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## Issues in Six Sigma Implementation – Reflection from TQM

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### **Abstract**

*Like any other technologies or techniques, implementing Six Sigma (SS) in an organisation requires a comprehensive understanding on surrounding issues on the implementation process. Many have been written on this topic which strongly suggests that “It is not what you implement, but how you implement it”. In this paper, a reflection on organisational issues relating to the implementation of Total Quality Management (TQM) is discussed, especially several underlying factors which managers or other members of organisations who implement it often overlook. Although SS proponents of have attempted hard to articulate the differences between SS and TQM, it is difficult to deny that there is a large degree of similarities between the two. Consequently, we still can draw several key lessons and apply them to SS which will prevent us from facing similar obstacles we had in the past with TQM.*

### **Introduction**

In introducing six Sigma (SS), one of the common approaches is to claim its superiority against TQM. It is easy to find how SS is advertised by using the failure cases of TQM. The arguments are that SS offer “more” than TQM, especially the tangible results which link to bottom line. The other argument suggests that TQM is “too soft” and produce a weak driving force to yield result. In conjunction with this, TQM is claimed to produce mainly “soft” results, such incremental improvement and employee satisfaction which do not affect significantly on business performance. In essence, there have been efforts placed in contending that SS is different from TQM. On the other hand, there is no less number of arguments suggesting that SS is a “re-packaged” TQM, or an evolution of TQM (Raisinghani *et al.*, 2005). This is because both SS and TQM share a large degree of similarities in terms of the key elements, tools, techniques, principles, and success factors for implementation. The emphasis of SS in yielding a quick result

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is considered not convincing enough to justify the difference; indeed, it has triggered a cynical view suggesting that SS is “*TQM on steroid*” (Hammer and Goding, 2001).

Based on the similarities of SS and TQM, this paper attempts to reflect on several key issues which have been largely ignored during TQM era which has contributed to the failure of firms in implementing TQM and yield satisfactory results. Installing a new technology or new management concept is something needs to be done carefully so as to prevent it from causing damage rather than improvement in the existing system. Therefore, TQM or SS is not a method that can be "unthinkingly" used without a clear sense of the context where it is implemented (Sitkin *et al.*, 1994). The tools and techniques are not implemented in a “vacuum”, but within an organisational context, and this demands an understanding on two major issues. The first is that every organisation has its own unique context and organisational context creates constraints for the implementation of the new technology. As a result, firms need to carefully adapt (as opposed to the blind adoption) the new technology within the existing constraints, or, they need to change the constraints to fit with the “nature” of the technology. In this way, the new technology can sit comfortably in the organisational context, produce a good alignment with other elements in the system and produce a synergy which results in an improved performance of the firm.

## *Strategy*

Since Six Sigma (SS) is part of the resources owned by firms to achieve their competitive goals, there is a need to align SS with organizational strategy. In this regard, the emphasis on quality by conformance seems to supersede other competitive strategies. This is particularly obvious during the TQM era (1990s) where quality has been heralded as the “order winner” of competition and

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the source of competitive advantage. Others view that although organizations can pursue different types of strategies, however, quality will always be considered as an overarching strategy under which firms can choose more particular strategies. Belohlav (1993), for example, linked quality with three generic competitive strategies by Porter (1980), cost leadership, differentiation, and focus. TQM proponents have strongly argued that improving quality will result in several byproducts, including improved delivery and reduced cost. This leads to a conclusive view that quality has been singled out as the strategy which all firms must pursue in order to be competitive.

However, whilst quality is always important, from operations strategy perspective, firms may achieve high performance by pursuing strategies other than quality. The works by Hayes and Wheelwright (1984) concluded that manufacturing firms can choose from at least five different strategies, quality, dependability, speed, flexibility, and cost. Nowadays more and more attention has been given to other competitive dimensions, including agility and innovation. Moreover, firms are now demanded to pursue multi-dimensional aspects of competitive performance. Just having quality is not enough in several industries where most competitive bases for quality (with regards to conformance to specification) have been equalized. In this situation, quality is easily degraded into “order qualifier” which only helps firms enter the market, but not necessarily win the competition. Looking further from a strategic perspective, in choosing their strategies, firms need to have an accurate understanding on both internal factors (i.e. resources) as well as external factors (i.e. business environment). Considering various characteristics of business environment, including dynamism, hostility, munificence, it is clear that quality has no “one size fits all” value. For example, Nowak (1997) suggests that quality management is suitable in

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strategically stable industries, whilst in strategically volatile conditions, innovation will have a better fit. Similarly, Williams (1992) argues that companies competing in the 'fast-cycle resources' class have to be very innovative because their resources are easily imitable and the only way to outperform their competitors is to continually innovate. He further suggests that such organization must make frequent and fast innovation; as they would not have time to learn about the process in order to bring it into one that is statistically controlled. This view promotes the contingency rather than the universality of quality management as a strategy.

The above discussion leads into several inquiries about the effectiveness of SS as resources, some of them are pointed below:

- Given different strategies pursued by firm, will SS be compatible with any strategy? Which strategies can accommodate SS (and vice versa) and which ones cannot?
- Is it possible to integrate different strategies and pursue them using one common vehicle (i.e. SS)?

## *Structure and culture*

The second contextual variables where SS is implemented are organizational structure and organizational culture. Whilst structure and culture fall into different bodies (domains) of knowledge, for the purpose of this argument both of them are considered as a combined context which may support or hinder SS. This is because these two factors play important roles in providing rooms as well as setting constraints for organizational resources (e.g. people, technologies, and system) in delivering outcomes. Learning from the experience of TQM, it is clear that TQM proponents hardly consider these factors when promoting TQM principles (e.g.

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customer focus, continuous improvement, teamwork). This has been attributed to the pragmatic view of TQM proponents which assume that TQM techniques and practices are universally applicable in any organizational context. However, owing to the mixed results of TQM implementation, the study by Powell (1995) began to reveal the importance of cultural aspects of organizations. The study concluded that TQM practices had to be implemented within a suitable environment (i.e. culture) that emphasized certain values (e.g. open communication); something which was not considered as originally part of TQM. The study has triggered a shift of focus on TQM from its “hard” aspects which are more observable, such as tools, techniques, and systems, to “softer” behavioural and cultural aspects of TQM, which are harder to manage and to change. This shift of emphasis has been driven by the fact that many TQM implementations have failed, preventing companies from realizing its potential benefits because of the ignorance of the cultural factors (Dale *et al.*, 1997; Wilkinson *et al.*, 1998). A similar view is applied to organizational structure which to certain degree is a reflection of organizational culture. The question here is: What kinds of culture and structure are suitable for TQM?

Since Powell’s study, scholars have attempted to identify typical cultures that are considered in the literature as suitable for TQM practices, and, influenced by Powell’s results, many papers have suggested those related to a flexible, people-oriented style. For example, Tata and Prasad (1998) conclude that such practices as leadership, employee involvement and empowerment, teamwork, customer focus, and continuous improvement are the reflection of people-centered and flexible cultures or will be best implemented where such cultures prevail. The study by (Westbrook and Utley, 1995) provides further support for this argument as the result indicates that creating culture where employees are valued and empowered leads to successful quality

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management implementation. On the other hand, the findings of the study by Germain and Spears (1999) indicate that structural and formal approaches will support rather than hinder TQM practices. They specifically mentioned that several TQM practices such as management by fact, strategic planning and formulation, the use of SPC, and process documentation are the reflection of formalization and control-oriented structure and culture in organizations.

Instead of fighting this inconsistency, scholars have gained a new insight on the multidimensionality of TQM as opposed to the unidimensional view of TQM. For example, Sitkin et al. (1994) suggested that with similar underlying TQM precepts there are two contrasting orientations, namely total quality control (TQC) and total quality learning (TQL). TQC is associated with a control approach, whilst TQL is related to innovation. Based on organizational model theory, Spencer (1994) argued that various practices under the TQM umbrella can be categorized into several organizational models, including the mechanistic and the organic model. For example, the real objective of pursuing quality is related to productivity and efficiency, something on which a mechanistic organization pursues. On the other hand, employee empowerment and cross-functional teamwork are closely linked to the organic model. In addressing the paradoxes of TQM, Thompson (1998) affirmed that in order to gain a sharper focus on the culture of TQM, organizations need to appreciate the contrasts embodied in a number of principles of TQM which appears to be antagonistic to each other, for example, between encouraging creativity on the one hand and promoting control and reducing variation on the other hand.

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Resolving the debates on the suitable structure and culture in organizations which are required to accommodate TQM (and SS), scholars have left a big task for practitioners in managing the paradoxes in the organizations, balancing efficiency versus creativity, mechanistic versus organic, and control versus autonomy.

## *Learning*

Similar to TQM, SS also promotes analytical, structured and linear thinking which emphasise the use of factual information. The problem solving method taught by TQM or SS emphasizes the use of data, indeed, one of the most famous terms used in TQM literature is 'management by fact'. This term strongly promotes the idea of rational thinking supported by a set of data, tools, and techniques. In the context of continuous improvement, these rational thinking approach workers are primarily applied to routine operational problems which they have been familiar. This results in a single loop learning using a systematic and rational sequences with the purpose of simplifying or streamlining a process and carrying it out in a better or faster manner. Glynn (1996) suggests that in situations where a problem is familiar, prior experience may lead to the direct retrieval of the prior solution, hence, preventing the workers from developing innovative solutions. The emphasis on single-loop learning results in a situation where the learning of production workers is typically constrained within a given pre-designed production regime. As a result, this brings employees to focus on the details of the quality process and improving the existing system incrementally which could be fundamentally flawed, as asserted by Burdett (1994):

“A more subtle potential shortfall in TQM is the extent to which an ethos of continuous improvement impacts on organizational learning . . . A question that is framed in terms of “How

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can we improve this?" by implication moves those involved away from what may be a more insightful question, "Do we need to this at all?"

In the context of capabilities development, under TQM or SS context, firms may be focused on exploitation capabilities which aimed at maximizing existing resources to achieve efficiency and productivity rather than exploration learning which are associated with innovative capacities and developing new skills and resources. In their seminal work, Benner and Tushman (2003) associated TQM with exploitation capabilities. They specifically argued that process management, which is focused on incremental improvement, involves routines and increased proficiency through repetition of organizational activities within the existing capabilities with the outcome being high quality products in terms of conformance to specifications. Whilst exploitation learning is important, Benner and Tushman affirmed that firms need to integrate and capitalize both capabilities simultaneously will determine its competitiveness and sustainability of its performance over time.

## *Performance measurement*

In conjunction with the learning issue, process control and measurement using statistical tools is another point which firms need to consider carefully. The slogan which said "*if you can't measure it, you can't manage it*" assumes that everything can be measured and quantified, hence, data can be collected from any process. Whilst this sounds sensible in the manufacturing sectors, this is not always applicable, at least from the point that not everything can be measured in a quantitative domain, in service industries. How can we accurately measure the elements of service quality such as courtesy or friendliness? We certainly can judge whether the service is good or not, but coming to attributing something as defective or not in order to measure the level of conformance is too ambitious. Even in the manufacturing sectors, process control and

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improvement is effective when applied on the production process which operates on a high volume, repetitive assembly line, under stable and predictable condition. When these conditions are violated, the effectiveness of the statistical tools must be questioned.

Further to this, the statistical definition of six sigma is 3.4 defects or failures per million opportunities based on the assumption of normality. However, normality itself requires certain conditions (e.g. minimum sample size) which may not be applicable in all situations. How SS deals with non-normal data is yet to be addressed (Antony, 2004). It is also necessary to ponder the extent to which firms need to pursue the level of performance. Do we have to have  $6\sigma$  (3.4 ppm) in order to be competitive? How much it costs us? Firms may not be aware that as they move to a higher level of sigma, the costs will begin to outweigh the return (Linderman *et al.*, 2003). At the same time, it is important to examine how much this six sigma conformance has appeal for customers (Senapati, 2004). The danger of being obsessed with six sigma (i.e. 3.4 ppm) level is that we may overdo something which provides no value to customers beyond what is normally acceptable. Worse than that, being placed under pressure to show improvements, people may take processes which are “easy to be improved” although they do not significantly contribute to the end results, that is customer satisfaction. As a result, massive internal improvements do not translate into the real benefits for firms.

## *Institutional forces*

The final issue discussed in this paper is the motivations of firms in adopting SS which could reflect the rate of SS adoption in industries or countries. From the experience of quality management, the diffusion of TQM and ISO 9000 has been largely driven by institutional forces

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despite the arguments suggesting that both will provide a resource for firms to improve their performance. This means that firms adopting TQM because of external forces rather than their perceived benefits on TQM (Westphal *et al.*, 1997). The institutional forces come in the form of coercive pressures, mimetic pressures and normative pressures. For example, certain customers (most of which are big and multinational firms) have demanded their suppliers to establish TQM program or alike or being certified to ISO 9000. The mimetic pressures is a big phenomenon arouse during the quality movement era in the 1990s where many companies join the bandwagon of adopting TQM due to “success stories” of firms who claimed significant benefits from implementing quality management practices (Powell, 1995). Normative pressures are belief that TQM or ISO 9001 will enhance their reputation in the customers’ or competitors’ perception, hence, serving as an effective marketing or public relation tool (Buttle, 1997; Huarng *et al.*, 1999).

There are two points of concerns when firms adopting quality management practices because of these institutional pressures. The first issue is half-hearted implementation approach. This has been widely recognized among ISO 9000 certified firms where they simply pursue the “rubber stamp” rather than the real benefits, causing lots of disillusion among the adopters who fail to realize the expected benefits. Whilst literature has blamed ISO 9000 (in particular) as failing to deliver its promises, it is easy to predict that institutional-driven adopters will take a minimum effort to have the certificate hung on the wall of the office rather than exploiting quality management system as a resource to build effective operations. In this way, although the adoption of TQM (or SS) may not provide an organization with substantial operational benefits, the claim that the firm has implemented TQM or SS is expected to confer legitimacy on the

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organization. How this legitimacy will last is another question, and how much this legitimacy is valued by customers is yet to be evident.

Secondly, firms driven by mimetic pressure will focus on the “tangible” aspects of TQM or SS, namely the tools and techniques whose knowledge can be codified. Whilst understanding the basic concepts of these tools and techniques is necessary, it is not sufficient to obtain benefits from them. The use of tools and techniques need another type of knowledge, tacit knowledge, which can only be gained through learning experience, hence, far more difficult to be shared and transferred (Nonaka and Takeuchi, 1995). Therefore, jumping to the bandwagon, and relying on others’ experiences (although it could be useful in certain extent), and assuming SS program as a “ready mix” package could lead to disillusion as different situations would produce different results (Antony, 2004).

In conjunction with this, institutional motives will drive firms to adopt TQM as a package and rely on the codified knowledge which has been widely disseminated based on the experience of the early adopters (e.g. textbooks, seminars, conferences, training, etc.). In this way, firms will attempt to swallow the “whole lot” of the package rather than selecting and adapting specific tools or practices which can be effectively used to realize their organizational goals (Westphal *et al.*, 1997). The pressure to implement “all or not at all” was very strong, and this can be traced back to the fact that TQM was introduced by different gurus in the form of a set (or package) of tools and practices (Dow *et al.*, 1999). For those which are driven by institutional motivations, they will likely to buy this strong recommendation that TQM or SS ‘package’ needs to be adopted ‘as a whole’ rather than “piecemeal” (i.e. selective) basis. As such, firms driven by

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*mimetic* pressure will likely to adopt what has been codified and disseminated publicly as a “one size fits all” package. The study by Dow et al. (1999), however, has exploded this myth suggesting that despite this well-known suggestion, organizations can implement selected elements of TQM according to their needs and yield satisfactory benefits from them.

## Conclusion

In outlining the issues above, this paper does not take a stand against SS. There are enough and compelling evidences that SS does produce results. However, for whom and in what conditions SS will effectively work is something that firms cannot take for granted. On top of the above issues, there are several challenges need to be overcome in disseminating SS, few of which are outlined below:

- Can we rectify the bad names of TQM? How can we heal the trauma of TQM failures?
- How can we help organizations to prevent them going through the same paths (i.e. mistakes) which have led to TQM failure?
- How to answer the difference between TQM and SS? Shall we insist that the two are different?

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