# Six Sigma – Friend or Foe?

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The Six Sigma improvement methodology has received considerable attention recently, not only in the quality literature, but also within general business and management literature. For example, a recent book on Six Sigma (Harry and Shroeder, 2000)[1] made the New York Times best-seller list. Today, Six Sigma is arguably the hottest contemporary topic in quality. After all, what company would not be interested in reducing the defects to nearly non-existent levels?

However, and as with any 'hot' management topic, there is a lot of hype surrounding Six Sigma, and many great promises of massive savings and formidable success fail to fully materialize. This article attempts to look at the other side of the coin by presenting an overview of the arguments for and against Six Sigma. The objective is to become better informed about the benefits of Six Sigma quality and to be able to place it in an appropriate context to reap the rewards.

Six Sigma quality is defined as achieving reduction in the variation which allows for a $\pm 1.5$ sigma shift (Harry Mikel 1997)[2]. This means that in any process, the output (products of services) will have no more than 3.4 defects per million opportunities. It is described as a philosophy, methodology, and a breakthrough strategy to solve problems. However, it comes at a price, as deploying Six Sigma is both time and money consuming. Moreover, and while it promises massive savings and benefits, not all organizations that pursued it have achieved their goals.

There are various reasons for this lack of success, and a fair number of these have to do with the way Six Sigma is being hyped as the 'silver bullet' for cost savings and high quality output. Many misconceptions float about around its concepts, and the first step in tackling these issues is to bring about an informed discussion in that regard.

One of the major issues facing Six Sigma stems from prevailing corporate cultures where most organisations are not designed nor led to allow such scientific management to be applied. The key to sustainable Six Sigma is the development of a supportive work environment, a culture that welcomes Six Sigma Black Belts into operational teams and encourages the active participation of all employees in business process improvement using the scientific methods of Six Sigma. Achieving this kind of work environment is not a natural process, and in most cases is resisted by employees at all levels alike. It requires active leadership to create the change that brings an organization to new levels of learning and develops a consistent process that turns an organization into a performer by applying the methods of Six Sigma. This change needs committed and trained leadership, and also requires the creation of new organisational positions. Critical in this transition is the role of the change agent who drives the Six Sigma deployment; usually called the Six Sigma Deployment Champion.

A more direct criticism is the 'rigid' nature of Six Sigma with its over-reliance on methods and tools. In most cases, more attention is paid to reducing variation and less attention is paid to developing robustness (which can altogether eliminate the need for reducing variation). This taps into the argument of whether Six Sigma inhibits organizational innovation when it becomes part of the culture. For example, Six Sigma has been indisputably successful in eliminating waste, reducing variance and increasing productivity and profits. But its potential to create new business models for growth and innovation is barely tapped. To deal with this aspect, some practitioners have deliberately introduced Innovation as an extra element in their Six Sigma methodology. They took the original DMAIC (Define, Measure, Analyse, Improve, and Control) and introduced DMAI²C (Define, Measure, Analyse, Innovate, Improve, and Control).

[1] Harry and Shroeder (2000) FULL REFERENCE
[2] Harry Mikel, 1997, *The Vision of Six Sigma*, Tri Star Publishing, Phoenix, Arizona.

The need for such flexibility and innovativeness is not only essential in the solutions proposed, but also in the way the tools are used to identify these solutions. When learning the Six Sigma methodology, one often gets caught up in the 'rules' and the 'correct' use of quality tools. In a true Six Sigma project, the methodology provides an important framework to follow to achieve the best improvement results. However, within this framework and equipped with a thorough understanding of the principles behind the methodology, one should feel able to use and modify quality tools as necessary to make progress. Thus, the appropriate application becomes more critical for effectiveness than correctness. The mantra should be 'make the tools work for you'. Six Sigma professionals should ensure that outside the bounds of a rigorous project, there is unlimited opportunity to apply concepts or tools from Six Sigma. f course, this doesn't mean that one can start using 2-sample t tests for analyzing discrete data (some rules maintain the integrity of the results the tool leads to), but it does mean that the categories of a fishbone can be adapted to any particular situation.

Another issue to consider is the more general point of relying on a 'model-based' approach to quality which Six Sigma advocates. There are several points that have been identified over time as shortcomings of such model based improvements, namely:

- Models are simplifications of the real world.
- Models are not comprehensive.
- Model interpretation and training must be aligned to business objectives.
- Judgment is necessary to use models correctly and with insight.

Giving these restrictions, Six Sigma, is not, and should not be taken as, a substitute for a good Quality System. Deming's point number 5 (part of his well known 14 point system for quality management) noted that organizations should "improve constantly and forever the system of production and service". In that context, Six Sigma does map sub processes, evaluates the measurement system of sub processes, and puts training, procedures, metrics, and so on in place where they are found to be lacking. However, a good quality system is more comprehensive and should demand an accurate map of every critical process and demand that every measurement system is qualified prior to use, and should have training as a disciplined practice already in place.

Overall, the overall thinking seems to be that 'all models are wrong but some models are useful'. The argument for using the 'model-based' improvement highlights that they:

- Provide common language.
- Forge a shared vision.
- Are based on best practices proven to work elsewhere.
- Provide a framework for prioritizing actions.
- Provide a framework for performing reliable and consistent appraisals.
- Support industry-wide comparison (benchmarking).

The reality is, within today's dynamic change environment, there is no escaping the model-based improvements, least of all for the benefits they provide, and the potential ease and speed of their application. However, when one relies on such approaches, it is prudent to keep in mind their shortcomings to avoid falling into being 'model-driven' as opposed to 'using and tailoring' the model to fit the context.

A more controversial criticism area is the effect on Six Sigma on organisational culture when adopted organisation-wide. It has been noted that in some cases, employees complained of the 'Six Sigma Bureaucracy'. Organisations that adopted Six Sigma as a way of life made it essential for all organisational projects and improvement initiatives to fit within the 'standard Six Sigma' format. While these were seen as useful and structured in many cases, there were cases that claimed this added unnecessary burdens and even stifled some ideas and initiatives.

Moreover, and due to such rigid procedures, many complained that Six Sigma, in some cases, created a roadblock for 'doing things fast'. Within the set corporate Six Sigma procedures, every idea has to go through the methodology and be subjected to tools and

analysis. While this might have been a useful filter to scrutinise new initiatives, having to submit every idea through standard forms and subject to strict methodologies might have caused a few good ideas from being implemented, or at least delayed them. In an age were we live 'instant' change, this might prove a vital point to consider.

Along the same lines, Six Sigma has its strength in being data driven. While this is crucial, being data driven advocates that 'if you can't prove it, do not use it'. This begs the question: what happened to creativity and management from the gut. Management has never been a complete science as many successful cases prove and the 'art' side must be kept alive in a dynamic environment. The principle issue here is that organisations should use Six Sigma as a tool to solve problems rather than make it a way for the whole organisation to live by the code-book.

Keeping the discussion within the organisational culture but on another front, it has been argued by some that Six Sigma caused some talent drain from certain organisations. The fact that everyone in the organisation had to go through a Six Sigma programme or another, and the fact that promotion was tied to Six Sigma achievement(s) made some very talented individuals leave such organisations. While they were otherwise excellent employees, they neither developed a liking or a deep understanding for the science and art of Six Sigma, and not everyone should be expected to.

A more technical point of criticism is about the trend of reporting improvement(s) in Sigma levels. While this is a common language and accepted within Six Sigma professionals, it might actually confuse rather than improve. This approach might give the *sense* that something good is happening: "surely we are doing much better as we are now operating at 4 Sigma from operating at 3 Sigma five months ago". It might be more useful for organisations to actually report the picture before and after in operational terms to give a realistic picture and a clear measure of improvement.

On the positive side, Six Sigma does provide a rigorous methodology and unlike mindless cost cutting programmes, which reduce value and quality, Six Sigma focuses on defect prevention, cycle time reduction, and cost savings by eliminating what adds no value to the customer. This, in fact, is the secret to Six Sigma's massive success in an age of management fads and approaches that, while looking good on paper, are yet to prove any value added to the organisations.

With this in mind, it must be remembered that Six Sigma is not enough. Defining quality as only the lack of nonconforming product reflects a limited view of quality. The notion of 'critical-to-quality' (CTQ) characteristics in a product or service are those that customers expect and consider explicitly when evaluating product or service quality. It must be kept in mind that while Six Sigma can ensure customer being not 'dissatisfied' by focusing on these CTQ's, no customer dissatisfaction does not equate to customer satisfaction.

One final criticism, probably more to the Six Sigma literature than concepts, relates to the evidence for Six Sigma's success. So far, documented case studies using the Six Sigma methods are presented as the strongest evidence for its success. However, looking at these documented cases, and apart from a few that are detailed from the experience of leading organizations like GE and Motorola, most cases are not documented in a systemic or academic manner. In fact, the majority are case studies illustrated on websites, and are, at best, sketchy. They provide no mention of any specific Six Sigma methods that were used to resolve the problems. It has been argued that by relying on the Six Sigma criteria, management is lulled into the idea that something is being done about quality, whereas any resulting improvement is accidental (Latzko 1995)[3]. Thus, when looking at the evidence put forward for Six Sigma success, mostly by consultants and people with vested interests, the question that begs to be asked is: are we making a true improvement with Six Sigma methods or just getting skilled at telling stories? Everyone seems to believe that we are making true improvements, but there is some way to go to document these empirically and clarify the casual relations.

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[3] Latzko, William J., 1995, *Notes on the Six Sigma Concept.*

In summary, there is no doubt that Six Sigma is a powerful approach to eliminate defects and improve performance. Moreover, there is no disputing that the rigor of the Six Sigma methodology must be adhered to for maximum results when improving processes. However, within the methodology, there are often opportunities to make discretionary choices as to the appropriate application or modification of a particular quality tool. Six Sigma will prove useful only when used as a *tool* and within context of the overall complex system that is an organisation, and not be allowed to take over the organisational culture and creativity.