TQM in IS?: The Case of a Government Agency in Singapore

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Abstract

In recent years, there has been an increasing push into electronic services by governments worldwide. In turn, this has new implications for the information systems (IS) functions residing within various government authorities and agencies. In particular, such government bodies are now very concerned about their IS related budget justifications and the associated quality of public services provided. Based on the literature, we begin our study by exploring the implementation of Total Quality Management (TQM) initiatives within a major government agency in Singapore. By analyzing the empirical data collected, we assess the project implementation impact of established TQM concepts on the longitudinal process of realizing the business value of IT. In particular, we discover the importance of multi-level leadership in facilitating the successful implementation of such TQM initiatives. We conclude with a proposed conceptual framework to guide future research in this area and with implications for practitioners.

Keywords: Total Quality Management (TQM), Information Systems (IS), Leadership, Business Value of IT

Introduction

The global environment today is characterised by rapid and unrelenting change, and many organizations are using information technology (IT) as a key enabler in helping them respond nimbly in the rapid changing environment. The focus on the provision of one-stop services through cross-agency linkages is especially profound among government authorities and its agencies. For example, the Singapore Government has seen through five National Infocomm Plans during the past 25 years and is currently on the sixth, namely the iN2015, a 10-year (2006-2015) masterplan to reaffirm the strategic role that information and communication technologies (hereinafter referred to as “infocomm” in short) will play in achieving the vision of an intelligent nation, a Global City. It will leverage such technologies for innovation, integration and internationalisation. Encompassing similar aspects, the iGov2010 vision is to be an Integrated Government (iGov) that delights customers and connects citizens through infocomm (Singapore eGov 2007).
Consequently, an important implication for information systems (IS) functions in organizations is that they can no longer regard systems building as their only role and major contribution to organizational productivity. IS departments are learning that besides their traditional responsibilities, organizations are now increasingly relying on them to support business strategies and provide value-added services. As such, the IS function has to examine how it can increase the quality of its services to enhance the socio-technical experience that will increase end-users productivity and consequently that of the organization (Watson et al. 1998). Following increasing reports of total quality management (TQM) success stories outside the manufacturing sector, many IS functions are starting to explore TQM as a suitable strategy in IS quality improvement.

Given the elusive evidence of the positive impacts of IT on organizational performance, IS functions in organizations have faced constant pressure to justify their budgets. Similar to IT investments, the impetus for a TQM program is its potential to create value for the investing organization and ultimately improve its performance. In our study, we seek to explore the possibility of applying TQM concepts to IS functions to help organizations maximise the business value of its IT investments. Considering that in the literature, there has been a constant preoccupation with how to implement TQM, and the associated problems of supporting new TQM strategies (Band 1991, Barclay 1993), we focus our study on how TQM can be successfully adopted in IS functions.

**Literature Review**

**TQM Implementation Frameworks**

Organizations have met with varied levels of success in their efforts to implement TQM. Yusof and Aspinwall (2000) suggest that this may be due to the absence of information regarding the different components of TQM and how to implement it. The need for an implementation framework is elucidated by Glover (1993) who notes that many organizations do not actually understand the complexity of organizational change and innovation brought about by TQM initiatives and it is only appropriate that a sound implementation framework be developed before actual implementation to ensure a successful adoption of TQM. There are numerous different implementation frameworks and models proposed by researchers, consultants and experts in the field but they can generally be classified in three broad categories (Yusof and Aspinwall 2000), namely, consultants/experts based, academic based and awards based.

Consultants/experts based frameworks are those derived from personal opinion and judgment through experience in providing consultancy to organizations embarking on the TQM journey. Prominent examples include Deming’s (1986) 14-points for management and Crosby’s (1979) 14-steps quality improvement programme. Academic based frameworks are those developed by academics and researchers through their own research and experience. Awards based frameworks are tools used by organizations to assess their progress towards TQM adoption. The current three highly recognized quality awards are the Malcolm Baldridge National Quality Award (USA), the Deming Prize (Japan) and the European Quality Award.

In the IS context, extant literature addresses the individual components of IS quality including application development process quality (Ravichandran and Rai 1999, Jovanovic and Shoemaker 1997, Cortada 1995), IT operations quality (Cortada 1995), data quality (Nelson 2002), and service quality (Pitt et al. 1995). There also exist holistic approaches such as the integrative framework for IS quality proposed by Stylianou and Kumar (2000), which introduces six dimensions of IS quality and their relationships with various stakeholders. Awards based frameworks such as the ISO 9000 standards have also been discussed in providing quality assurance in the software development process (Jovanovic and Shoemaker 1997). Dean and Bowen (1994) provide an account of the principles, practices and techniques associated with total quality and explore the relationship between the principles of total quality and those of management theory using the Baldridge criteria which are based on a weighted score of seven categories of performance. They are leadership; strategic planning; customer and market focus; measurement, analysis and knowledge management; human resource management; process management; and business results. We shall base our discussion on TQM concepts using this set of criteria as it addresses the principal domains of TQM and is not limited to a single quality perspective (Deming 1986, Juran 1988), but rather it incorporates a diversity of viewpoints. We shall exclude the business results category in our study as it is simply an assessment of effectiveness.

**TQM in IS?**

The fundamental role of IS in most organizations is that of a service provider. The services that IS provides are essentially intangible and unlike physical products, its quality cannot be seen or touched, but only experienced (Pitt et al. 1998). One major category of service quality research concerns the evaluation of service quality. Research in this area typically uses the gap model (Parasuraman et al. 1985) or a highly popular instrument, SERVQUAL (Parasuraman et al. 1988). Valuable in assessing service quality from the user’s perspective, these models however do not prescribe ways to assist IS in achieving
service excellence. Plugging this gap is the increasing amount of literature in identifying the critical success factors of IS quality. In particular, a rising trend is the application of TQM practices in the IS function (e.g. Stylianou and Kumar 2000, Ravichandran and Rai 1999). Originating in the manufacturing environment with the emphasis on producing products with “zero defects”, TQM has gone beyond focusing on better products and embraced management and organizational elements and incorporated a wide range of quality strategies such as customer satisfaction, competitive benchmarking, fact based management, and employee empowerment. There is no perfect consensus in terms of the key concepts of TQM, and various TQM proponents may emphasize different features. Nevertheless, TQM’s overriding objective is to improve the processes within an organization and the organization’s ability to meet customer demands by emphasizing continuous quality improvement.

Leadership seems to be the fundamental enabler driving all the rest of the TQM concepts under the Baldrige criteria. The long history of research found in literature on leadership highlights the importance of leaders in many social settings, including countries, organizations, and teams. In classical management theory, it is argued that there should be a single chain of command within organizations and that every individual should have one, and only one, boss. As explained by House (1970), adherence to a single chain of command ensures that there is only one person to whom each organizational member reports and from whom the individual takes orders, which consequently increases managerial control and reduces role conflict experienced by subordinates. Current models on TQM place high emphasis on senior leadership. In fact, the prestigious European Quality Award recognizes senior leadership as the fundamental driving force in a TQM application (Campbell et al. 2002). It is through leadership driving policy and strategy, people, partnerships, resources and processes, that excellence in performance is achieved.

As such, it appears that potential business value in major IT project implementations may be more effectively realized through the application of TQM concepts with effective leadership playing an important facilitating role in overcoming “conversion contingencies” (Chircu & Kauffman 2000; Davern & Kauffman 2000)

Research Study

Research Site

This paper reports on a field study in a major government agency in Singapore. Established in 1955, the agency provides a social security savings scheme to its members, which includes the employees and self-employed people in Singapore. Jointly funded by employees, employers, and the government, the social security system has consistently been rated as one of the best in the world. The agency’s strength lies in its strong quality and customer service culture thus gaining recognition as one of the leading customer-oriented organizations in the public service. Responding to quality campaigns since 1990’s, it has achieved numerous awards including the Singapore Quality Class, ISO 9001:2000 certification, and more recently in 2004 the prestigious Singapore Quality Award, Singapore’s equivalent of the Malcolm Balridge National Quality Award. The agency relies very heavily on the use of IT for its daily operations. Its IS functions, under its Infocomm Technology Services Division (ITS), takes up a sizable portion in the entire agency, with around 300 employees under six departments consisting of applications development services, operational support, and quality assurance on the division’s processes and products. The quality concept, started as ITS’s software development process, was consequently solidified as the foundation for its continual total quality efforts.

Research Questions

To explore the total quality initiatives in ITS, this study addresses the following research questions:

1. How can TQM be successfully implemented in the IS functions of an organization?
2. How can TQM concepts help organizations to maximize the business value of IT?

Research Methodology

This study was conducted from May 2004 to August 2006 with a two-month immersion at the agency. Much of the immersion time was spent in the Quality and Security Administration Branch (QSA) in ITS. At other times and during follow ups, interactions with other divisions and the ITS headquarters contributed significantly to the sources of information. Altogether, 28 pre-arranged formal interviews were conducted on a face-to-face basis. Interviewees consists of the CIO of ITS, 1 senior deputy director, the assistant director in charge of QSA, 1 assistant director in charge of an application development department, 5 managers from 3 application development departments, 9 senior IT consultants and 10 IT
consultants from various application development departments and the QSA. The senior staff were selected for the interviews based on their position while the IT consultants were selected at random within the targeted departments. Using a basic set of interview questions, the interviews proceeded in a semi-structured manner. Conversations were not restricted to pre-drawn questions and upon relevancy in responses, impromptu questions were also frequently asked to solicit further opinions to build up depth in the answers. After each interview, the dialogue was transcribed and verified by the interviewee to uphold accuracy. In addition, rich information was also drawn from informal sources such as conversations held over breaks and meals. Secondary information was also gathered from minutes of meetings, presentation slides, newsletters, reports, plans and other documents pertaining to the quality initiatives. Access granted to the agency’s intranet provided information on events that took place before and after the immersion period. Searching and analyzing of secondary information was focused on scrutinizing and counter-checking of accuracy on information derived from interviews, chats and observations.

To analyze the data collected, qualitative analytic coding of Emerson et al. (1995) was employed for the analysis of fieldnotes and interview transcripts. In particular, open coding was used in the initial phase of the study, followed by focused coding in the later stages. The final step involved reflecting on the data collected and themes identified, which provided the premise for our eventual findings.

Research Findings

Influence of TQM

Initiated by the CIO of the agency, interest in strategic planning led to the formation of the Strategic Planning and Innovation Unit. As pointed out by an assistant director on their strategic plans and visions,

“We started planning early and strategically, by the end of 2010, our wide range of high quality electronic services will be available to our users anytime, anywhere in the world.”

The unit is now responsible for setting policies and standards for the agency’s technical architecture and IT governance, and for continuous explorations on the needs of ITS customers as well as on technology trends. In so doing, the information derived from these activities could be meaningfully used in strategy development. For example, two officers involved in the process of strategy development discovered the potential value of mobile phone services through their sensitivity to the changing needs of their customers and also to the shifts in market demands and technology. Following this observation of the customers’ growing attachment to their mobile phones and the growing importance of mobile commerce, this information led to the development of a new strategy in launching a project on providing mobile services.

Similar to strategic planning, the interest in having a customer and market focus in ITS had been to a large extent influenced by activities initiated at the organizational level. In an effort to inculcate in its employees the value of a customer service mindset, the agency’s senior management adopted a variety of techniques mainly in the form of programmes and initiatives. One major initiative was an organizational-wide systematic and structured training programme, whose purpose was to ensure that all staff adopted a customer-oriented mindset and were passionate about providing their customers with the best service. The interests of senior management in adopting a customer focus were also frequently inscribed into verbal speech and into writing. The mediums utilized to communicate their beliefs were usually meetings, informal sessions, and newsletters. Moving down to the divisional level, the CIO (through the strategic planning and innovation unit mentioned earlier), discovered the potential value in modifying the computer systems in 2003 to improve the overall performance on the electronic transactions. The exploratory approach used was explained by a senior IT consultant from the unit,

“...we do our own exploration on technology via newsletters, networking with friends from other organizations... and when users have ideas, we tap in, and the ITS account manager will help them to think through the ideas...”

Following the successful ISO 9001:2000 certification, the issue of measurement received heightened awareness and importance in ITS. More importantly, performance measurement was crucial in determining if ITS had met its many performance targets established during the planning stage. Specifically, as mentioned by an assistant director from ITS, management was interested in knowing “... have we improved over the years?” Management believed in the importance of measurements in enabling continuous improvement. However, the quantity and more importantly the quality of measurements was sorely lacking in ITS. A manager cited “...lack of expertise” as a major obstacle. Indeed, partly due to the intangibility of the services ITS provide, there was little help they could get from the industry as well as literature. A senior deputy director asked, “If there was any “magic solution”? and a manager wondered, “...are there better ways that can be adopted for such an evaluation?”

Among these observers on the lack of IT measurements was the CIO himself, who sought to address this problem by enrolling QSA into initiating a year-long IT measurement project that began in 2004. According to the CIO, the objective of the measurement program was, “...to look at the cost and productivity after projects have been implemented. Have there
been any improvements in people productivity and cost effectiveness?” As pointed out by the head of QSA, senior management was generally concerned with metrics that provide a macro perspective on the business value of IT and the justification of IT budget. Middle management on the other hand was concerned with the cost of implementing the measurements and the level of support it offers to the users. Staffs at the operational level generally preferred metrics to be less tedious and easy-to-use. IT strategy and planning, in alignment with the overall agency’s strategic plans on cost effectiveness, becomes a crucial role in converting the identified potential value into reality.

Underlying the concept of human resource management is the belief that employees who are able to develop and use their full potential can achieve high performance in alignment with the strategic direction of the agency. To successfully get the employees to agree and act in accordance with this belief, senior management ensures the provision of sufficient resources with which to develop the employees’ potential and consequently building the belief in them. The resources provided were mainly training courses, both work-related and non-work-related. Courses not related to employees’ functional work area focused on creating an innovative and creative mindset, deemed by the initiators to be necessary in preparing the agency for the new economy in the 21st century. In addition, various reward schemes were also put into place including performance bonus, staff excellence awards, innovation fund award. Indeed, employees in ITS were so well-versed in these innovation techniques that they used them frequently to realize value of their projects, as reflected in the following comment,

“We are so used to the WIT [work improvement team] concept that staff automatically use PDCA [plan-do-check-act] to implement work projects as well as in solving problems”

Since the successful ISO certification, the CIO never ceased to be involved in and continued championing total quality practices in ITS. The CIO was very well-aware that the sustainability of quality practices is to a large extent determined by the internal motivation of his employees and the management and alignment of work procedures play a crucial role in the process. He continued to mobilize his network by generating quality awareness through the intranet bulletin, newsletters, and face-to-face sessions with ITS staff. The establishment of the Quality and Security Administration branch, whose mission is to “apply the latest knowledge in our fields of specialization to continually improve quality standards in ITS”, is yet another powerful message the CIO sent to his staff about his clear and unwavering commitment towards quality excellence in ITS. Reflecting on the past, a senior deputy director pointed out:

“Initially, ISO received a lot of user resistance because it involved a lot of documentation, but they [users] soon saw the benefits when they find it easier to search for the documents.”

“We [management] try to tell them [employees] that the quality standards should not be seen as so much of an overhead… they serve as an important form of communication”

This is echoed by comments from staff members: “ISO was a hassle sometimes, but now I think the [ideas of] documentation is good, because it reduces communication, and so improves the quality.” In essence, they were convinced that the idea of a managed process facilitated them in realizing value of their IT projects.

Influence of Leadership

Our research findings interestingly revealed that one very common and effective strategy used by the leaders at the higher levels of the organizational hierarchy in engaging their staff was the use of informal approaches such as newsletter stories, e-mails, face-to-face interactions rather than circulars and directives. As noted by Valikangas and Okumura (1997), the nature of strategic leadership is mostly one of indirect contact with the majority of subordinates, and therefore, the CIO must rely on means that create desirable organizational conditions that institutionalize his beliefs over time. On the other hand, the leadership role within ITS was not the sole responsibility of the CIO as can be seen clearly from comments of people below him in the organizational hierarchical structure, for example, a senior IT consultant within the Strategic Planning and Innovation Unit was clearly assuming a leadership role when speaking of “To me, it is like having a child….planning how to bring her up to become a successful adult” and so was a senior deputy director quoted above in pointing out “We (management) try to tell them (employees)….”. A unit director was more specific in saying “we lead by applying our latest knowledge in the field of IS quality to continually improve quality standards in the ITS”.

This observation of “multi-level leadership” is interesting as it contrasted with that of the traditional thoughts of leadership as a single boss. Persons at different levels appear to be taking leadership responsibilities depending on their knowledge, skill or ability as the situation may require (Pearce and Conger 2003).
Discussion

Our findings above revealed that each key TQM concept has in one way or another and at different stages contributed to the realization of IT business value. On the other hand, the leadership roles were shared at multiple levels—which is different from the traditional idea of leadership being concentrated in a single person or an elite group of persons.

From Potential to Realized Value: The importance of TQM

Based on our findings, it appears that a strategic planning approach and a focus on the customer and market aided ITS in discovering the potential value of IT. The TQM concept of measurement, analysis and knowledge management facilitated IT strategy and planning at the strategic level; while appropriate management of its key processes and human resources in particular helped ITS to successfully realize the value of its IT projects.

In establishing the process for strategy development in ITS, the CIO established the strategic planning and innovation unit, which provided rich information relevant towards strategic planning in ITS. Consequently, this unit became one of the vital sources for the discovery of potential value as exemplified by the mobile services project. Our findings also showed that a commitment to satisfying the demands of customers led to the discovery of areas for improvements in IS processes. We also noted the crucial role of measurements in IT strategy planning. It is impossible to plan and decide on next year’s goals and performance targets unless existing performance can be measured to provide a baseline from which future targets could be established. Following the implementation of the process management tool under ISO standards, employees learned that, through a controlled and structured process management approach, they were in a better position to realize potential of the IT projects they were involved in. In addition, employees were able to utilize the skills from the various training programmes and innovation sessions in realizing value in their daily work activities and projects.

Facilitating TQM in IS: The importance of Multi-level Leadership

We have noted earlier that leadership responsibility was actually shared at multiple levels among many individuals or units rather than concentrated at the CIO or in a single chain of command. In a knowledge intensive society, it is simply impossible for management to lead everything from the top, necessitating the delegation of leadership roles to those who have the know-how - thus resulting in the emergence of multiple individuals who become leaders in their own right as a result of their knowledge, skill and ability (Pearce and Conger 2003).

Leadership during the implementation of TQM in ITS appeared to be dispersed at the strategic, tactical, and operational levels. Our research findings show that strategic leadership was not only confined to the CIO but also included various management staff throughout the whole organization, all of which contributed to the success of the TQM program in ITS. Senior management mainly led in initiating each TQM concept and in the provision of desirable resources and conditions to accommodate total quality practices. In this regard, the establishment of two units, namely the strategic planning and innovation unit and the QSA, facilitated the implementation of total quality in ITS, through the knowledge and effort they provided to the strategic leaders. As such, the two units had assumed a tactical leadership responsibility in transforming the ideas and beliefs of the strategic leaders into concrete action-plans. During certain periods of time, these tactical leaders too adopted an operational leadership role, by implementing the action plans, as can be observed when QSA undertook the measurement project and sought to operationalize it. In addition, employees at the operational level also led in stabilizing the networks that they participated in. For example, employees who were initially reluctant to adopt the ISO standards were subsequently won over by the increased efficiency it brought to their work activities and consequently became “delegates” for the project. In short, different leaders led at different levels in different time periods with different foci of action.

Proposed Conceptual Framework

Based on our findings and discussion above, we propose a conceptual framework for realizing the business value of IT (Figure 1), taking into consideration the key observations that emerged. In particular, the implementation of the various TQM concepts were led by leaders distributed at various organizational levels. Furthermore, each TQM concept holds potential in helping organizations maximise the business value of IT. In particular, we discussed how strategic planning and a focus on the customer and market enabled the discovery of potential value. Subsequently, the quality concept of measurement, analysis and knowledge management facilitated the IT strategy and planning process. Finally, a well-defined process management approach and human resource management were vital in realizing the potential value through implementing the IT projects.
Often, the realized value is not the same as the potential value since problems are likely to occur during project implementation, reducing the degree of success (Chircu and Kauffman 2000). Thus, the proposed framework may help to minimize potential value lost through identifying the key concepts of TQM which may help organizations identify potential value of IT, execute appropriate IT strategy and planning, and then effectively implement projects to maximize realized value.

![Proposed Conceptual Framework](image)

### Conclusion

**Contributions**

This study makes several contributions. Firstly, in the literature, there has been a constant preoccupation with how to implement TQM, and the associated problems of supporting new TQM strategies. In this regard, our study on the implementation of TQM in the IS function offers additional insights to extant literature. Secondly, considering the relative "novelty" of TQM in the IS arena, our study contributes to the scarce literature available in addressing the IS-specific TQM implementation issues in organizations. For practitioners, our case study offers an “inside” view on how a major government agency has successfully implemented TQM not only in its IS functions but also throughout the whole organization. In this way, we offer useful information about a very comprehensive real-world TQM implementation as well as provide unique perspectives from the various stakeholders involved in the successful project. A limitation of this study relates to the generalizability of the findings to other settings due to its government and Singapore context. Interested researchers may thus wish to explore the applicability of the framework in other settings.

**Implications for Research**

It is relatively easy to inspire stakeholders at the onset of a business initiative but sustaining commitment and motivation over time is more problematic. Since the essence of successful TQM programmes is continuous improvement over time, sustainability becomes a critical factor. In this regard, a possible research focus for future researchers interested in TQM in IS functions is to examine how TQM can be effectively sustained in the IS function.

Another possible area for future IS research is in the study of TQM in other environments such as the IS functions in private organizations or in other industries. Differences between private and government organizations have been noted in the literature (Bretschneider 1990). Differences have been found, for example, in personnel management, decision making, and information systems. For this reason, research in other environments may present a different set of findings and offer fresh insights into this rising phenomenon of applying total quality practices in IS functions.
Implications for Practice

TQM has proven very successful in numerous companies such as Motorola and Xerox, but the many failures and false starts (Greising 1994) show that the TQM concept is not easily mastered in practice. Even though the overall adoption of TQM concepts has been successful in the ITS of the agency that was studied, we still observed a handful of stakeholders who are not really ready to embrace the philosophy and practices of TQM. A senior IT consultant’s perception of “widely used in industry, doesn’t mean will apply well in [our agency]’s environment” suggested that the implementation of TQM should not be done in a “one size fits all” manner, because of the inherent differences between organizations or industries. One individual in a customer survey challenged ITS’s diligence to quality work with “Many problems were reported years ago but still not resolved today”. Practitioners should therefore note that the application of TQM concepts will require a simultaneous awareness of the profile (e.g. strengths and weaknesses) of the IS function as well as the environment (including the organization and the market or industry). This study suggests that the informed IS practitioner should tailor and integrate the various TQM concepts into the IS function, rather than to simply overlay it without due consideration of the unique contingencies that could hinder the TQM project.

References


