

IMPACT OF INFORMATION SYSTEMS CAPABILITIES AND TOTAL QUALITY MANAGEMENT ON THE COST OF QUALITY

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ABSTRACT

The paper aims to investigate the relationship among information systems capabilities, total quality management and the cost of quality. The 220 valid surveys received from the bank employees in United Arab Emirates is analyzed through the SPSS by using ANOVA, Regression, and correlation tests to examine the study model. The findings support the existence of relationship and confirm the impact of information systems capabilities, total quality management on the cost of quality. It is suggested that the banks should start taking initiatives related to total quality management approach along with improving the information systems capabilities to enhance the cost efficiency of quality related issues. Banks need to improve and provide resources and structure of information systems capabilities to cope with the new challenges that affect the TQM implementation.

Keywords: Information Systems Capabilities, Total Quality Management (TQM), Cost of Quality

JEL: M15, L15, O14

INTRODUCTION

Total Quality Management (TQM) has gain importance due to the rapidly changing business environment in global market (Ondra, 2021). It is an organization wide philosophy used for making continuous improvement in order to facilitate organizational development and efficient functioning (Dahlgaard et al., 1992; Acimovic et al., 2021). The key functions of TQM practices implementation are to improve the processes that used in production of good/services and customer satisfaction, and finally to exceed the expectation of the customers. Evidence has suggested where the right implementation of quality improvement strategies have verified to be highly valuable for business. However, according to Ernst and Young around 66% of the companies were not able to get any competitive advantage through the implementation of TQM practices (Dahlgaard et al., 1992).

Cost of Quality is defined as a practice where firm are allowed to determine resources it is using to avoid poor quality. Quality costs are largely classified into preventive quality activities and inspective quality activities. It aims to expect, avoid failures from emerging while the final stage, and focus on correcting and tracing failures. The management use the cost of quality to recognize the areas that required enhancements in the process aiming to reduce overall costs. TQM focuses on improving all the processes related to a certain firm, while cost of quality is responsible for understanding the amount of resources that are

invested by firm in avoiding poor quality. According to the concept of TQM, the aim of the practices would be to reduce the cost of quality, as it would focus on reducing the overall costs and promoting sustainability, which is also an important goal for TQM strategies (Dahlgard, et al., 1992; Amponsah & Ahmed, 2017).

LITERATURES REVIEW

Information Systems Capabilities and Cost of Quality

Recently, most of business operations rely on information technology and Information Systems Capabilities (ISC). There are critical and competitive weapons to improve effectiveness and efficiency in the hyper competitive marketplace. However, as the use of ISC increases the benefits of reducing some quality related cost. The concept of ISC driven from the use of the resource-based approach in the information technologies (IT) research field (Alzoubi & Aziz, 2021). This approach allows the development of a structure to evaluate the strategic contribution of Information Systems (IS) resources to the organization (Wade & Hulland, 2004). Under such an approach, the organization's IS resources (assets and capabilities) that are important may take lead to achieve the sustained competitive advantages (Ravichandran et al., 2005; Alzoubi & Yanamandra, 2020). According to Bharadwaj (2000) ISC is organization's power to provide and deploy IT-based resources in combination or jointly with other resources and capabilities. These are skills, competences and abilities upon which the value of the physical IT resources can be leveraged (Doherty & Terry, 2009). Wade and Hulland (2004) describe capabilities of information technology, data analytics, and business intelligence systems which are required for any organization be well organised, come up with quick solutions and make faster decisions under any circumstance. Wai, et al. (2011) investigated the ISC usage to provide the various quality cost management. Khayyat (2010) indicated that Information technology capabilities has a great role in improving quality cost in public entities reform, governance and operation and to improve the cost transparency and efficiency of the public sector. Ravichandran et al., (2005) examined how (IS) resources and capabilities may affect the firm performance. Firm's performance can also be explained by how effective the firms are in utilizing IT capabilities to provide support to enhance its operations and quality related costs. Lee, et al. (2018) investigated competitive factors of information systems capabilities in countrywide Korean competitiveness awards project which helps to improve the cost efficiency of IT projects.

TQM and Cost of Quality Dimensions and Discussion

Total Quality Management practices is simply the process of improving organizational performance through continuous improvement in terms of efficiency, productivity and costs reduction. It aims to improve employees, products, services, environment and processes within firm (Alzoubi & Ahmed, 2019) (Farooq et al., 2017). The major difference between traditional management styles and the TQM approach is that TQM deals with all firms' aspects and aims to implement complete improvement, while in the traditional style, each firm's section only worried in making improvements in respective departments. The implementation of TQM has large implications on the management; it is obvious that it is necessary to have high attention and commitment from the management in order to successfully implement TQM practices. Organizational managers play a key role in changing the perception of the firm's workforce towards total quality management. Under the current conditions, the traditional methods of improving quality have failed to provide results due to its short-term approach and high cost. Production and manufacturing of high-quality,

reliable products has always the slogan of most business firms (Lakshminarayana & Kusuma, 2019). However, the implementing strategies that ensure such standards has mostly verified to be difficult. The common implementation of TQM and cost of quality integration in strategies have verified to be highly valuable for many firms in the modern business environment. According to researchers, the union of both the mentioned aspects ensures that the quality of products is maintained and at the same time keeps the amounts invested to quality in check through appropriate implementation of TQM (Farooq et al., 2017).

Total Quality Management (TQM) has been usually implemented in recent times because of its popularity gained, as it aims to focus on firm wide improvement rather than focusing on improving particular areas or issues (Kendirli & Tuna, 2009). The objective of TQM practices is to non-stop improve and address all the departments within the firm trying to improve the processes that it follows, which leading to have positive impact on the overall performance. However, many researches focused only on the positive sides of TQM implementation, and they failed to highlight that inappropriate TQM implementation which marks in few or no improvement as part of competitive advantage (Sadikoglu & Olcay, 2014). The results that have been attained for years ago, indicate that its effect has been rather varied, while continuous improvement is highly important for focusing on innovation, which is an important factor in improving firm's performance within the modern business environment. Likewise, it is essential to focus on the financial aspect as the most important objective of TQM implementation is to ensure better financial performance. There are many studies which reflected that utilization of accounting methods such as activity-based costing along with quality costing and TQM verifies to be beneficial for firm to achieve their financial objectives (Kendirli & Tuna, 2009).

In addition to that, TQM practice is for focusing to improve customer satisfaction through methods such as growing the market, improving the quality of product/services presented and arrange required improvement and modifications into the firm culture in order to improve employee engagement and job satisfaction (Hadjicostas, 2004). According to Kendirli and Tuna (2009), modern businesses have tending to make large investments in terms of time and financial resources into quality costing and TQM. However, the role of TQM here is to ensure cost reduction and optimal utilization of resources which is often ignored by managements, because they are spending extensively on quality control, improvement measures which are barring them from producing products at realistic price points (Kendirli & Tuna, 2009). The benefits of proper implementation of TQM practices aims to improve organizational efficiency, productivity through minimization of inefficiencies and wastes. It focuses on adapting to a value-added approach among the workforce which challenges the employees to continually review their work and improve based on. The major focus of TQM is to add value to firm practices in order to achieve higher customer satisfaction through continuous improvement in all aspects of the business operations (Laszlo, 1997). Moreover, leadership played a key role, where the leader work on directing the workforce on achievement of firms' objectives through implementation of TQM practices. For example, the leader is required to supervise activities which improve efficiency through reduction of expenses while improving quality through adapting to more productive methods within the workforce (Laszlo, 1997). Like also the environmental impact on the overall performance (Lee & Syah, 2018).

Nowadays, all modern business firms are extremely focused towards improving quality of their processes, products and services in order to gain competitive advantage over competitors due to the presence of strong competition (Munizu, 2013). However, the process of ensuring that the products/service maintains a particular level of quality contains a number of costs, which need to be checked to don't exceed the agreed budget. Larger firms face risks related to insufficient level of service or defective manufacturing. Quality costs are also considered as the sum of all the costs that experienced in order to avoid product of poor

quality and the costs that are required to ensure non-performances do not occur (San, 2000). Investment as well carries different types of cost (Lee and Wang, 2018). Costs of Quality are divided into different categories such as preventive costs, appraisal costs, internal failure cost and external failure cost. Large amount of resources is invested into these aspects, which basically ensure flexible functioning of the firm and enhances the chances of improving the production process to provide high quality products/services to its customers. According to study conducted on evaluating cost-quality trade-offs for inspection strategies of manufacturing processes, it has clearly reflected that organizations that have been successful in reducing external costs have been able to improve the quality of the products through proper cost of quality and total quality management implementation (Farooq et al., 2017).

- Prevention costs are mostly the costs that happen in order to avoid non-compatibles and faults. It also includes the expenses in quality in order to avoid the release of deficient products into the market. Prevention costs are important in ensuring that firm is able to keep its product quality and sale standards of any products, whether faulty or not produced based on company standards (San, 2000). Principally prevention costs include training, developmental programs, surveys and quality planning
- Appraisal cost is mainly caring about evaluation and auditing products, components and the bought materials in order to ensure all the components are in line with the performance requirement and required standards. Appraisal cost related activities include monitoring the operations, inspections and quality audits. With the aim of ensuring that firm is able to take advantage from cost of quality, it is required to combine TQM practices in it through having regular analyze and evaluate the impact of cost of quality in tangible performance of the firm (San, 2000).
- Quality of cost has become an important part of many firms, where number of companies have connected it to TQM practices as it aims to continuously make improvements in the overall functioning of a business unit. In addition to above mentioned quality costs, internal and external failure costs are also considered as major costs that firm has to care about.
- Internal failure cost is show up there when products components and materials are not be able to meet the chosen quality-based requirements. It is described in situations when the fault is noticed before handover the ownership to the customer (Raheja et al., 2017).
- External failure costs are show up in situations when the customers are not satisfied with the delivered products after the handover of ownership. Situations when external failure costs happen are customer returns, product recalls, warranty claims and consumer complaints.
- A proper quality strategy is always based on the requirements of the business firms. Studies have indicated that cost of quality is highly important but most of firms focus more on the quality costing and decrease the attention into actual implementation because they believe that cost of quality acts as standard to improve the actual processes that need to be implemented (Raheja et al., 2017). Measuring the cost of quality in a certain firm is very important, as it is leading to identify issues related to quality and then it facilitates the improvement in product quality. According to Sower et al. (2007) study, between prevention costs and internal failure costs, there is a negative relationship which reflects on firms that properly assigned resources towards prevention costs are less likely to suffer from internal failure issues such as poor product quality. However, many firms have been planned for not assigning quality costs effectively in their budget. It is a dynamic to distribute quality costs proper in order to ensure the firm is working within strategies of total quality management (TQM) as it includes ensuring cutting of costs to optimize usage of resources. (Sower et al., 2007). Cost and prices could be affected by different microeconomic factors (Lee and Brahmaasrene, 2018).

Impact of TQM on Cost of Quality

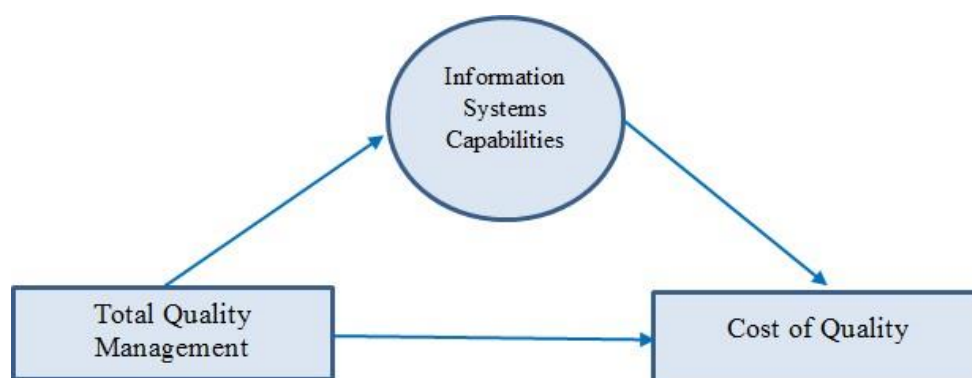
The main objective of TQM is to continuously improve the functionality of a firm. Cost of quality focuses on the costs that are experienced when there is a problem related to the products or the process of manufacturing a product or service (Lakshmi Narayana & Kusuma, 2019). Evidence from industries have proposed that quality plays a fundamental

role in enhancing firm productivity (Khanam et al., 2015). Hence it is highly important to integrate quality improving measures through the application of total quality management practices and integrating proper cost of quality methods as well (Dewhurst et al., 1999). In order to properly implement TQM and Cost of quality practices it is important to focus on the human resource aspect such as employee and managers as the workforce is a key in the proper implementation of quality improvement practices. Modern organizations are focused towards improving quality while keeping the financial investments dedicated towards enhancing quality in check (Al-Dujaili, 2013). The main concept is to develop a cost-effective quality management program which provides the requirement of both aspects and ensures achievement of firm objectives. However, it is clear that all cost-effective measures don't improve quality, hence, the aim need to improve quality as all quality improvement projects reduce costs, and the major aim for TQM and Cost of quality practices is for improving the quality (Laszlo, 1997). TQM and quality costing related activities are seen as a strategic weapon which can be used to gain competitive advantage. It is considered as 'total concept' which involves every aspect and individual within the firm and aims to function in proper coordination with processes which involve customers and suppliers (Siam et al., 2012). And will impact the customer acceptance (Lee, 2017). Utilizing the cost of quality method in context of TQM is aiming to improve the efficiency practices based on financial aspects of the business. The benefit of combining both the practices is to adapt to a value driven approach which also focuses on quality in its production which would enhance customer satisfaction and facilitate firm growth (Laszlo, 1997). Also, it has been found that the reason behind firms which are not able to benefit from cost of quality implementation is due to lack of proper management which often leads to unnecessary spending (Sower et al., 2007). Or spending no luxury brands (Becker et al., 2018). According to study conducted by Sarlak and Nasrollahi (2016), where they both put efforts to establish a proper relationship between quality costs and the quality of products manufactured by the firm. In order to understand the quality perfectly it is essential to evaluate each dimension separately which will allow the management to understand the strengths and weaknesses that lie in each area. The results have showed that proper investment on prevention cost reduced external and internal failure costs, as number of incidents that involved defective production reduce primarily because the firm make investments on achieving the processes involved in production of the goods (Sarlak & Nasrollahi, 2016).

In fact, modern business environment has highly competitive nature and it would be impossible for businesses to keep up with the competitors without using effective strategies that are focused on improving organizational limitations and weaknesses (Dewhurst et al. 1999). Modern firms have focused on analyzing costs of quality because the significant amount of investments is made on such activities, so it is important to explain and evaluate the actual impact of cost of quality on improving the firm's performance. According to (Starcevic et al., 2015) who suggested that firms that focus on quality costs tend to perform better money-wise as the costs are kept in check. In the same time, TQM in framework of cost of quality is focused on analyzing the unnecessary costs of quality and would aim to reduce it to optimal levels as TQM strategies encouraging the proper usage of available resources avoiding wastage at all costs (Tanis & Kefe, 2013).

Banks in United Arab Emirates

There 22 local and 30 foreign banks in United Arab Emirates, which divides into 4 types of banks, (a) commercial (b) industrial (c) Merchant (d) Islamic, and the UAE Central bank is the reserve bank in the country, and the biggest banks dominate with 60 per cent of the assets. The 8 full-fledged complete Islamic banks and other 23 Islamic windows of the conventional banks accounts for 19 per cent of the total banking sector (CFI, 2021).



**FIGURE 1
MODEL OF STUDY**

Hypotheses

HO1: Information Systems Capabilities has no statistical impact on Cost of Quality at Banks in Fujairah at ($\alpha \leq 0.05$) level.

HO2: Total Quality Management has no statistical impact on Cost of Quality at Banks in Fujairah at ($\alpha \leq 0.05$) level.

HO3: Information Systems Capabilities and Total Quality Management have no statistical impact on Cost of Quality at Banks in Fujairah at ($\alpha \leq 0.05$) level.

METHODOLOGY

An exploratory study employing a causal analysis has been implemented to determine the association between Information Systems Capabilities, Total Quality Management (TQM) (independent) and Cost of Quality (dependent) variables of research concept, to test any association between those variables. Applying structured survey plan helps to collect, summarize, present, and analyze the data to clarify and support the previous studies conducted previously with current study which conducted at banks in UAE. Through this questionnaire. The adapted survey has been used a five-point Likert-scale method to gather the required data from the participants who are employees in the banks. Out of 500 questionnaires sent out only 220 valid questionnaires have been used for the analysis in order to measure the relationship among Information Systems Capabilities, Total Quality Management and Cost of Quality at Banks in UAE.

Reliability

A reliability test is basically a stable and consistent results that can be produced through assessment tool over the time. A study can be measured to be reliable if the its result produced under comparable methodology; which means study tool has the ability to be applicable and repeatable over the time. Hence, this research has used Cronbach's alpha tool, and the minimum reliability score to be accepted is 0.60. As shown in below table 1, the reliability tool has been tested two variables (dependent and independent factors), and each variable contained four dimensions through using 220 records. The reliability scores for ITC, TQM & its dimensions, and CQ & its 4 dimensions showed strongly significant, where Cronbach's alpha value were above (0.60) for all dimensions, which indicates that the items are internally consistent for each dimension.

Construct	Cronbach's Alpha
Information Systems Capabilities	0.728
Total Quality Management	0.857
Cost of Quality	0.782

Data Analysis

The questionnaire was distributed to the different banks employees in UAE by the academic and industrial experts to review, then all comments have been take into consideration and adapted before it is distributed. All received questionnaires were checked for validity. A 220 valid Questionnaire and the data were investigated and examined through statistical and analytical package (SPSS), in order to test the relationship and the impact of Information System Capabilities, Total Quality Management on Cost of Quality, descriptive statistic, correlation and regression analysis and ANOVA analysis were conducted to obtain the results.

Descriptive Analysis

Descriptive analysis and statistic are a way used on studying of data and responsiveness of respondents about research variables that help in describing and summarizing the information into a meaningful. As showed in Table 2 the importance for each construct of the study indicating significant value, as all means and standard deviation refer to accepted values.

Construct	Mean	Std. Deviation	Variance
Information Systems Capabilities	3.8470	0.89834	0.807
Total Quality Management	3.8500	0.88635	0.786
Cost of Quality	3.4955	0.97845	0.957

Hypotheses Testing

Table 3 illustrate the results of Correlation, ANOVA and Regression analysis to cost of quality in Information Systems Capabilities, it described significant relationship between cost of quality in Information Systems Capabilities where the correlation (r) is (0.528). The determinant coefficient is (0.279) which means that (0.279) changeability in the cost of quality is explained by the changeability in information systems capabilities.

	r	r²	F	DF	Sig*	β		t	Sig*
Cost Of Quality	0.528	0.279	14.362	1	0.000	Information Systems Capabilities	0.282	2.129	0.001
				219					
				220					

* level of significance ($\alpha \leq 0.05$) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is impact of information systems capabilities on cost of quality at beta is (0.282) confirmed by (t) is (2.129) and (f) is (14.362)

and all values are significant at ($\alpha \leq 0.05$) level. This evidence supports the first hypothesis which prove the impact of information systems capabilities on cost of quality.

Table 4 illustrate the results of Correlation, ANOVA and Regression analysis to cost of quality in Total Quality Management, it described significant relationship between cost of quality in Information Systems Capabilities where the correlation (r) is (0.498). The determinant coefficient is (0.248) which means that (0.248) changeability in the cost of quality is explained by the changeability in total quality management.

	r	r²	F	DF	Sig*	β	t	Sig*	
Cost Of Quality	0.498	0.248	9.8362	1	0.000	Total Quality Management	0.368	3.109	0.002
				219					
				220					

* level of significance ($\alpha \leq 0.05$) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is impact of TQM on cost of quality at beta is (0.282) confirmed by (t) is (3.109) and (f) is (9.8362) and all values are significant at ($\alpha \leq 0.05$) level. This evidence supports the second hypothesis which prove the impact of TQM on cost of quality.

Table 5 illustrate the results of Correlation, ANOVA and Regression analysis to cost of quality in Information Systems Capabilities and Total Quality management, it described significant relationship between cost of quality in Information Systems Capabilities and Total Quality Management where the correlation (r) is (0.574). The determinant coefficient is (0.329) which means that (0.329) changeability in the cost of quality is explained by the changeability in information systems capabilities and total quality management.

	r	r²	F	DF	Sig*	β	t	Sig*	
Cost Of Quality	0.574	0.329	12.862	1	.000	Information Systems Capabilities & Total Quality Management	0.312	3.019	0.002
				219					
				220					

* level of significance ($\alpha \leq 0.05$) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is impact of information systems capabilities and total quality management on cost of quality at beta is (0.312) confirmed by (t) is (3.019) and (f) is (12.862) and all values are significant at ($\alpha \leq 0.05$) level. This evidence supports the third hypothesis which prove the impact of information systems capabilities and TQM on cost of quality.

RESULTS AND DISCUSSION

The study aimed to examine the relationship and level of impact between Information Systems Capabilities, Total Quality Management and Cost of Quality through testing and exploring the influences and dimensions of each factor. The data reliability which been gathered is measured by using analytical tool called "Cronbach's Alpha". The score of all variables and dimensions are within the accepted rate which indicated the highest level of reliability and consistent in examining and reflecting respondents' perceptions. In addition to that, regression analysis which confirmed the effect of among the variables. The results indicated that there is positive association among the variables, (r) and (r_2) all significant at p

< 0.05 . This suggested that the final model can describe 100% of variability. Therefore, the research hypothesis is supported and the outcome has determined the important role of Information Systems Capabilities, Total Quality Management on overall Cost of Quality in any organization for enhancement purpose.

According to the results found in methodology part, the first finding exposed a significant and positive relationship between information systems capabilities and the cost of quality which basically confirmed the finding of literature review part which aligned with the results of (Lee, Leem & Bae 2018; Wai, Seebaluck & Teeroovengadum, 2011; Khayyat 2010; Doherty & Terry, 2009; Ravichandran et al., 2005; Wade & Hulland, 2004; Bharadwaj, 2000).

Secondly, as the results indicated for the second hypothesis, the finding uncovered a significant and positive relationship between TQM and the cost of quality which basically confirmed the finding of literature review part which aligned with the results of (Alzoubi and Ahmed 2019; Farooq et al., 2017; Khanam et al., 2016; Starcevic et al., 2015; Munizu, 2013; Tanis & Kefe, 2013; Kendirli & Tuna, 2009)

Third, finding declared a significant and positive relationship among information systems capabilities, TQM and the cost of quality which basically confirmed the finding of literature review part which aligned with the results of (Lakshminarayana and Kusuma 2019; Raheja et al., 2017; Sarlak & Nasrollahi, 2016; Sadikoglu & Olcay 2014; Al-Dujaili, 2013; Siam et al., 2012; Sower et al., 2007)

CONCLUSION

Total Quality Management regularly has been categorized as one of the better methods to ensure firms are able to maintain a competitive advantage through continuously making improvement in the processes and functions. However, over the years, the results related to the implementation of TQM have been mixed with a large number of business units failing to take advantage of TQM practices. Cost of quality is an essential part of TQM, where it focuses on the costs that are involved in assuring the products produced by the firms keep a specific quality. In addition to that, it has highly helpful in ensuring delivery of high-quality products to keep the financial resources dedicated on these activities in check. Many business organizations are focused on quality costing and therefore it has failed in truly implementing strategies that improve the processes of production. To summarize it, one of the major aims of TQM strategies is to ensure that there is no wastage of resources so that costs can be reduced and profits can be maximized which will directly facilitate organizational growth.

At the end, the effect of TQM practice implementation on cost of quality of several organizations has been conducted earlier in many studies, which indicated to the importance of applying the balance of effective quality and cost in one workplace aiming to enhance the overall performance and productivity. One limitation of the study is the study is concentrated in the emirate of Fujirah as the student surveyors and also bank employees mostly belong to Fujirah. According to this study, it's clearly presented and showed the significant positive relationship and level of impact between both variables and their dimensions. Which concluding the research with the results of matching the proposed hypothesis with previous studies that conducted by many researchers.

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