the 80/20 rule, which says that 20% of the causes create 80% of the effects.
- **“Control Charts”** – Use time as the X-axis and your desired measure as the Y-axis to generate statistically based process control.
- **“Flow Process Charts”** – Use symbols to show the hierarchy of your operations and the sequence of your work. These charts identify any work that doesn’t add value to your process.

“Quality service, reliable products, value for money and accountability are now taken for granted. Competitors are global, standards are world class and organizations that fail to [perform] will soon be found out.”

Other tools include “Check Sheets” that record the incidence of specific events, such as equipment maintenance, breakdowns, defects or operator training; “Run Charts” that reveal trends by showing a line graph of regular observations over a set period of time; and “Scatter Diagrams” that combine data points with a regression curve to show the project’s activities.

How to Analyze Quality

Once you measure your work, Fit Sigma suggests various tools for analyzing the data. Use a “Flow Diagram,” for example, to illustrate your processes, and map the links among your tasks and activities. Other analytical techniques include:

- **“SWOT Analysis”** – Delineate “strengths, weaknesses, opportunities and threats.”
- **“PESTLE Analysis”** – Think through your “political, economic, social, technical, legal and environmental” situation.
- **“Five Whys”** – Repeatedly ask “why” to find a problem’s root causes.
- **“Interrelationship Diagram”** – Examine the network of relationships affected by project problems or changes.
- **“Overall Equipment Effectiveness”** – Divide your actual output by your equipment’s potential output to see how well you are using it.

How to Implement Improvement

Now that you have defined, measured and analyzed your operations, implement your improvements and validate your solution. Get things underway with a brainstorming session. The “KJ method,” also known as the “Affinity Diagram,” allows your team to generate lots of ideas on cards or sticky notes and later cluster them by similarity. Use the “Nominal Group Technique” to develop a team consensus. Every member votes on or ranks a list of priorities until certain ideas emerge with a majority of votes. To maximize the use of your machinery, use the “Single Minute Exchange of Dies” (SMED) approach to cut changeover time to less than 10 minutes. Use “Mistake Proofing” (or “Poka-Yoke”) to detect embedded mistakes, keep them from becoming product defects and establish standard practices. Put “Mind Mapping” to work “as a learning tool for ordering and structuring the thinking process of an individual or group working on a focused theme.”

Getting a Handle on Quality

Once you make improvements, Fit Sigma calls for using careful metrics to monitor your processes so they don't drift away from your hard won standards. Document every project, including what the operators must continue to do after the initial work is completed. Record the lessons learned in your project so they become your organization's new best practices. Tools you can use to maintain quality include:

- **“Gantt Chart”** – Display your project's activities, dependencies and schedule.
- **“Activity Network Diagram”** – Find your project's “critical” or most efficient path.
- **“Radar Chart”** – Diagnose the gaps between your actions and your goals.
- **“Plan, Do, Check, Act Cycle”** – Use the PDCA for ongoing monitoring.
- **“Earned Value Management”** – Show how your project added value to your company.

“Quantitative Methods”

Most quality advances since 1950 evolved through the creation of numerical and statistical methods to measure and manage manufacturing processes. However, do not let these Fit Sigma techniques tempt you to become too enmeshed in “variance analysis” or slavishly “caught up with the elegance of statistical methods.” Monitoring techniques include:

- **“Failure Mode and Effects Analysis”** – The aerospace industry developed the 12-step FMEA process, which Ford pioneered in the car industry. It subjects design failures to intense analytical scrutiny.
- **“Statistical Process Control”** – SPC, which began at Bell Laboratories in the 1920s, measures the variation within processes so you can manage and minimize it. The Americans and British used it initially in weapons production, and the Japanese later plugged it into modern quality control. Now it is part of Six Sigma.
- **“Quality Function Deployment”** – The Kobe Shipyards originated this method for building customer requirements into a practical design to gain an ongoing competitive advantage.
- **“Design of Experiments”** – DOE allows you to see the impact that various factors have on your results so you can systematically improve your processes and products.
- **“Define, Measure, Analyze, Improve, Control”** – Motorola added DMAIC to its Six Sigma efforts in the 1980s. It uses data to drive improvements in a project's life cycle.
- **“Design for Six Sigma”** – Use DFSS to create a systematic process for component design and manufacture. It enables you to get it “right the first time.”
- **“Monte Carlo Technique”** – This method analyzes the variations in a random sample by running predetermined computer simulations thousands of times.

“Qualitative Methods”

Even scientific measurement cannot reduce some human activities to precise numbers. Use qualitative systems to measure and facilitate the work people carry out in your Lean and Six Sigma processes. For example, Xerox developed benchmarking to compare present productivity and quality with its past performance and its competitors. Improve your practices by comparing your processes with similar tactics in other firms and industries. Use a “Balanced Scorecard” to align employees' work, especially executive performance, with corporate strategies and goals.

“Six Sigma may sound new, but critics say that it is really Statistical Process Control in new clothing.”

Fit Sigma calls upon measures with different time frames and goals to follow employee development, financial performance or operational efficiency. Executives use “Sales and Operations Planning” to align their operations and resource use to create and meet realistic sales goals. “Kanban” is a visual signaling system that enables you to pull inventory as needed rather than pushing unneeded product down the assembly line. “Activity Based Costing” accurately and efficiently applies variable and fixed costs to your operations. “ISO 9000” and “9001” quality-management systems document customer satisfaction. “Lean Thinking” is another name for the “Toyota Production System” and its variants. These systems are designed to make inventory flow when and where it is needed, as each operation adds value and sends a high-quality part downstream.

“We are what we repeatedly do. Excellence, then, is not an act but a habit.” (Aristotle)

Fit Sigma can help you transform your company by assigning a committed management team and an energized work force to each project. Apply Fit Sigma by using solid project management to control your undertaking's boundaries, schedules and resources. Provide specialized training for people whose work demands it. Build a fast, effective communication infrastructure throughout your firm. Measure and document each time you save money or meet a goal. Fit Sigma is not a quick fix or a turnaround program for weak companies. If you have problems that it doesn't address, fix them first. If you are successful before you implement Fit Sigma, expect employee pushback because most people don't want to change if they feel they are already doing well. But push you must, because Fit Sigma can give you continuous, sustained improvement.

“Borrowing the racket of Pete Sampras does not make one win a Wimbledon title. Without appropriate training and application, the tools and techniques cannot be effective.”

Now that you know the best tools from Lean, Six Sigma and Fit Sigma, recognize that just having the top golf club does not make you a champion. You have to learn the best ways to use the techniques and tools. For real quality implementation, make sure everyone has the right training.

About the Author

Ron Basu held senior management positions at such corporations as GSK and Unilever. A director at Performance Excellence Ltd., he teaches at the Henley Business School and ESC Lille.

