BPTrends COLUMN

September 6 2016

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: Lean Six Sigma…Always Together?

I confess, when articles began appearing some years ago heralding the advantages of Lean and Six Sigma as a unified methodology, I was a bit mystified.

That's because in my own experience, Lean and Six Sigma were already integrated. I started my career at Motorola in the 1980's just as the decision had been made to improve product quality by tenfold, which triggered the company's long ascent from maker of defect-riddled Quazar televisions to winner of the first Malcolm Baldrige Quality Award.

The biggest driver of change was the emergence of Japanese competitors in the industrial and consumer electronics industries. In the course of a few months in 1985, Motorola, Intel and other American manufacturers were driven wholesale from the memory chips market and they went into psychic shock. Just as it had happened earlier to American car makers, this was the long overdue wake-up call that caused American "high tech" companies to finally pay attention to quality and customer needs. To many inside Motorola, the most humiliating realization was that the Japanese were beating the pants off western businesses by using America's own industrial engineering and statistical process control techniques.

As improvement and competitiveness became obsessions for Motorola leaders, they turned at last back to the tools its technical communities already had. There was a large array of tools and techniques already known to the company's engineers and manufacturing techs; the big innovation was not a new toolset but the teaching of these tools to just about everybody else. Thus the creation of Motorola University, which then packaged and provided an avalanche of employee training courses.

Back then there was no separation between "lean" and "six sigma". You might assume that statistics-oriented courses were for engineers and problem-solving courses were for line workers, but since these employees worked with each other on "participative problem-solving" teams (Motorola's term for quality circles), there was a lot of crossover educating going on. At most there was an informal separation of courses into statistical versus non-statistical training (somewhat analogous to today's green-belt versus black-belt training). But everyone—even entry-level manufacturing workers and office staff members-- learned to use histograms and how to calculate sigma levels and thus gained at least a starting knowledge of distribution theory.

It was also well understood that it was the *combination* of detecting variation, eliminating defects, streamlining the manufacturing process, reducing inventory, and establishing pull systems that would really make a difference--improving quality

while also reducing costs and speeding up delivery. In other words, Lean and Six Sigma together yielded the greatest punch. The more employees knew about the interrelationships between quality, cost and speed, the better they were at finding improvements themselves. So many courses were aimed at pursuit of overarching goals. For example, there was a 1989 course for all employees entitled *Six Sigma Total Cycle Time* with the following course outline:

- Introduction to Six Sigma Quality
- Steps to Six Sigma (a precursor to DMAIC)
- Calculating Sigma
- Defining Total Cycle Time (baseline, entitlement, benchmark)
- Mapping the "As-Is" Process
- Mistake-Proofing the Process and Eliminating Wasted Effort
- Mapping the "Entitlement/Should Be" Process
- Defining the "Best in Class" Process
- Calculating Sigma Level
- Prioritizing Process Defects Using Pareto

Another driver for change at Motorola was the growing pressure of its customers for better products. One of Motorola's largest customers in the 1980's and 19990's was Ford Motor Company, which encouraged a spirit of shared destiny and freely provided its own approach for manufacturing improvement to Motorola while also making heavy demands for better quality and on-time delivery. Ford had a wide range of training in what it called "team oriented problem-solving". Those training programs contained a mix of tools and techniques that today would be considered both Lean and Six Sigma. The aims of these programs were exactly the same as Motorola's: to speed up the manufacturing line and satisfy customer requirements by eliminating waste, delay, defects, and cost.

Here's a list of tools (once again a mix of Lean and Six Sigma) from its course for manufacturing improvement teams, which consisted of engineers, techs and line workers:

- Cause/effect diagrams
- Process flow maps
- Histograms
- Control charts
- Stem and leaf plots
- Check sheets
- Pareto diagrams
- Scatter diagrams
- Gage R&R
- Capabilities indices
- Design of experiments
- FMEA's
- Wiebull analysis

When I left Motorola and joined the Rummler-Brache Group, I had the chance to do consulting work at other manufacturing companies such as 3M and HP in the 1990's and I saw the same mindset: manufacturing improvement was the goal and any combination of tools and techniques that made a difference were eagerly adopted.

The Current Situation

Yet even a cursory search online for articles and books about Lean versus Six Sigma will demonstrate that debate continues about the merits of each approach and about the advisability of combining them. After conducting my own unscientific review of much of this literature as I could stomach, I came away with the following observations:

- The authors of these tomes often have a bias for one of the approaches in question and against the other. This is apparent even in the seminal book credited with identifying and giving a name to the Lean approach, *The Machine that Changed the World: The Story of Lean Production*.[i] In its 300-odd pages, two are devoted to statistical process control, where it is acknowledged that Japanese companies followed Deming's advice and applied SPC in the 1950's, way before developing Lean. The remainder of the book focuses on Lean. (In earlier books, such as *Japanese Manufacturing Techniques*[ii] by Richard Schonberger, statistical process control is described hand in hand with such other practices as "housekeeping" or 5S, a set of concepts today associated with Lean thinking.) A more recent book, *Six Sigma Demystified*[iii], does the opposite, devoting a few pages to a very quick explanation of Lean within its nearly 500 pages of Six Sigma description. So it would be easy enough to pick up a bias from writers and teachers.

- Six Sigma fans view Lean as a complementary extension to Six Sigma; Lean fans view Six Sigma as a complementary extension to Lean. For Lean devotees, it makes sense to start with Lean projects to remove the most obvious forms of waste and then to apply Six Sigma analysis to ferret out root causes. For Six Sigma advocates, it makes sense to incorporate Lean's tools and mindset into the larger Six Sigma Chamber of Improvement.

- The strongest and most frequent argument for Lean and against Six Sigma is that Lean is faster, easier and cheaper to deploy. People understand Lean thinking very quickly, projects can be of short duration, and results are quick in coming and highly visible. Six Sigma projects require far more structure, more training, formal roles and charters, and while the payoffs can be big, so is the effort.

- The strongest and most frequent argument for Six Sigma and against Lean is that eliminating waste and non-value-added time does not ensure a high-quality product that customers value. You could have a very lean process and still be producing junk. So only deep statistical analysis and removal of defects can improve process outputs.

Advocates of an integrated approach do reinforce my own bias. They point out that the two approaches are "better together" because Lean and Six Sigma have complementary tools but different goals and different strengths and weaknesses. It's hard to argue with that.[iv]

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Author

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Alan was employed by Motorola for ten years as an internal consultant on organizational performance. As a member of the team that founded Motorola University, he was the first person to introduce Geary Rummler's pioneering concepts in process improvement and management to business units within Motorola. Alan advocated and led several of the first groundbreaking projects in process improvement that evolved to the invention of six sigma and Motorola's winning of the first Malcolm Baldrige Award in 1988. Alan was also involved in major restructuring projects at Motorola, and in job design work, compensation planning, workplace literacy, and educational program development.

After joining The Rummler-Brache Group in 1991, Alan led major successful performance improvement engagements within Fortune 500 companies. His experience spanned several industries and the full spectrum of corporate functions and processes, such as strategic planning, manufacturing, product development, financial management, and supply chain. Major clients included Shell, Hewlett-Packard, 3M, Citibank, Motorola, Steelcase, Citgo, Hermann Miller, Louisiana-Pacific, and Bank One. After leading many high-profile projects, he became a partner and Managing Director of Consulting Services at RBG. He led development of much of RBG's products and services, and was responsible for selecting, training and mentoring RBG's consultant teams. Upon leaving RBG, Alan founded his own consulting company, where he continued to practice in the field of performance consulting. He was also involved in several organizational restructuring initiatives in the U.S. and in Asia.

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