

Are Lean and/or Six Sigma Right for My Business – Or Just for the “Big Guys”?

Perhaps you’ve seen an article that described how Jack Welch used Six Sigma in General Electric to bring \$8 billion to the bottom line. Or perhaps you’ve heard about the dramatic reductions in cycle time and waste achieved by using Lean methods in the Toyota Production System. Both of these methods of business process improvement have been around now for more than 20 years and have achieved dramatic results in a majority of larger firms and in many governmental units worldwide. Penetration in smaller organizations has been much more limited.

This chapter will describe how you can determine if these methods are adaptable to your situation. Our scope here is limited to what may be regarded as “core” elements of these methods – various refinements and extensions applicable to manufacturing only are not discussed. I will describe how the key features of these proven methods can be adapted to smaller businesses and to smaller units within larger entities – an application of the Pareto Principle (the “80/20” rule). I will describe a “low-calorie” approach that will deliver a large part of the potential benefit of Lean and Six Sigma at a fraction of the usual cost. These methods can be scaled to fit – they’re not just for the big guys!

As there are many misconceptions about what these methods actually are I’ll begin with a straight-forward description of each method and then get into how you might go about deciding if they are appropriate for your organization.

What is “Six Sigma”?

In a general sense, Six Sigma is a *methodology* – a defined approach to improving any product or process. Six Sigma is also a *philosophy* that espouses “management by fact” rather than by opinion. Hence if fully understood and realized it implies a significant culture change for many organizations. Opinion takes a back seat – “In God we trust, all others bring data.”¹

Technically the term “six sigma” refers to six “standard deviations”² from the mean of a set of numbers, which translates to 3.4 defects per million “opportunities” (whatever they are) - i.e., nearly perfect. This term often leads to a fundamental misconception – it does not mean we can or need to achieve that level of perfection in every instance. It simply means we strive to be as good as the customer and competitive realities require. Aircraft require six sigma (or better) quality - toothpicks do not. Many organizations use the Six Sigma method with great success and *never* actually measure “sigma level” – the stats geeks love it, but you really don’t need it to improve business outcomes!

Six Sigma is concerned with reducing “defects”, defined very broadly to include any variation from customer’s requirements. Too expensive or too slow may be a defect in the eyes of the customer. Six Sigma is also concerned with variation, not simply averages. In many business processes the average may be appropriate to customer expectations, but if performance is excessively variable a certain percentage of customers will be dissatisfied even when the average is sufficient. If we deliver in 24 hours on average, but 10% of the time it takes a week that may not be good enough in the eyes of the 10%.

What is “Lean”?

Lean is primarily concerned with eliminating the “7 wastes” – *Partially done work; Extra features; Relearning; Handoffs; Task switching; Delays; Defects*. The primary tool of the Lean approach is “Value Stream Analysis” – a process mapping method that is used to identify and quantify the seven wastes. Various tools, most of them also used in Six Sigma, are used to find root causes of the wastes and to define “to-be” processes that eliminate or minimize wastes identified. Certain other aspects of Lean, such as work center design and total productive maintenance, are rarely used outside of manufacturing and are hence not part of the “core”.

Lean Six Sigma (“LSS”)

In practice a “low calorie” Green Belt level of training appropriate to small and mid-size organizations incorporates elements of both Lean and Six Sigma without sharp differentiation between them – in the remainder of this chapter I refer to “Lean Six Sigma” (LSS) as a single topic. This approach is “lean” in the sense that it covers only the core, not less frequently used elements, and because it is delivered on the job in “just-in-time” mode over a period of several weeks or months – i.e., learn a little, do a little.

The core framework or “roadmap” is called “DMAIC” – Define, Measure, Analyze, Improve, Control – and may be briefly summarized as follows.

Phase	Key Activities & Tools (partial list)
Define	Identify a significant opportunity; Create a “Project Charter” that defines the desired outcome(s), sets goals, identifies stakeholders, limits scope to ~ 3-4 months (don’t try to boil the ocean) Understand the current “baseline” process; Understand the “Voice of the Customer” using interviewing and language skills to identify unstated and unmet needs, identify “delighters” Process mapping, Value Stream Analysis
Measure	Identify and quantify factors driving outcomes (“Ys”) using the framework $Y=f(x)$, where outcomes (“dependent variables”) are determined by the “x” factors (“independent variables”) using

	brainstorming techniques such as Ishikawa (fishbone) diagrams; Validate existing measures and/or gather new data
Analyze	Screen potential x's to identify the most influential using techniques such as correlation analysis, segmentation and stratification to focus on the "significant few"; when appropriate develop forecasting models using techniques such as regression analysis
Improve	Brainstorm process and/or product changes to drive significant influential factors (x's) to levels necessary to achieve target outcomes (Ys); Prepare implementation and control plans
Control	Implement product and/or process changes; implement and monitor metrics necessary to ensure sustained performance at target levels; make the improvement "stick" long term

This process can be considered at three different levels of abstraction.

- Applying LSS concepts and principles informally – thinking quantitatively, managing by fact, using a systematic approach to improvement that does not 'fire' before aiming. An organization of any size can leverage this level.
- "Low calorie" LSS using part-time LSS practitioners (Green Belts) who are formally trained in the core principles and may be 'certified' based on actual project performance rather than by taking a test – results trump traditional certification. This level is generally applicable to firms in the 20 – 500 employee range.
- "Traditional" LSS programs that add formally trained and certified full time specialists called "Black Belts". This level becomes feasible and useful at somewhere around 500 or more employees.

Do We Need LSS?

The answer to that question really depends on where you stand relative to your competition and customer's expectations. If you are "king of the hill" in terms of customer service, cost structure, market share, quality, and any other factors significant to your success, then the answer is a resounding NO!

If you're not lord of all you survey, if you have significant results gaps relative to competitors and customer expectations, then the answer may well be YES! LSS is very effective in closing gaps between current performance and "best in class" benchmarks. LSS is about dramatic step change improvement – if you are satisfied with 5% improvement you don't need these high-powered tools.

In some cases these methods will be used to solve a problem you are painfully aware of – perhaps your costs are too high, or your cycle times are too long – you know what the problem is, but perhaps you don't know what actions to take to achieve a long-term fix. On the other hand, you may not know exactly what the problem is – you may be losing

market share but you're not sure why. The Six Sigma DMAIC framework can be used to address both classes of problems – to fix what you know is a problem, or to discover the root cause of a symptom that is not well understood.

Can We Afford It?

To be frank, if you follow the “traditional” approach used by many large multi-nationals, the answer is *probably not*. As classically defined and implemented a Six Sigma program trains a cadre of process improvement specialists known as “belts” of various hues. “Black Belts” typically receive 4 weeks of training and are in most instances dedicated full time to process improvement.

Companies like GE and Motorola trained thousands of these, and generally expected each one to deliver \$1,000,000 - \$2,000,000 in net benefits per year. In addition most of the big guys trained additional thousands of “Green Belts” – usually providing 1 or 2 weeks of training and expecting these individuals to devote perhaps 20% of their time to process improvement projects and to deliver \$50,000 - \$200,000 in net benefit per project. Others, called “Yellow Belts”, got a day or two of orientation and worked in improvement teams on a very part time basis under supervision of Green and/or Black Belts. All of that makes sense if you have tens or hundreds of thousands of employees, but clearly not if you are much smaller.

More recently some training providers have devised “low calorie” training designed to deliver the core “Green Belt” level ideas in a few days – the key 80% at a fraction of the traditional cost. Excellent Green Belt programs are available as eLearning for single individuals at around \$500 per person. This level of training is sufficient for most of the typical problems encountered in small to mid-size organizations. In general a Green Belt will be able to deliver substantial net benefits by devoting perhaps one day per week to process improvement projects.

There are many reasons the number of persons you might assign can vary, but a rough “rule of thumb” suggests training a number of Green Belts equivalent to about 1% of total staff hours. If you have 20 people in your organization that equates to one person devoted to LSS projects 20% of their time. In addition to the cost of training it is likely you and they will need a bit of consulting / coaching advice from an experienced Lean / Six Sigma professional. You can expect to pay rates similar to those you pay your attorney or CPA – generally in the range of \$150 - \$250 per hour. In a typical situation each Green Belt might need four to eight hours of coaching over a period of several months to help them get started. *The amount of consulting help needed may vary as a function of the experience and capability of those you select to train.*

Let's look at several typical cost/benefit scenarios scaled to different size organizations. For this illustration I make various assumptions that I find from experience are generally reasonable for many firms. Some of these assumptions, such as staff compensation, are subject to significant variation. Benefits projections assume the per project benefit likely to be realized increases with organization size, simply because improvement opportunity and size generally grow in sync. For those who may be interested I'll be happy to provide an Excel spreadsheet you can use to "what if" your own assumptions.

Return on investment estimates given here are conservative relative to experience in larger organizations where ROI is generally reported in the 3-10x range. For simplicity I have assumed you would train the numbers of individuals indicated all at once, but of course in reality it is likely training would be staggered.

Figure 1

Total Headcount =>	< 20	20	40	100	500	1000
Apply principles informally	x	x	x	x	x	x
Trained & Certified Green Belts	-	1 @ 20%	2 @ 20%	5 @ 20%	20 @ 20%	40 @ 20%
Trained and Certified Black Belts	-				1 @ 100%	2 @ 100%
Year 1 Cost	?	\$21,300	\$42,600	\$106,500	\$660,000	\$1,320,000
Year 1 Net Benefit	?	\$50,000	\$140,000	\$500,000	\$2,450,000	\$5,200,000
Year 1 ROI	?	2.3	3.3	4.7	3.7	3.9
Year 1 Costs						
		\$21,300	\$42,600	\$106,500	\$660,000	\$1,320,000
Green Belt Salary @ \$100k loaded		\$20,000	\$40,000	\$100,000	\$500,000	\$1,000,000
Black Belt Salary @ \$150k loaded					\$150,000	\$300,000
Training (eLearning)		\$500	\$1,000	\$2,500	\$10,000	\$20,000
Coaching @ \$200/hr		\$800	\$1,600	\$4,000		
Year 1 Net Benefits						
		\$50,000	\$140,000	\$500,000	\$2,450,000	\$5,200,000
Net \$ Savings per GB project		\$25,000	\$35,000	\$50,000	\$50,000	\$50,000
# GB Projects completed		2	4	10	40	80
Net \$ Savings per BB project					\$150,000	\$200,000
# BB Projects per year					3	6

I recommend you develop a model like this with values appropriate to your organization. If the indicated ROI numbers look attractive to you relative to other opportunities that may be available to you it makes sense to think seriously about moving forward.

Critical Success Factors

First and foremost is the style and attitude of the executive team, especially the owner or CEO. Certainly there are many successful organizations that operate in fire-ready-aim mode. If you are one of those, and that style is working for you, LSS is probably

going to go against your grain. No point swimming against the tide – if it's not your style so be it. If on the other hand you prefer to think things through carefully and you have a preference for facts and data, LSS may be a good fit.

Assuming LSS is consistent with your style the next most critical factor is project selection. Focus on the things most important to your success – things like win (or loss) percentages, warranty costs, defects and rework, or customer satisfaction. Do a somewhat formal organizational assessment – what are your strengths and weaknesses? What threats or opportunities do you face? Rank them. Evaluate where you are relative to “best in class” in each important area. When there are significant gaps between current performance and best in class those are excellent areas to initiate DMAIC projects. Set aggressive goals, recognizing they may or may not be achievable – adjust goals later if it makes sense to do so. Seek to close at least 50% of the gap relative to best in class. 5% improvements are for sissies – swing for the fence!

Next, think through whom in your team makes a good Green Belt candidate. The ones you want are the ones who probably already have too much to do – the rising stars. Sending someone to training because they happen to be available or are charming dinner companions is usually not a formula for success. People already accustomed to quantitative thinking are often good candidates, provided they are able to see the big picture. Some engineers or accountants may be good candidates if they are able to distinguish forest from trees. Statistical knowledge can be helpful, but is not essential.

Each project needs an executive sponsor willing to devote time and attention to the project. The sponsor, often jointly with the assigned Green Belt, will prepare and as necessary adjust a Project Charter. Most important, the sponsor ensures the Green Belt's responsibilities are off-loaded sufficiently to ensure an adequate amount of time is actually devoted to the selected project. The sponsor helps and guides the Green Belt by removing roadblocks, ensuring necessary resources and access, and conducting “tollgate reviews” at the end of each phase to ensure the project is progressing satisfactorily. The sponsor enforces MBA rule 1 – “ignore sunk cost”. If it becomes clear at any tollgate review that the project is unlikely to succeed it is the sponsor's job to cancel the project. Don't throw good money after bad.

Possible Next Steps

If after reflecting on this you want to investigate further and/or move forward there are a number of resources you may find helpful. In conjunction with Business Expert Webinars (www.BusinessExpertWebinars/? .com) I offer three one-hour short courses designed to teach Lean Six Sigma Project Fundamentals for those seeking an introductory understanding of the DMAIC process that provides a next level of detail

beyond this chapter. Topics available include (1) Selecting and Defining Projects, (2) Measure and Analyze, and (3) Improve and Control. These are most appropriate for those seeking to apply these ideas informally and/or for those desiring a fuller understanding prior to making a decision to go further.

In addition I provide (www.Process-Fusion/?net) eLearning Programs including Green Belt (approximately 32 hours) and Introduction to Basic Statistical Terms, Concepts, and Tools (approximately 4 hours as a standalone module that is also included in the Green Belt).

Many Universities and Colleges as well as the American Society for Quality also provide training programs and certifications.

¹ W. Edwards Deming [Competing on Analytics: The New Science of Winning](#).

² A statistical measure of variability and hence risk