

*“Crime wouldn't pay if the government ran it.”*

Anonymous

# **Six Sigma: A multidimensional TQM methodology**

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Dr. Larkin Dudley and Dr. James Wolf

Virginia Polytechnic Institute and State University  
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Marco Rodriguez

Total Quality Management (TQM) has been widely used by the private sector, especially after the lessons obtained from the Japanese success during the late 70's and early 80's. Today, methodologies like Six Sigma are in vogue due to the immediate financial benefits companies are experiencing after its implementation. Its effects have also been felt by public organizations and some of them have tried to apply it but the results are less evident: "Existing research results about the relationship between total quality management and service quality in the public sector are controversial" (Hsieh, Chou and Chen, 2002). Why is TQM less successful on the public sector? What are the factors that influence on the success of a TQM program like Six Sigma?

The purpose of this essay is to explore some of the reasons for these failures and to tie these symptoms to the fact that there is a general misunderstanding of TQM. Total Quality Management is usually seen as only a mechanistic model of an organization, without appreciating other concepts that are included on it. As Barbara Spencer shows on her article "Models of Organization and Total Quality Management: A comparison and Critical Evaluation", TQM is a more complex and holistic theory than simply a process improvement. Methodologies, like Six Sigma, that not only involve the mechanistic perspective (statistical tools) but also, because of its integral approach, take in consideration the environment and the culture. We will try to show how some implemented TQM methodologies, like Six Sigma, can improve any kind of organization because of its emphasis not only on statistical tools but also because it provides tools to manage the change of the culture of an organization and to adapt to the environment.

## **A failure tied to a misconception**

Total quality management (TQM) continues to be promoted by governments across the world and forms part of the improvement strategies for many public organizations. However, there are no empirical studies of the relationship between TQM and performance in the public sector. A critical review of the 19 private sector studies is undertaken to identify the impact of TQM on performance. These studies do not offer comprehensive support for the TQM-performance hypothesis, and there are many unresolved issues in the evidence (Boyne & Walker, 2002)

The failure of TQM on the public sector has different reasons. Some of the most important mistakes (as described by Lin and Ogunyemi, 1996) are:

1. conduct mass training before support systems for TQM have been set up;
2. over-emphasize the technical tools at the expense of leadership and management issues;
3. apply the tools before the needs are determined

On the origins of this failure is the misunderstanding that TQM as basically a set of tools (instead of a cultural change or a new way of thinking). The common belief is that using the statistical tools, like quality function deployment matrix or process controls charts, you are already implementing and using TQM. This narrow view not only underestimates the power of this organizational methodology but also leads to painful failures, provoking resentment and cynicism. Regretfully, even academia still keeps this single dimension view, assuming that Total Quality Management is only a more refined taylorist perspective. Spencer believes this incomprehension is due because TQM was not originated as an academic trend but on the field, product of the work of engineers like Deming and Juran. Therefore, its comprehension and analysis has been partial and some time has been depicted by organizational theory researchers.

During its earlier times, the private sector believed that Deming's lessons were only for manufacturing and that it was also just a set of statistical tools. This is still

common mistake on the public sector because, as Lin and Ogunyemi argued, it is funded on the belief that tools alone will do the work, without any notion of the need of a cultural change. Nevertheless, the private sector has corrected this misunderstanding and it has now begun to implement successfully these techniques on the service companies. However the public sector is still trying to assimilate them without much success.

It is necessary to understand that this is not only because of a misunderstanding of the concept that has failed on the public sector. The implementation of the methodology has also been followed by gross mistakes: “TQM has been unsuccessful in some public organizations because it was misunderstood, misapplied, or both” (McGowan, 1995) Because of all these factors, for example, the President’s Award (the Federal sector equivalent of the Baldrige Award) was not even given to any agency during 1990 and 1993 (Anschutz, 1996). Thus, with some notable exceptions in some specific agencies, TQM in the public sector is often considered a buzzword, “the fad of the moment”, something that it will disappear over the time, replaced by another fad (‘e-government’ for example).

The next question would be: what went or is wrong on the TQM implementation on the public sector? I believe the reasons behind these problems, it is the wide lack of knowledge of the real characteristics of TQM.

This misconception (that is not exclusive of the public sector but it is more spread there than in business) is closely tied to the fact that most of the ideas we have about TQM are basically related to what Spencer calls its “mechanistic dimension.” However, as she recalls, this is just one aspect of a more complex and holistic perspective. She sustains, doing a scholarly research on the original concepts of Total Quality Management, that it has a more systematic and amorphous philosophy, and its

characteristics are possible to fit not only on the mechanistic model, but also on the organismic and cultural models of organization.

The summary of her findings it is summarized on figure 1.1:

<i>Dimensions</i>	<i>Mechanistic Model</i>	<i>Organismic Model</i>	<i>Cultural Model</i>
<b>Organization goal</b>	Organizational efficiency/performance goals	Organizational survival (requires performance)	Meet individuals needs/human development/(requires system survival)
<b>Definition of Quality</b>	Conformance to standards	Customer satisfaction (requires conformance to standards)	Constituent satisfaction (requires customer satisfaction /conformance to standards)
<b>Role/nature of environment</b>	Objective/outside boundary	Objective/inside boundary	Enacted/boundaries defined through relationships
<b>Role of management</b>	Coordinate and provide visible control	Coordinate and provide invisible control by creating vision/system	Coordinate and mediate negotiations regarding visions, system, rewards; lead by sharing control demonstrating values
<b>Role of the employees</b>	Passive/fellow orders	Reactive/self-control within system parameters	Active/self-control: participate in creation of vision, system
<b>Structural rationality</b>	Chain of command (vertical communication), Technical rationality	Process flow (horizontal & vertical communication), Organizational rationality	Mutual adjustment in any direction  Political rationality
<b>Philosophy toward change</b>	Stability is valued but learning arises from specialization	Change and learning assist in adaptation	Change and learning are valued in themselves

Spencer, p.459

### **TQM and Six Sigma: The reasons behind a success**

The table 1.1 shows the multiple dimensions that TQM covers, and there are some of the key ingredients of the success of Six Sigma. Behind the success of this

methodology is the fact that involves concepts not only related to the mechanistic perspective, but in fact elements that make of this methodology a powerful tool for organizational change.

What is exactly Six Sigma? As defined by Thomas Pyzdek (2003), “Six Sigma is a rigorous, focused and highly effective implementation of proven quality principles and techniques” (p.3). The history behind the methodology is interesting, because it is a reflection of how American companies decided to answer the Japanese challenge during the early 80’s:

Many measurement standards (Cpk, Zero Defects, etc.) later came on the scene but credit for coining the term "Six Sigma" goes to a Motorola engineer named Bill Smith. (Incidentally, "Six Sigma" is a federally registered trademark of Motorola). In the early and mid-1980s with Chairman Bob Galvin at the helm, Motorola engineers decided that the traditional quality levels -- measuring defects in thousands of opportunities -- didn't provide enough granularity. Instead, they wanted to measure the defects per million opportunities. Motorola developed this new standard and created the methodology and needed cultural change associated with it. Six Sigma helped Motorola realize powerful bottom-line results in their organization - in fact, they documented more than \$16 Billion in savings as a result of our Six Sigma efforts (www.isixsigma)

Six Sigma has evolved from the quality programs of the 1980’s (Cost of Quality, Zero Defects and TQM) utilizing the collective knowledge of practitioners like Deming, Juran, Crosby and others. It has expanded significantly from the Statistical Process Control (SPC) programs of the 80’s and early 90’s, to become a total business improvement strategy. Because of this more holistic perspective, typically, companies implementing six sigma programs today are doing so with a significantly higher level of structure and leadership commitment than previous TQM programs. On this way, they guarantee the support from the top managers but, at the same time, Six Sigma build a whole structure to push cultural changes. That is probably one of the keys to six sigma’s success today.

The use of this methodology has been also critical for the success of diverse companies such as General Electric and Bank of America. Ironically, one of the main reasons of its success is clearly because it is not only focused on the mechanistic perspective: "Six Sigma is many things, and it would perhaps be easier to list all the things that Six Sigma quality is not. Six Sigma can be seen as: a vision; a philosophy; a symbol; a metric; a goal; a methodology." (Tennant, 2002).

Therefore, to understand the reasons behind Six Sigma success can help us to understand also the success of TQM not only seen as a simple set of tools but also as a philosophy and way of doing business. This perspective will be explained using the same elements enumerated by Spencer on table 1.1:

*Organization Goal:*

Six Sigma utilizes an improvement cycle (DMAIC – Define, Measure, Analyze, Improve and Control) of process definition, targeting and measurement, statistical analysis, improvement and control. Each phase, as described by Mutize (2003), has a specific goal:

**Define:** Select the appropriate customer-focused defect or problem. This includes the initial measurement of the process capability and the documentation of the current business practices. Before start the project, it is necessary to evaluate the impact and the project deliverables in a project charter. Once defined the project, it is necessary to form a multidisciplinary team that will include all the areas that are involved on the process.

**Measure:** During this phase, the team will develop a factual understanding of the current process and locate the main sources of problems, at the same time that it defines the right

scope of project. It will establish an "as-is" process map, measuring the process capability, and collecting the data to give a baseline of the current process.

**Analyze:** The team will then identify the potential root causes of defects or sources of variation, analyzing the external environment and the internal conditions that are affecting the process output. The research includes investigate the causes of defects using experiments (and statistical analysis). Obviously, this includes also to verify the root cause(s) of the problem.

**Improve:** The critical part of the project is to eliminate the verified root cause(s) or reduce sources of variation, at the same time without shocking the company and provoking internal resistances. The goal is to demonstrate with data that the problem is solved and leads to a measurable improvement but also that it will become an improvement that won't fade over the time.

**Control:** The team, finally, will implement methods to hold the gains such as standard

operating procedures and statistical process controls (SPC), but also looking to spread the knowledge over all the employees involved on the new process.

Despite this cycle relies heavily on previously developed problem solving tools and statistical evaluation techniques (mechanistic perspective), it also utilizes a very structured set of organization roles and includes elements of program leadership and change management (cultural and organis mic perspective). “Unlike other quality initiatives, Six Sigma attempts to identify the core processes that drive an organization's strategic business objectives.” (Eckes, 2003) and, unlike other quality methodologies, it sustains that organizational survival is based not only from the internal quantifiable variables, but also from such different elements like human skills, environmental

conditions and the multiple relationship between them (Caldwell). Goals are not only defined as way to measure performance and therefore, control the employees. Six Sigma define goals as a process to connect the organization to the needs of the customers (internal or external) and looking to have the greatest impact on key factors and company bottom line (Pzydek, p. 188)

*Definition of Quality:*

"The goal is business performance, not Six Sigma," says Jeff Osborne, vice president of Six Sigma Plus at Honeywell Engines, Systems and Services (Phoenix). "You have to look at how do you fit Six Sigma into the business, not the other way around," he says (Anonymous. 2003) However, at the same time, this means that the definition of quality that is managed by Six Sigma is not only a conformance to standards, but it also emphasizes the use of "Voice of the Customer" as an important element of quality. "Its ultimate value to the business, when used as a product development process, is in avoidance of costly late-stage rework" (Johnson and Swisher, 2003). Thus, we can see clearly how Six Sigma mix not only the simple measurement of outputs but also includes on its methodology more qualitative concepts like the importance of customer satisfaction. The definition of quality, finally, becomes a result of an analysis of the client's need and satisfaction combined with an awareness of the external environment.

*Role/nature of the environment:*

One important step to consider before launching a Six Sigma initiative is the need to align the projects and its goals to the strategic objectives of the company. A scan of

the internal and external environment is an important part of the strategic planning process and the use of managerial tools like SWOT as part of a whole strategic planning process are highly recommended. In this way, Six Sigma is taking account not only the internal conditions that would affect the project (inside boundary), but also the external elements that can have an important role on the final output. This also includes, for example, the relationship networks and the cultural values of the people involved on certain processes. This is an especially critical path during the Analyze and Improve phases, because the environment has a tremendous impact over the final success or failure of the project. The reason to have in consideration these factors are multiple and, among them, is the fact that the dramatic cost and cycle time reduction requires a radical departure from traditional (mechanistic) perspectives and methods, and this is what Six Sigma can offer to organizations (Pzydek)

*Role of Management:*

Six Sigma programs have highly structured organizations consisting of a combination of full time and part time resources. The executive leadership and team lead roles are particularly important, not only because of the need of its support but also because the symbolism that it is involved. The management has to build six sigma teams which will be focused on perpetual improvement of processes and will continually cycle through improvement projects of varying duration in search of achieving the desired process performance. Management specifically has the role as a champion, who are executives trained to understand and support the companies six sigma programs. They provide program leadership for projects, eliminating road blocks for the teams,

negotiating solutions, defining system rewards and protecting the values of the methodology.

Obviously, this is a much more complex and multidimensional role than the classical mechanistic play defined by the Taylorist school. Those who have implemented and practiced six sigma agree that the most important factor is continued top management support and enthusiasm (Henderson and Evans, 2000). People in the highest level of the organization must drive six sigma. In six sigma success stories like Motorola, GE, and AlliedSignal, the CEOs are the ones who have made it possible, not because of the simple chain of command but because they shared and demonstrate publicly the importance of its values. All of them support, participate and are actively involved and dedicated in company-wide six sigma initiatives. (Anon)

*Role of employees:*

Six Sigma has an enormous emphasis on the role of the employees as an active participant in the creation of the vision and the system (process) inside the company. That is why the fundamental unit to drive process improvements is through Improvement teams – groups of individuals forming teams that are directed to improve a specific process or implement a specific solution. It also important to notice the importance of the symbolism, due to the fact that typical teams are led by a Black Belt (title taken from the karate degree) staffed with Green Belts and process subject matter experts.

Black belts are highly regarded, technically oriented product or line personnel who have an ability to lead teams as well as to advise management. He is the leader of the team responsible for applying the Six Sigma process and he is trained on the

methodology so he can manage the project but also teach the members of the team on the tools and the values of the methodology.

On the other hand, Green Belts are individuals who support the implementation and application of Six Sigma tools by way of participation on project teams. They are potential black belts candidates on future projects and usually it is necessary to have a critical mass of them so they will have the opportunity to spread the word and assure permanence of the culture

Once the projects are in place, a cultural change (a philosophy toward change) is in place and “Six Sigma organizations can prevent much of the resistance described above by hiring personnel who are likely to be more open-minded” (Eckes). Six Sigma requires that employees have to be more open and proactive, so they can be receptive to new ideas and imaginative enough to provide the organization with added value thinking.

The logical conclusion is, as any TQM methodology, the highlight of the teamwork. Teamwork is a fundamental element within Six sigma. Citibank, one of the top banking organizations that is adopting the principles of Six sigma, uses widely cross-functional teams. In a project on manual funds transfers, it forms a cross-functional global team of 80 people, representing each functional department involved in the project. This large number of people was needed since Citibank searches for a process standardization all over the world. The team identified the entire funds transfer process, tabulated defects and analyzed them using six sigma tools. They identified internal call-back procedures as the main defect and then focused on solving it. The results were quite amazing with an elimination of 73 percent in the call-backs (Rucker, 2000).

*Structural rationality:*

Six Sigma, despite the appearance of been a rigid and structured methodology, is flexible enough to adjust to the new internal or external conditions of the organization.

As Eckes describes

“First and foremost, Six Sigma is a strategy for an organization to manage by fact and data. This approach is a radical departure for those organizations that ran their businesses based on anecdotes and the opinion of the person who was highest on the organizational chart [...] it is how management can create and sustain Six Sigma as a management philosophy, rather than see it as a series of tools and techniques to be used by problem-solving teams (Eckes)

Unlike other quality initiatives, Six Sigma attempts to identify the core processes that drive an organization's strategic business objectives, and this includes to understand how process flow (including a fluid vertical and horizontal communication) and how to adjust the projects depending of the circumstances. The chain of command is usually erased by teams where multiple layers of the organization are included. It is not unusual, for example, that the team leader of a Six Sigma group implement a solution with the help of team members where there is no distinction of rank or status. The organizational and political rationality is highly considered and the decision process becomes a more complex (but richer) product, improving the chances of a better solution.

*Philosophy toward Change:*

Six Sigma, as we have seen, it is a refined product of TQM and not a simple technical tool. Its implementation requires a delicate balance between cultural and technical change. Despite the fact that one of the main concepts of Six Sigma is the reduction of variation, stability is not valued by itself (it is a mean, not a goal). Change

management and employees who can deal with, it is a skill highly regarded in Six Sigma. The need to link this methodology to the business strategy and objectives, shows that it is not possible to treat Six Sigma like another stand-alone activity. It requires adherence by the employees (especially the top levels) to a whole philosophy rather than just the usage of a few tools and techniques of quality improvement (Dale, 2000). Six Sigma projects must be targeted for process and product improvements that have a direct impact on both financial and operations goals. This is not different for a public or a private organization. Even if the first efforts focus on fairly narrow problems, their impact on the whole business should be clear and assimilated by all the employees involved. It needs to be clear to everybody how projects and other activities link to customers, core processes and competitiveness (Pande et al., 2000).

The learning, as a continuous improvement process, is deeply appreciated as way to understand and teach the methodology to the rest of the employees of an organization. Learning abilities are critical to assist the organization in the adaptation process to the new environments but also to assimilate this new work philosophy.

## **Conclusions**

Six Sigma, they assert, can and should be applied to almost all processes in all companies, including service and office functions. As Mikel Harry (one of the leading thinkers on Six Sigma) says, the methodology is not just about reducing defect levels by improving processes, it is about building profitability and market share. In the case of the public sector, the emphasis on customer service, environmental adaptation and learning process are still fundamentally valid. Still, there are some voices of concern

that TQM (and one its products, Six Sigma) is just a fad that will disappear over the time. However, what is in reality a “fad”? Webster dictionary defines fad as “practice or interest followed for a time with exaggerated zeal” and that implicitly will become a temporary fashion to be discarded later. As Specter clearly mentions on her article lately during “the past new years, American managers have been inundated with articles, books and seminars describing the “quality revolution” (p.1). As one of the most recurrent techniques mentioned, “Six Sigma” has had deep results on companies like GE or Allied Signal and it is highly probable that the public sector will start using it during the next following years. It can be a temporary stage until TQM concepts become so engrained on the organizational culture of public organizations that it is not necessary to put a tag on it. The fact that Six Sigma is considered “TQM on steroids” because of the use of tools and learnings from practitioners like Deming and Juran, is a proof that it succeed to illustrate some of the most important principles of the pragmatic and scientific management streams. Thus, it is worth to understand and putting them in practice on the day to day operation of an organization.

Despite negative criticisms because of its mechanistic emphasis (from Perrow, for example), we can conclude that TQM has also important characteristics that are associated with a more cultural and organismic perspective. Six Sigma has the virtue to summarize most of them, mixing the quantitative and qualitative aspects of the TQM philosophy. Maybe, as we said, over the years the tag “Six Sigma” will disappear and it will be given a different name to the use of the tools and concepts from Dr. Deming, Juran and others. But that won’t mean its value has decreased. In fact, that will be a positive outcome because that will mean people are much more aware of the

multidimensional perspective of TQM and they don't only see the mechanistic optic of the methodology.

However, there is still a long way to walk, especially on the public sector where TQM has been losing momentum. Although there are still some promising perspectives: it is my impression that, during the next following years, the healthcare sector will be the key area where Six Sigma will prove its value on the public sector. It will be the opportunity for researchers and academia to understand and evaluate the value of TQM (and Six Sigma) as a tool for the improvement of public organizations.

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