Lean Six Sigma:
A Fresh Approach to Achieving
Quality Management

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INTRODUCTION

Are the weeks spent in Green Belt and Black Belt training a form of *overproduction* from a lean point of view? Over the last 10 years, the E-470 Public Highway Authority—a Denver, CO toll road—has taken a different approach to implementing a quality system. It uses a project-oriented approach—and it works! While most Lean Six Sigma practitioners embrace a traditional top-down implementation and focus on Green Belt and Black Belt training using bodies of knowledge that were tailored to reducing variation in manufacturing environments, few stop to consider if there is any scientific basis for this approach. Consider that only one person out of 100 in the United States works in a manufacturing plant. The rest work in service industries from healthcare to the backroom functions in manufacturing.

THE CHALLENGES OF IMPLEMENTING A QUALITY MANAGEMENT SYSTEM LIKE LEAN SIX SIGMA

There are many challenges to the successful implementation of a Lean Six Sigma quality management system. For example, some managers use improvement projects to justify their gut feel. Or, true metrics about success may not be available. However, it is easy for quality managers to schedule Green Belt and Black Belt training and to get business managers to provide attendees. Counting the number of people trained is a simple metric for the quality manager to use, but one that rarely correlates with success. After they are trained, Green Belts and Black Belts often struggle with their initial projects. Obstacles include fellow employees clamming up when asked to provide data or disappearing when asked to work on projects. Some belts give up or move on to other jobs before completing a project. And still others are hired away by competing or nearby firms. As most quality managers discover, Lean Six Sigma is simple; people, on the other hand, are hard. The "hard" stuff is easy and the "soft" stuff is hard.

THE E-470 APPROACH

E-470 is a toll road around the eastern portion of Denver. In 2005, the E-470 Public Highway Authority decided to embrace Lean Six Sigma as a way to cut costs and boost productivity. After researching the usual Green Belt and Black Belt training model for implementing Lean Six Sigma, they decided to take a different approach to accelerate results.

Unlike many organizations, E-470 didn't commit to a wall-to-wall, floor-to-ceiling implementation of Lean Six Sigma. The leadership team focused on delivering results quickly, project by project. They focused on giving employees just enough training in key methods and tools to solve E-470's key problems, not the entire Lean Six Sigma body of knowledge. This saved weeks of training and months of implementation. They provided team members with software to simplify analysis. Using the QI Macros SPC Software for Excel, the personnel in customer service, toll collection, and roadway

maintenance quickly discovered how to analyze data to identify and improve problem areas.

E-470 began by focusing on the pain points: missed key performance indicators (KPIs), safety issues, customer problems, and backlogs. Using a balanced scorecard and Lean Six Sigma approach, they focused on improving efficiencies and eliminating process defects.

In early 2005, I led a half-day workshop to train the leadership team and a one-day workshop to jumpstart the first group of E-470 Lean Six Sigma Yellow Belts. The workshop consisted of a half-day lean workshop and a half-day Six Sigma workshop. This led to projects saving $463,518 per year and winning the coveted President's Award from the International Bridge, Tunnel, and Turnpike Association (IBTTA) in 2006.

Nine years later, the management team continues to focus on fixing ongoing problems that affect operations. Team members still finish one project and move on to the next. When needed, they have another one-day workshop to jumpstart the next wave of improvement teams.

WHAT MAKES E-470 SUCCESSFUL AT CONTINUOUS IMPROVEMENT?

The Six Sigma community often points to top leadership commitment as a key to success, and to explain why Six Sigma doesn't always work. Why did Six Sigma work at E-470?

First, by choosing to use a "results-focused" program rather than a "training-focused" program, E-470's leadership team telegraphed that Lean Six Sigma was about results. Learning everything in the Green Belt or Black Belt body of knowledge can be confusing and overwhelming to many team members. Instead, quickly training teams in the key tools needed to solve E-470's problems (not every possible tool needed in manufacturing) accelerated learning and application.

Second, by giving team leaders ownership of the project *and empowering them to make changes*, teams developed an extremely high level of buy-in.

Third, by continuing to encourage teams to innovate and improve, E-470's leaders reinforce the message that improvement is not only good, but expected. By continuing to train new teams to focus on new problems, E-470 continues to send the message of ongoing improvement and develop more team leaders to handle emerging problems. There have been six one-day workshops since 2005. Each workshop developed four to six projects. In addition, team members have gone on to do additional improvement projects as needed.

Fourth, the ongoing use of both innovation and improvement has kept E-470 on the forefront of toll-road efficiency and productivity while returning value to investors and customers. For example, collecting cash tolls costs E-470 46 cents of every dollar collected. By switching to photo tolls, E-470 was able to dramatically reduce this cost, improve traffic flow, and eliminate stop-and-go accidents at toll booths. Of course, some cameras didn't read license plates as well as others, so improvement projects improved the accuracy of photo tolls and reduced the cost of manual correction.

Fifth, Lean Six Sigma provides a common language for communicating problems and their solutions. Employees can see improvements and employees know how to look for additional ones. Leadership and employees both speak the language of Lean Six Sigma. When something goes wrong, they blame the process or system and use data to figure out how to resolve it. For example, car-deer accidents were particularly problematic along a five-mile stretch of the roadway. An eight-foot fence installed along this section reduced these kinds of accidents from 71 to 31 in 2013, saving $80,000 per year in repair costs, according to the American Insurance Institute.

THE DIFFUSION OF INNOVATIONS—THE SCIENCE OF SUCCESSFUL IMPLEMENTATION

How to get a culture to adopt change has been studied and is well covered in *The Diffusion of Innovations* (fourth edition) by Everett Rogers (1995). While

authoritarian (that is, top-down) implementations can be successful, they fail 50 percent of the time. This is so common that it has a nickname: *the Stalinist Paradox*.

While most companies hesitate to admit failure, it has been estimated in various quality magazines that Six Sigma implementations fail 50 to 75 percent of the time. This is barely a one-sigma performance. How can an industry so focused on achieving "Six Sigma" fail so miserably at implementation?

The "secret sauce" outlined in the book by Rogers mirrors what E-470 did:

1. Start small and focus on solving real problems that matter to the attendees. This provides immediate *advantage* to the attendees. It also makes it easy to try (*trialability*).

2. Tailor the workshop to the organization to make it *compatible* with the existing environment.

3. Reduce *complexity* by only teaching the tools participants need to solve their existing problem and by giving them easy-to-use, Excel-based tools for data analysis and charting.

4. Making team results visible to managers and other employees makes the results observable. It also creates some buzzworthy word of mouth to invoke interest.

This project-focused approach gets results and creates momentum. Doing additional projects cements the learning and methodology. Having additional workshops as needed continues and expands the momentum.

The Diffusions of Innovations found that when as few as four percent of the employees have embraced a change, the change will stick. When the number of employees involved in the change exceeds 15 percent, the change will transform the rest of the culture. It is a slower but a more successful approach to implementing quality management systems and it delivers results along the way.

WHAT'S WRONG WITH THIS PICTURE?

If *diffusion* is the best known way to implement change, why is the quality community so resistant to using it? Why do quality professionals cling to tradition when there are clear, simple ways to be more effective and successful at implementing quality management? Is it because leadership teams want big efforts to show their boards and investors? Are longer Green Belt and Black Belt training sessions more lucrative for consultants? Are the client's success and results so unimportant that consultants accept a 50 percent failure rate as the cost of doing business? How bad of a taste does a failed Lean Six Sigma implementation leave in the mouths of those who participated? Does it cloud their ability to participate in the future?

RESEARCH NEEDED TO IDENTIFY THE PATH FORWARD

Traditional approaches to implementing quality management are prone to failure. There are proven methods to increase the likelihood of success and get results immediately, but quality professionals hesitate to embrace them. E-470 is one example of how using this results-focused approach can save time and money and produce bottom-line results.

If Lean Six Sigma is so fabulous, why is it so unappetizing? How does one make it more appetizing? There is plenty of research into how to make ideas more *sticky* (e.g., *Made to Stick* [Heath and Heath 2007]). Why does one keep trying to implement quality in the same old boring fashion? Why does one teach the quality methodology the same way it was taught in the 1960s? Isn't it about time quality professionals understand and use the "soft" stuff to get the results they want. Isn't it time for a change?

Quality management researchers have identified that successful implementations of Six Sigma have a positive return on investment. But they have not investigated why these companies succeed or fail. Academic researchers can help provide a way forward for quality managers by investigating how the rationale for implementing Six Sigma affects its outcomes. Related to this is the need to investigate how the initial focus of the program affects its ability to diffuse throughout the organization. Was it a grass-roots results focus or a top-down, training focus that led to success or failure? Which of these two

approaches worked best? Researchers have not investigated how best to ensure that Six Sigma takes root and thrives in every corporate culture.

Researchers have not investigated the negative effects of unnecessary training (overproduction) on Six Sigma implementations. Healthcare, for example, does not need all of the tools used in manufacturing (e.g., design of experiments). While most hospitals have had many process improvement trainings over the last decade, many employees I meet say they've never produced a useful result. How is that possible?

What would happen if one turned the tools of Lean Six Sigma inward and focused on Lean Six Sigma itself? How much faster and more effective could it become?

REFERENCES

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BIOGRAPHY

Jay Arthur teaches people how to use Excel to eliminate the delays, defects, and deviation that devour a third of corporate profits. He is the author of *Lean Six Sigma Demystified* (McGraw 2011), *Lean Six Sigma for Hospitals*, and his new book: *Breakthrough Improvement with QI Macros and Excel—Finding the Invisible Low-Hanging Fruit* and the QI Macros SPC Software for Excel—a software package that automates all the charts, graphs, and documents required for quality improvement. Arthur has a bachelor's degree in systems engineering from the University of Arizona. He can be reached by email at: jay@qimacros.com.