



A framework for connection between Total Quality Management and Innovation Processes

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Abstract. A comprehensive conceptual framework has been proposed in this study to investigate the connection between the total quality management and innovation. In order to clarify the gaps of this study, a wide-range literature have been reviewed in different dimensions of TQM. Initially, this study proposes that the exterior and interior environment will influenced the implementation of TQM approaches. Then, a developed model of TQM performed is then reflected in terms of several outcomes depending to innovation performances.

Keywords: TQM (Total Quality Management); Innovation processes; connection

1. INTRODUCTION

Total Quality Management (TQM) is one of the outstanding advances in the management. Around 1980, as the feedback to severe concerns from various firms TQM start to be emerged in the US. Recently, most of manufacturing firms have notified the identification of TQM as a reasonable benefit. Furthermore, innovation plays a prominent role in securing the sustainable benefit in the recent bazaar (Tushman, M. and Nadler, D. 1986). Accordingly, this study attempts to investigate the connection between the TQM and Innovation performance.

Three bases are considered in this study: to determine the practicability of TQM as a sources for innovation, to shed light on competing accounts of the connection between innovation and TQM, and to investigate the role of TQM regards to innovation. Moreover, this research proposes an estimation of the necessity for using TQM in management. Basically, it has been approved that the effective utilization of TQM will have viable advantages. Nevertheless, by changing the market, it is predictable that the foundation of challenge will be varied according to the primary criteria and basically innovation taking over as “winning order regulation” (Bolwijn, P.T., Kumpe, T., 1990). Although several studies have been conducted on TQM, only few of them have been focused on investigating the connection between innovation and TQM. The relationship between the TQM and innovation performance has been examined in this study. Therefore, the following objectives are introduced for this research:

1. To examine the connection between TQM and innovation,
2. To compare and investigate the stability of this connection,
3. To analyse the connection between TQM and innovation.

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TOTAL QUALITY MANAGEMENT

During the past five years, several studies have been done to clarify the concepts of TQM. By using the TQM the organization involved in a conjunction of belief. They include the nonstop enlightening processes, gathering customer requirement, reducing the rework, developing employee participation, restructuring procedures, increasing handier link with suppliers, evaluating the outcomes and directing logical benchmarking. The TQM supporters demonstrate that the companies that exert it completely make numerous advantages including developed outcomes, less costs, increasing the satisfied customers and employee, and increasing the quality of financial performance (Prakash J Singh is and Alan J.R. Smith 2010).

Based on the literature review, TQM is a interminable performance improvement. Accordingly, for developed performance, people need to recognize what and how to implement it, to have suitable devices to do it, to be expert in testing the performance and to receive feedback on levels of performance. The following principles have been suggested by TQM (Kanji & Asher, 1993).

- Satisfy the customer;
- Administration by fact;
- People-based management;
- Nonstop progress.

Each of the aforementioned principles can be used to develop the process. To this end, there are some concepts in order to transform the each above value into innovative ideas. These concepts are as follows:

- Client pleasure;
- Interior costumers are actual;
- All work is a subject;
- Evaluation;
- People make excellence;
- Consecutive development process (Gopal K. Kanji 1996).

2. TQM APPROACHES

The approaches of TQM have been formulated by the association of quality management e.g. Juran (1988), Crosby (1979), and Deming (1986). These frameworks have made the fundamental concept of the next studies in the field of TQM such as Kaynak, (2003), Flynn, et al., (1994), Powell, (1995), Saraph, Benson, & Schroeder, (1989). Furthermore, the awards and certificates of marketing such as MBNQA and EFQM have been affected by these frameworks.

Saraph et al., (1989) have proposed the first framework to improve the measurement of TQM approaches through the experimental study. They gathered their data through a comprehensive literature review by contributing of twenty companies in order to propose the eight TQM developed approaches. They are represented in Table 1. Moreover, the connections between the various approaches together with the link among the other management area have been investigated in Saraph et al., (1989) study.

Flynn et al., (1994, 1995) have conducted another research on TQM approaches. They proposed eight developed method for TQM approaches for measuring manufacturing plant level. They have a few similarities with Saraph et.al. study. Both of these frameworks have a major role in academic environment. Particularly in developing a comprehensive model in

analyzing the link among several types of QM approaches. Nevertheless, there are a few differences in these two researches. For example, the vision and awareness of the labors in the plants are considered in Flynn and their colleagues study to propose their developed framework. Also, Saraph et.al study has focused based on the literature and Flynn has conducted his research based on experimental sources from industry.

In 1987, another TQM approaches have been developed based on the regulations of the excellence business award (MBNQA). These practices have been introduced by the National institute of Standards and Technology (NIST, 2012). According to these approaches the criteria for award has been developed to calculate the degree of QM practice. These practices are useful for both manufacturing and services organization.

Seven criteria have been employed by MBNQA awards to evaluate the quality performance of any organization. A few examples have been illustrated in Table 1.

Table1. Samples of TQM Practices.

Saraph et al. (1989)	Flynn et al. (1995)	MBNQA (2007)
Employee empowerment	Supplier connection	
Quality division	Work tendencies	Planning
Training	Workforce management	Workforce focus
Preparing the report for quality	Statistical analysis & preparing control report	Analysis of information
Management of performance	flow management	Management of performance
Management of quality of supplier	Customer relationship	Power of market
leadership	Top management	Leadership
Measurement control	Product design	Business

3. INNOVATION

Based on Chambers Twentieth Century Dictionary 'innovative' means

- To present something new;
- To present novelties;
- To cause variations.

Current researches have specified that some of the advanced work has been advanced by:

- Dropping the concept-to-market sequence;
- Decreasing the design-to-manufacturing sequence;
- Replying to technological deviations;
- Replying to market variations;
- Challenging and collaborating instantaneously;
- Stimulating administrative training;
- Evolving and revising central capability;
- Pursuing novel business chances;
- Incorporating a diversity of original technologies, etc.

Yet, with the aim of comprehending the innovation and total quality management (TQM) process, we will contemplate the following chief groups of origination. Procedures innovation_ development in the process for product manufacturing, e.g. decreasing in cycle time or discount in the number of process stages. Request innovation_ the submission of current or novel thoughts or the growth of novel methods of original design concepts, e.g. inexact reasoning founded pattern appreciation, unsure logic regulator of spontaneous washing machines. System origination_ a novel system to assimilate a diversity of subsystems, concerning product, process and request novelties, e.g. in a system the electrical subsystem, the control subsystem and the computer subsystem were united to make a novel joined electrical (control) computer system. Central ability innovation_ design, creation examining and manufacturing innovation wanted to attain ability novelty, e.g. the growth of micro-controllers for usage in industrial businesses, electrical applications, information processing, vehicles, etc.

Horizontal allocation innovation_ achieved by presenting numerous novelties in presentation parts, by straight handover to central competence (Saraph et al., 1989).

4. THE RELATIONSHIP BETWEEN TQM ACTIVITIES AND INNOVATION PERFORMANCE

In the literature, the studies which show the connection between TQM and innovation are rare. They just focus on the blended relationship. Its reason may be due to the existence of different types and dimensions of TQM and various forms of innovation. The foundation of competitive profit, in the current business market, is changed to a higher level such as innovation. Innovation assists organizations to protect their products from insecure circumstances and let them to adapt themselves to the fluctuations happen in the market. The level of incomes and business section of companies which utilized innovation have been increased greatly. Since TQM is an appropriate method of developing quality and innovation process together, the companies that aims to be prosperous in innovation need to produce products with quality standards. Reviewing the previous studies demonstrated complicated and incompatible results. Some studies indicated a negative relationship between TQM and innovation while others showed a positive connection between these two concepts. These findings can be related to the characteristics of these two constructs which are multidimensional. Management leadership, customer orientation, and unceasing development are the positive features mentioned by researchers who advocate the existence of positive relationship between TQM and innovation (Tan, 2001). However, those who claimed that the link between these two concepts is negative focused on the interference of creativity because of the implementation of standardization. According to Miengo et al (2009), the TQM features are categorized into two groups. They indicated the connection between innovation and organic features of TQM (e.g. management leadership). Through applying leadership, employees will be motivated to discuss about their innovative opinions, solve problems, and expand the novel products. Other researchers demonstrated the positive relationship between innovation and customer orientation as another feature of TQM. By paying attention to the customer orientation, companies can achieve the recent needs of customers continuously and survive in the competitive market. Moreover, the constant development as another feature of TQM is significant in the attainment of innovation. It stimulates the creative thinking in coordinating works (Costa, Lorente, 2008). Hence, according to Sadikoglu and Zehir (2010), there is a significant positive link between the features of TQM and innovation. Hung et al (2011) conducted an empirical study on the connection between TQM and innovation. Their findings verified the positive relationship between these two concepts.

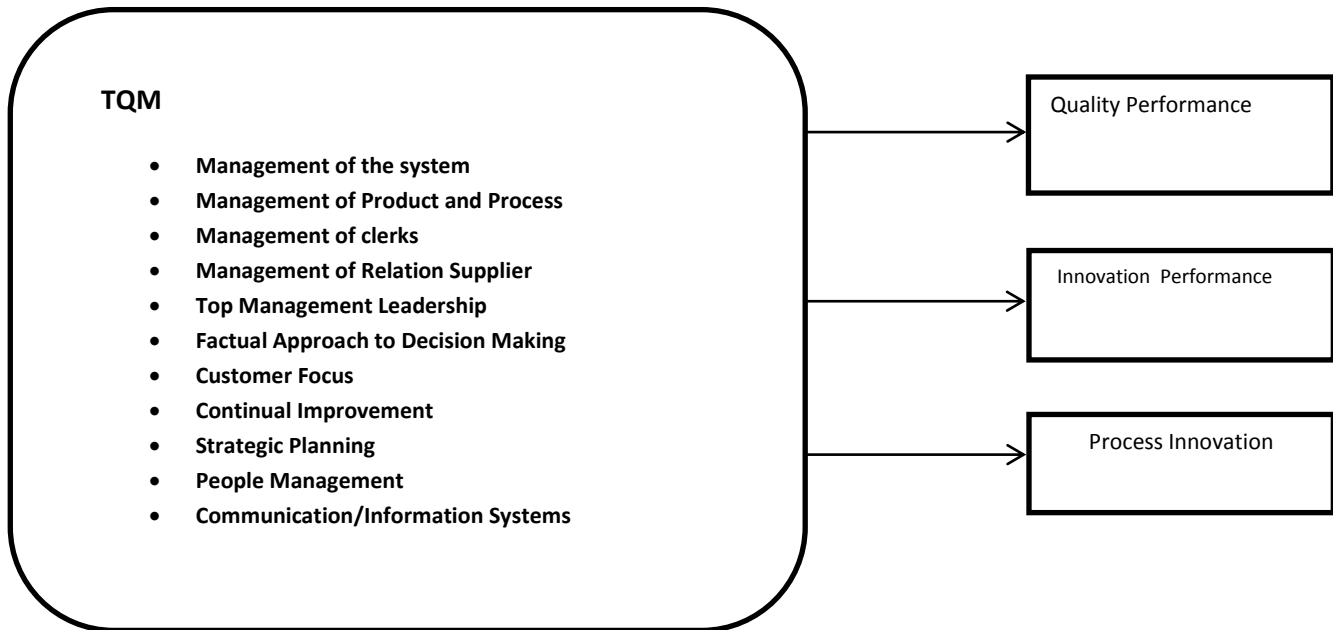


Figure 1. Conceptual Model.

5. LITREATURE REVIEW

The positive connection between the innovation and total quality management were represented in the literature review. Therefore, it is essential to understand the concepts of TQM and innovation. TQM is a general definition and there is not a specific and uniform explanation about this concept and this causes several challenges in defining TQM. Therefore, it is very important to define a clear border in order to distinguish the process whether they are related to the TQM or not. Based on the literature review, the scopes of TQM for a few studies have been illustrated in the following table. The authors and their difficulties are represented in table 2.

Table2. Definition of Authors and Problems.

Authors	Problems
Lau and Anderson (1998)	“What is TQM?”
Dean and Bowen (1994)	Establishing a clear-cut bounding to distinguish “TQM” from ”not TQM”
Hack man and Wageman (1995)	Certain description for “TQM”
Plenert (1996)	What is belong to “TQM “and what does not?
Lau and Anderson (1998)	Various definition of “TQM” from different perspectives

Finally, the link between the TQM and innovation has been discussed deeply in this article. Also, the different visions about this subject will be introduced in this article. Consequently, this study search to remove this discussion from a theoretical outlook, commonly we can do that with regarding into the significant progress of research for probing the link between TQM and Innovation.

6. SUPPORTIVE ARGUMENTS OF THE AFFIRMATIVE LINK BETWEEN TQM AND INNOVATION

The firms which are utilizing TQM are potentially ready to develop the innovation in their systems. This happens because of the compatible principles of TQM with innovation. This comment has been suggested with studies that believe the affirmative link between TQM and innovation (Mahesh, 1993; Dean and Evans, 1994; Kanji, 1996; Tang, 1998; Roffe, 1999). Therefore, the organizations try to develop and create new services or products to reply the need and expectations of their client based on the principle of customer. Also, introduce the new stuffs according to the changing of market's needs (Juran, 1988). Customer orientation proposes the significant of gratifying clients. Thus, the manufacturer not only should consider the initial requirement of their clients but also should produce more creatively to overpass the customers' expectations. Indeed, this is an innovative strategy. Thus, this unceasing development will encourage the creative thinking in handling and organizing a system (Hoang, D. T., Igel, B., & Laosirihongthong, T. 2006).

The results of implementing the innovation management (Zairi, 1999) in several organizations and companies in the world level such as IBM, 3M, Ford, AT&T, Rover Group, Hewlett Packard, Rank Xerox, Kodak Ltd and D2D represents that the approaches are well identified as TQM principles. Among them it can mention the "learning organization", "quality culture", "customer-driven organization", and "continuous improvement" as TQM practices. Furthermore, a wide range of quality tools are comprised in these practices. These tools are including the Taguchi methods, quality function, statistical process control, design of methodology, benchmarking, seven problem solving, ISO 9001, six-sigma, employee and involvement, seven planning tools, multifunctional teamwork, failure mode and effect analysis, and supplier partnership.

The positive connection between TQM and innovation performance is supported by several experimental researches. For instance, in 1994 Flynn with their colleagues provide a report to represent the connections between the velocity of product innovation and quality management. Based on their results, they proposed that there are considerable discrepancies for different types of speed of product innovation according to the TQM elements. These elements are in terms of feedback, top management quality leadership, cleanliness and organization and designing the characteristics of product. Also, Gustafson and Hundt (1995) propose some more elements in succeed the innovation performance. These elements have not the same weight in forecasting the success. These elements are including the benchmarking, management/leadership, customer mindedness, process mindedness, continuous improvement and data/information. In 1998 McAdam with his colleagues have given two significant results by investigating the link between TQM and innovation in 15 firms in Ireland. They discover that there is significant connection between the TQM and innovation (Herrmann, A., Gassmann, O., & Eisert, U. 2007). Also, over a qualitative research, they catch that assured performs replicating a philosophy of incessant development happens in the administrations thought to be groundbreaking.

Furthermore, they discover that there is a robust relationship between the development and innovation (McAdam, R., Armstrong, G., Kelly, B., 1998). In 1996 Baldwin and Johnson proved that TQM can be used as management techniques in identifying the level of innovative administrations.

Based on the previous research interpretations about the relationship between the TQM and innovation we received to several points. At first, the findings are contrasted. For instant, in a study by Prajogo and Sohal (2001) found that there is a relationship between TQM and innovation. While, in the study by Singh & smith (2004) there is no relationship. However, the most study represented a provision for the confident act of quality management on innovation. Secondly,

there is gap in the knowledge of investigating the effects of TQM on innovation. This gap is related to the furniture and construction companies. Most of the studies in this area are related to the industrial companies.

Furthermore, this study has been tried to make connection between two sections of this research by investigating the level of correlations between TQM and efficiency of organizations together with the link among the three kinds of companies. Based on our findings, there is significant link between the TQM and the quality of products. Instantaneously, they represented more confidential connections with innovation performance than the innovation of product.

Specially, a weak connection between the TQM and the innovation of production is dependent with a weak relationship between the quality and innovation of product.

In means that in the area of production TQM equip minimum patronage for innovation. The previous studies have mentioned the common properties between TQM and innovation (Prajogo and Sohal, 2001). These properties include the methods of thinking, behavior properties, and approaches. Precisely, it can be concluded that TQM has less contribution when there is more limitations in product innovation. In fact, the aim of this study is to determine the properties of radical innovation, for instance, the market primary candidate that given the strategies of the first mover. In some cases, these strategies are not suitable to the concept of TQM. Specially, when considering the customers and the basis of the quality (Hausman, A. 2005).

Table 3. Recent studies about the relationship between TQM and innovation (Abdul Talib B. and Esam M.A 2013).

Study	Data source	Analysis Tool	Findings
Santos –Vjande and Alvarez-Gonzalez (2007)	93 firms that are certified by ISO 2003 in Spain	Using Structural equation modelling	They proved that an important positive relationship exists between innovation and TQM
Sadikoglu and Zehir (2010)	373 different firms with various industry in Turkey	Using Structural equation modelling	They proved that an important positive relationship exists between innovation and TQM
Leavengood and Anderson (2011)	215 different firms in USA.	Using Data envelopment analysis	There is negative relationship between TQM with customer focus oriented and innovation in quality oriented firms
Hoang et al. (2006)	204 service and manufacturing companies in Vietnam	Using Structural equation modelling	There is positive connection between innovation and TQM, but all TQM techniques have similar effect
Martinez-Costa and Martine-Lorente (2008)	451 companies includes manufacturing and non-manufacturing in Spain	Using Structural equation modelling	There is a positive connection between TQM and the process innovation

Furthermore, a better conformity has been represented in the relationship among the product quality, TQM and innovation performance. This link suggests that the companies can implement the innovation performance by enhancing processes to improve the quality of their product. This idea is compatible

even for radical innovation and in using the new technology to improve their capabilities. Besides the significant of enhancing the processes, there is a connection between enhancement and advance development. This idea has been proposed by Imai in 1986. Also, Jha et al. (1996) indicated that the steady development make a strong organization with radical innovations. In another study that was conducted by Smed (1997) presents this fact that the reposition of principled stages of innovations could finally causes in radical innovations. In order to obtain significant advantages, the compatibility of the innovation to the aims of the organization should consider (Klein and Sorra, 1996). This study discussed that considering the quality can make compatibility to guaranty the innovation performance that is applied in a obvious context of aims of the organizational plan. For instance, substitute the old technology with new technology.

The theorem of Gobeli and Brown (1994) has been supported by the mixture of these findings. They suggested that on the view of innovation performance the concepts of TQM can be matched into the category of value leader. Accordingly, it has high penetration on process innovation and low penetration on product innovation. Moreover, it is possible for value-chain, specially, between design and production as upstream and downstream processes. As explained in the previous sections, TQM and process control have a same origin that is in the basis of the statistical process control (SPC). Thus, they are so close to each other's. Simultaneously, the innovation performance belongs to downstream activities. The aim of these activities is to improve their efficiency. Also, designing and developing activities have strong effects on product innovation where the creativity and smart vision collect simultaneously. Nevertheless, our finding has given a close relationship between the innovation performance and quality of productions together with innovation of productions. This relationship makes overall connection between TQM, quality and innovation. Finally enhances the affirmative link between TQM and innovation.

7. CONCLUSION AND RECOMMENDATION FOR FUTURE WORK

Based on the findings achieved by previous studies, in terms of product and procedure, TQM contributes to innovation performance significantly. However, the level of contribution of TQM to innovation performance is less than the level of its contribution to quality performance. Hence, a great attention is required when mentioning that TQM is adequate for obtaining a high level of innovation performance (Abdullah, Uli, & Tari, 2009). Moreover, the results of earlier studies demonstrated a significant positive link between innovation performance and quality performance. It can be realized that the quality performance obtained from conducting TQM practices may lead to the comprehension of innovation performance. Since the main aim of TQM is to understand the quality performance, the innovation performance as an outcome of TQM will be able to provide additional support for the existence of connection between TQM and innovation performance. The integration of the aforementioned findings indicates the existence of relationship between innovation performance and TQM. It could be concluded that not only TQM alone can present the innovation performance, but also the quality performance is required for innovation performance.

The extensive literature review demonstrated that TQM provides a "precondition" for innovation performance. It can supply useful information for researchers who are doubtful about the direct influence of TQM on innovation performance. According to Bolwijn and Kumpe (1990) and Ferdows and DeMeyer (1990), it's true that TQM does not directly lead to innovation performance, but the companies should be able to manage quality conditions of products if they want to follow a high level of innovation performance. Furthermore, since the quality management is a precondition for innovation, the total quality management is significant for achieving innovation. Consequently, we suggest companies to pay a great attention to TQM when producing their products even if the quality is not important as a standard for winning orders (Bolwijn & Kumpe, 1990).

In conclusion, the total quality management (TQM) in organizations presents a systematic fundamental for controlling the quality in order to make strategies which help them to attain the competitive profits, involving innovation. Companies that are interested in innovation performance are required to choose TQM while associating it with other strategies that are relevant to technology management. Therefore, further studies are required to examine the types of practices that are in harmony with TQM in verifying the innovation performance.

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