

Aligning total quality management, continuous improvement for process performance: An empirical review

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Abstract - The fundamental goal of this research is to develop a conceptual framework for performance, continuous process improvement, and total quality management. Exploring the literature on total quality management and other variables in connection to various relationships has been the subject of recent investigations. This paper provides an introduction of total quality management, explains how it transforms into a sophisticated strategy employed in modern businesses, and discusses the literature-based research that has been done in this field. This study suggests that total quality management, a concept popularized by Deming, be investigated in a range of industries in order to enhance product quality, reduce waste, and increase productivity. This study is an integrative evaluation of the prior research on the idea of overall quality management and its connection. Future researchers are urged to make use of descriptive survey and empirical technique to generalize its findings. To reflect comprehensive quality management, continuous improvement, and process performance, this study created a conceptual framework and model. The author created a summary table to display earlier research on the subject, including authors, topics, countries, methodologies, and findings. In light of the aforementioned, the researcher filled a knowledge gap.

Keywords: total quality management, process performance, continuous improvement, product quality

1. Introduction

Many businesses around the world have adopted Deming's concept into their manufacturing facilities towards decreasing waste, and boost productivity in their industry (Houghton, 2019; Deming, 2012; Raza, 2020). In order to get the greatest outcomes and boost profitability, manufacturing enterprises in the globe have embraced Deming's management philosophy. Demings is best known for his contributions to the expansion of the manufacturing industry and businesses more than any other Japanese person. He was honored for his management-related achievements with a prize from the National Academy of Science, which helped him gain notoriety in the United

States of America. According to Deming (2006) and Deming (2012), he is credited with founding modern quality and management.

According to Quain (2019), distinctiveness of the market and competitive advantage of the company are essential factor for financial success due to a high-quality product. According to the authors, total quality management (TQM) is essential for business sustainability, customer satisfaction, and customer retention. No matter what a company does, if a customer's expectations are not met, they will look elsewhere for alternatives. Consumers are more likely to notice standardized products or services than inferior ones, according to studies (Al-Qahtani, Alshehri, & Aziz, 2015). Quality management is crucial if you want to significantly boost customer satisfaction and loyalty.

Previous research on this subject has produced mix result. Basak and Henk's (2012) research used a meta-revealed that businesses who use the ISO 9001 quality framework experience improvements in efficiency, productivity, cost control, sales, and market share, all of which have a direct beneficial effect on their ability to generate profits. Another study by Ali and Alolayyan (2013) found that company's performance was impacted favorably by TQM using Jordan hospital. Positive and negative results were found in a comparable study conducted by Wahjudi et al (2013) employing 151 manufacturing companies in Indonesia. According to the study, strategic planning had a large detrimental impact on business performance, whereas customer focus and people management had a significant beneficial effect.

A variety of industries were used in earlier research conducted in other parts of the world. None of past studies researched on TQM, continuous improvement and process performance. According to study by Miles (2017), a new taxonomy on research gaps can be developed on evidence, knowledge, methodological, theoretical, and population gaps. The researcher has found a gap in terms of study population, geographic coverage, and empirical studies. This is the gap present study seek to fill.

This paper provides an overview of TQM, discusses its applications, continuous improvement, process performance. The paper is divided in sections and sub-sections below.

1.2. The Concept of TQM

Total quality management has grown increasingly over time for enhancing a company's processing capabilities in order to maintain competitive advantages. It is integrated into all levels and functions of an organization (Bestertield et al., 2003; American Society of Quality, ASQ, 2023).

All staff members participate in ongoing training as part of the management framework for client-centered businesses included in TQM. To incorporate the quality discipline into the organization's culture and operations, it makes use of strategy, data, and effective communications. Many of these ideas are included in the contemporary quality management systems that take the place of TQM (ASQ, 2023).

Adam et al (2023) define total quality management (TQM) as the ongoing process of locating and minimizing or eliminating production flaws, improving the supply chain, enhancing the customer experience, and ensuring that staff members are trained to the highest standards. Applications include improving customer service, making sure employees are trained, and streamlining the supply chain management. The objective of ongoing internal practice improvement is to raise the standard of an organization's outputs, including its products and services. The goal of total quality management is to hold everyone responsible for the overall standard of the finished product or service. Two of the eight guiding principles of TQM are adhering to established procedures and prioritizing customer needs.

Watt (2020) claims that Total Quality Management (TQM) aims to consistently provide excellent customer satisfaction and high-quality IT services. The entire organization must collaborate as a single entity in the pursuit of excellence in order to successfully implement TQM practices. With proper TQM implementation, a business can produce a product for less money. Businesses that use TQM deliver more dependable products that boost customer loyalty through a focus on quality and

the elimination of waste. Due to the fact that TQM affects every department within an organization, a business may experience significant cost savings in the areas of material sourcing, production, distribution, or back-office operations. Successful TQM implementation typically results in organizations being able to change more quickly and plan ahead to avoid obsolescence (ASQ, 2023).

1.2.1 Applications of Total Quality Management

In the 1920s, Edward Demings and Shewhart Walter created quality theories. Deming (2006) and Deming (2012) list several of his books, including *The New Economics for Industry, Government, and Education*. The three main tenets of quality management theory are productivity, cost reduction, and customer satisfaction.

Quality factors like ISO 9001 enable continuous production of high-quality goods or services that meet consumer demand. In order to achieve company performance, quality management offers standardized procedures that promote knowledge and idea sharing among employees. This achievement is feasible thanks to cultural change, strategic leadership, and employee engagement, all of which help to achieve particular goals. The financial performance of Plan-to-Do-Act (PTA) employees' organizations is improved by their encouragement of innovation and problem-solving (Stanton, 2020; Ali & Alolayyan, 2013). Business performance is improved by the effective application of total quality management.

Nevertheless, Deming's contributions to this field of study led to the widespread recognition of his philosophy. Many academics have criticized his theory because they claim that it was intended to maximize organizational processes while minimizing risk. TQM was criticized for not fostering innovation and creativity at work, according to its detractors. The TQM implementation may cause the business to feel uneasy and unstable due to the extensive training and procedure changes it will entail. Deming's quality framework may initially cause cultural harm, output reductions, and employee turnover in organizations that try to implement it (Lipscomb, 2018). According to critics, implementing the TQM system might take some time and organizational resources. In order to fill the void left by an old employee, it might be necessary to train new hires. Every new hire will need training to perform job duties, which will inevitably involve a sizable time and financial investment to complete.

1.2.2 Edward Deming's 14 Points for Total Quality Management

Any organization can more effectively implement total quality management by implementing the TQM principles. Deming's 14 principles are as follows: (1) Establish ongoing objectives for service and product improvement. The emphasis should be on setting long-term quality planning, forecasting, and improvement goals in order to be prepared for upcoming challenges. (2) Adopt a new way of thinking. embraces quality within the company and puts the needs of the customer before those of the competition. (3) To achieve quality, don't rely solely on inspection. (4) To reduce overall costs, stop making purchases based solely on price and work with just one supplier. (5) All planning, production, and service processes are constantly being improved. (6) Provide on-site training. (7) Conquer your fear. (8) Eliminate boundaries between employee domains. (9) Eliminate employee slogans, campaigns, and goals. (10) Removal of management's quantitative goals and labor quotas. (11) Offer everyone effective programs for personal growth and education. (12) Encourage everyone to participate in the transformation within your organization. (13) Adopt and institute leadership. (14) Improve constantly every process for planning, production and service (American Institute for Quality, 2023; University of Tennessee, 2022).

1.3 Product Quality

Product quality is the capacity of a given product to carry out a given task, and it may include attributes like longevity, dependability, accuracy in the results, ease of use and maintenance, and other important overall product qualities (Amanah, 2010). Customers must feel confident in the quality of a product for marketing to be successful, and they are more likely to buy products that satisfy their needs or desires.

In other words, consumer preferences or market demands, such as a demand for high-quality goods, should influence the creation or design of products. Customers will be happy if the product they use is of excellent quality (Bei and Chiao, 2001; 2006). Cronin et al., (2000) assert that future research on satisfaction models should take into account a product's service quality. According to Jahanshahi et al., (2011), Amanah (2010), and Brucks et al., (2000), a product's perceived quality affects how satisfied customers are. According to Etemat-Sajadi and Rizzuto (2013), product quality has a positive impact on customer satisfaction.

According to Lupiyoadi and Hamdani (2013), a product's quality is determined by how closely it adheres to its standards. A company's success can be assessed based on how consistently high-quality its products or services are by looking at metrics for customer, employee, and business profitability satisfaction. The majority of the blame for customer satisfaction is placed on high-quality service components (Kotler & Armstrong, 1996). The customer will be happier if the goods and services are of a higher quality because "free from damage" is the definition of quality. However, the majority of customer-centric businesses define quality as providing value and meeting customer needs (Kotler & Armstrong, 2001).

Higher customer satisfaction results in higher sales for the company. Sviokla in Lupiyoadi and Hamdani (2013) stated that these outside advantages might have an impact on the creation of goods or services. Specifically, the caliber of the product or service offered by the business might help the client form a favorable opinion of it, leading to satisfaction and client loyalty. A company's emphasis on quality can give the company its internal positive value in the process of improving the quality of its products, as the value and satisfaction of the customer are intimately related to quality. A more precise definition of quality is "free from damage.". However, according to Kotler and Armstrong (2001), the majority of customer-centric businesses define quality as bringing value to and ensuring the happiness of their customers.

1.4 Continuous Improvement

Continuous improvement is also referred to as Kaizen or rapid improvement. This technique is used to find opportunities to eliminate waste and streamline procedures (Terry, 2023). In response to the adoption of Lean, Agile, and Kaizen in business and manufacturing, the process was created. It is now used by millions of companies worldwide to identify cost-saving opportunities. Many of these ideologies mix well together. Kaizen and Kanban, for instance, can be combined to offer continuous improvement through process visualization. In addition to maintaining high standards for customer service and getting rid of waste in the form of time, money, and defects (rework), the main goal of all Lean / Agile approaches is continuous improvement.

Continuous improvement refers to the process of constantly identifying, evaluating, and improving systems, processes, products, and services (Kanbanize, 2022). The goals of continuous improvement are to increase productivity, raise quality, reduce costs, boost employee morale, encourage innovation, and facilitate change. Continuous improvement, which increases productivity and efficiency, can help businesses find and remove waste, inefficiencies, and redundancies in their processes. By continually assessing and improving their processes, businesses can increase the quality of their products or services while also reducing the number of flaws, errors, and customer complaints. Continuous improvement can help businesses cut costs by reducing defects, eliminating waste, and streamlining processes to increase profitability (Terry 2023; Kanbanize, 2023). The ability to provide feedback and evaluate individual efforts is another benefit of continuous improvement. This feature fosters employee engagement, satisfaction, teamwork, and collaboration. Continuous improvement can encourage innovation and lead to the development of brand-new or improved products and services by encouraging businesses to test out novel ideas and methods.

According to Raza (2020), continuous improvement in manufacturing entails taking an established production process and seeking out numerous ways to gradually improve the production process. In the manufacturing industry, optimal automation and standardization are the main focuses of continuous improvement because they will cut down on waste and unforeseen equipment

failures. Japanese manufacturers have successfully implemented continuous improvement with a high success rate.

An increasing number of producers are utilizing artificial intelligence in their production facilities. One of the main applications for artificial intelligence (AI) products is predictive maintenance. Costs related to production line maintenance are consequently decreased. Businesses can achieve sustainable production levels by using AI-powered software to optimize processes. A few other applications and benefits of AI in manufacturing include precise demand forecasting, greater cost savings, safety improvements, and supply chain efficiencies. Artificial intelligence is the future of manufacturing, and since industrial manufacturing environments necessitate close cooperation between humans and machines, the two are inextricably linked.

According to annual data produced by GP Bullhound and cited in IIOT World (2023), manufacturing companies produce 1,812 petabytes of data annually, which is more than other industries like retail and communications, among others. Manufacturers are using artificial intelligence techniques like machine learning, deep learning, and natural language processing to improve quality control, inspection, and warehouse automation. hasten decision-making and data analysis. According to a different study by Capgemini, AI is being used by 51% of European manufacturers, 30% of Japanese manufacturers, and 28% of US manufacturers to improve 29% maintenance and 27% quality of manufacturing enterprises (Dilmegani, 2023). The analytical data that is plentiful in the manufacturing industry can be analyzed more quickly and efficiently by machines. According to a McKinsey report, company that adopt Fourth Industrial Revolution (4IR) technologies will generate more value across the board. These technologies include automation, advanced and predictive analytics, and the internet of things (Betti & Giraud, 2020), The results showed that while AI alone can produce \$1 point 2 trillion in value for manufacturing and supply chain management, 4IR innovations are expected to generate \$3 point 7 trillion in value by 2025.

1.5 Process Performance

The efficiency with which a process achieves the desired results is a sign of its performance or capabilities (Kueng, 2000). Determining a process' potential and actual capacity to meet quality requirements requires taking into account the tolerance of the tested property. With the help of this data, we can estimate the number of products that satisfy our requirements.

Process-oriented businesses use process performance indicators (PPIs), which have predetermined goal values over a predetermined time period, as their primary method of monitoring the development of the process lifecycle (Río et al., 2010). All parties should be able to agree on the set PPIs, and they should be amenable to automated analysis for verification (the SMART model is suggested for this). Prior to the start of the lifecycle, they should be ready. The PPI specification should include the process name, objectives, definition and target of indicator, scope, source, and accountable person in order to prevent misunderstandings and subsequent problems. Depending on how well a process performs, it can be determined whether or not it can actually produce the desired results.

1.5.1 Benefits of Process Performance are

(a). **Increases Productivity**-Process performance raises output quality. It is the result of measuring and fixing process performance bottlenecks. Identifying bottlenecks in a process allows for targeted optimization that ultimately boosts output (Río, 2012).

(b). **Improved Customer Satisfaction** -Performance improve process which leads to higher quality products and services, which in turn increases customer satisfaction.

(c). **Save Money**: Process performance can lessen manufacturing and maintenance expenses by exposing and fixing inefficiencies.

(d). **Improve Product or Service Quality**. The quality of goods and services can be enhanced by optimizing their production processes. Customers are happier and more loyal as a result.

(e). **Better Decision Making**- Managers and executives can make more educated decisions about the process's future success by gaining insight into its current performance.

Río (2012) has noted the process's performance limitations. The author claims that the process's performance is constrained by the quality standards established for it. The quality criteria set forth for a process have an impact on how well it functions. If there are too many different steps, the process might not always adhere to strict standards. The materials and tools employed also have an impact on how well a process works. If the tools and products used are of poor quality, the process won't go as smoothly as it could. The human element affects a process' effectiveness in other ways as well. If the individuals involved lack the necessary skills or don't carry out their tasks properly, a process won't function as effectively as it could. Knowing more about how the process works will enable managers and executives to make better decisions regarding how to enhance it.

2. Literature on Total Quality Management, Continuous Improvement and Performance

This section provided empirical evidence of previous studies on total quality management done across the globe. Some of these papers were reviewed by several scholars around the globe and stated below.

Indra et al (2018) carried out study on a Structural Model of Total Quality Management, Kaizen, Operational Performance on Service Quality and Patient Satisfaction in Indonesia. A sample of 398 respondents was used to test the hypothesis using inferential statistics and structural equation modeling, and the results were obtained. Findings revealed that kaizen, operational performance, and comprehensive quality management all had a favorable impact on the level of patient satisfaction and service quality at four Makassar hospitals.

Walsh et al (2002) examined the practices of total quality management philosophy within companies operating in Ireland. The study used questionnaire as instrument for data collection. Findings showed that total quality management approach offers firm a platform for developing strategies that guarantee competitiveness and success.

Anh et al (2019) used international manufacturing plants in 12 different countries to assess the impact of total quality management (TQM) practices and just-in-time (JIT) production practices on flexibility performance. Between 2013 and 2015, regression and correlation analysis were used to investigate high performance foreign enterprises from nations like China, Finland, Germany, Italy, Israel, Japan, Korea, Spain, Sweden, Taiwan, United Kingdom, and Vietnam. The outcome supported the notion that TQM, JIT production techniques, and flexibility performance are positively correlated.

Suhard et al (2019) examined Supply Chain Management and Total Quality Management in Textile Manufacturing Companies, Bandung. Data from an eight manufacturing businesses' representative sample of 104 employees were analyzed using the simple regression method. The findings showed that supply chain management and total quality management have a substantial favorable association.

Alolayyan et al (2011) conducted research on the impact of operational flexibility on hospitals' performance using Jordanian hospitality industry. Data was examined using the multiple regression method using 231 respondents from two different hospitality industries as the sample. The results showed that operational flexibility significantly improved hospitality performance.

Fening et al (2013) explored the relationship between total quality management and organizational survival in Ghanaian manufacturing companies. Face-to-face interviews were used to gather primary data from a sample of 250 manufacturing companies in the Kumasi city. To test the hypothesis and examine the relationship between the variables, structural equation modeling and correlational methods were used. The results demonstrated a considerable positive association between total quality management and company performance.

Saadia (2018) looked into the performance of commercial banks in Kenya's Garissa County in terms of total quality management practices. The study used a questionnaire and survey design as its primary data collection tools. A total of 104 bank employees served as the primary source of data. The distribution of the questionnaire used a stratified random sample technique. To produce the outcome, data were examined using tables, graphs, frequency, charts, and multiple regression. The results demonstrated a substantial positive association between operational success and the entire

quality management variables (such as customer focus, top management commitment, continuous improvement, and employee involvement).

Sadikoglu and Olcay (2014) examined the impact of Total Quality Management Practices on Performance in Turkey. A number of 242 respondents made up the study's population from which primary data were collected. To evaluate the link between the variables, data were analyzed using exploratory factor analysis and multiple regression methods. The results showed that whole quality management methods have a considerable impact on the performance of firms.

Chauke et al (2019) investigated the effectiveness of Total Quality Management and Operational Performance in South Africa. 110 workers from Pretoria-based bakeries provided the primary data. Data were analyzed using mean values, standard deviation, correlational, and regression approaches to look into the relationship between the two variables. The results showed that leadership, knowledge management, supplier management, customer focus, employee involvement, and process management all had a negative effect on staff opinions of total quality management characteristics. Results also showed a positive effect of whole quality management on operational performance.

Mohammed et al (2019) investigated the effect of Total Quality Management on Operational Performance of Ethiopian Manufacturing Firms. The study's target population included 12 pharmaceutical companies in Ethiopia. 65 respondents made up the sample from which the primary data were drawn. Only 57 of the 65 questionnaires that were sent to the participants were returned and used for the study while the other 8 were not. The link between the two variables was examined statistically using the correlation and regression method. The results demonstrated a significant association between operational success and the whole quality management variables (such as customer focus, process management, product design, and people management).

Shaheen (2022) conducted research to determine the impact of quality management on organizational performance in Pakistan's textile industry. A quantitative research strategy was applied after a deductive approach. 131 workers from various garment companies in Karachi provided with survey questionnaires on a five-point Likert scale were used to gather the data. With the help of IBM SPSS version 22, the regression method was used to test the hypothesis at a 5% level of significance. According to the research, quality management has a considerable and advantageous impact on operational performance.

Senarath et al (2020) explores the impact of Total Quality Management (TQM) practices on operational performance using a sample of 279 employees of Sri Lankan large scaled manufacturing organizations. Two hypotheses were tested using structural equation modeling. The study showed that TQM practices have a positive impact on operational performance.

Jbeily (2022) examined the effect of quality management on the competitive priority of Lebanese industries. To accomplish the research goal, cause-and-effect and descriptive approaches were both applied. A questionnaire was used to collect primary information from enterprises in Lebanon. More than 200 managers and supervisors were sent the survey, and 184 of them responded appropriately while the remaining 16 respondents did not respond during the survey. The hypothesis were analyzed using multiple regressions to establish a correlation between the variables. The results show that TQM and competitive priority factors are heavily utilized by Lebanese businesses, and there is a high association between these two variables. The commitment of the top management, staff development, engagement, and continual improvement also have an impact on the competitive objectives of Lebanese businesses.

Table 1 Summary of Literature on Total Quality Management, Continuous Improvement and Performance

S/N	Authors	Topic	Country	Data Gathering Techniques and Analysis	Major Finding
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1.	Indra et al., (2018).	Structural Model of Total Quality Management, Kaisen, Operational Performance on Service Quality and Patient Satisfaction	Indonesia	Inferential Statistics and Structural Equation Modelling	kaizen, operational performance, and comprehensive quality management all had a favorable impact on the level of patient satisfaction and service quality at four Makassar hospitals
2.	Walsh et al., (2002)	Total quality management philosophy.	Ireland	Questionnaire	Total quality management approach offers firm a platform for developing strategies that guarantee competitiveness and success.
3.	Anh et al., (2019)	Total quality management (TQM) practices and just-in-time (JIT) production practices on flexibility performance		Regression and correlation analysis	TQM, JIT production techniques, and flexibility performance are positively correlated.
4.	Suhard et al., (2019)	Supply Chain Management and Total Quality Management in Textile Manufacturing Companies		Simple regression	The findings showed that supply chain management and total quality management have a substantial favorable association
5.	Alolayyan et al., (2011)	Operational flexibility on hospitals' performance using Jordanian hospitality industry.	Jordan	Multiple regression	The results showed that operational flexibility significantly improved hospitality performance.
6.	Fening et al., (2013)	Total quality management and organizational survival in Ghanaian manufacturing companies.	Ghana	Structural equation modeling and correlational methods	a considerable positive association exist between total quality management and company performance.
7.	Saadia (2018)	Performance of commercial banks in Kenya's Garissa County in terms of total quality management practices	Kenya	Tables, graphs, frequency, charts, and multiple regression.	A positive association exists between operational success and the entire quality management variables.
8.	Esin and Hilal (2014)	Reasons for and barriers to TQM practices in Turkey as well as the effects	Turkey	Multiple regression analysis and exploratory factor	

		of TQM practices on performance					
9.	Mohammed et al., (2019)	Total Management Operational Performance of Ethiopian Manufacturing firms	Quality on	Ethiopia	Correlation and regression method	A significant association exist between operational success and the whole quality management variables.	
10.	Sadikoglu and Olcay (2014)	examined the impact of Total Quality Management Practices on Performance in Turkey.	the Total on	Turkey	Exploratory factor analysis and multiple regression methods. The results showed	Quality management methods have a considerable impact on the performance of firms.	
11.	Chauke and Mbohwa (2019)	Efficiency of Total Quality Management and Operational Performance.	Total and	South Africa	Mean values, standard deviation, correlational, and regression techniques.	Total quality management had a favorable impact on operational performance.	
12	Senarath and Fernando (2020)	Total Quality Management (TQM) practices on operational performance	Quality on	Sri Lanka	Structural equation modeling.	The study showed that TQM practices have a positive impact on operational performance.	
13.	Shaheen (2022)	Effect of quality management on organization performance in the garment sector in Pakistan.	quality on	Pakistan	Regression	quality management significantly and positively influences operational performance.	
14.	Jbeily (2022)	Impact of total quality management on competitive priorities of Lebanese Industries	total on	Lebanon	Correlation	Total quality management is influence by the competitiveness of Lebanese enterprises.	

Source: Authors Own Creation

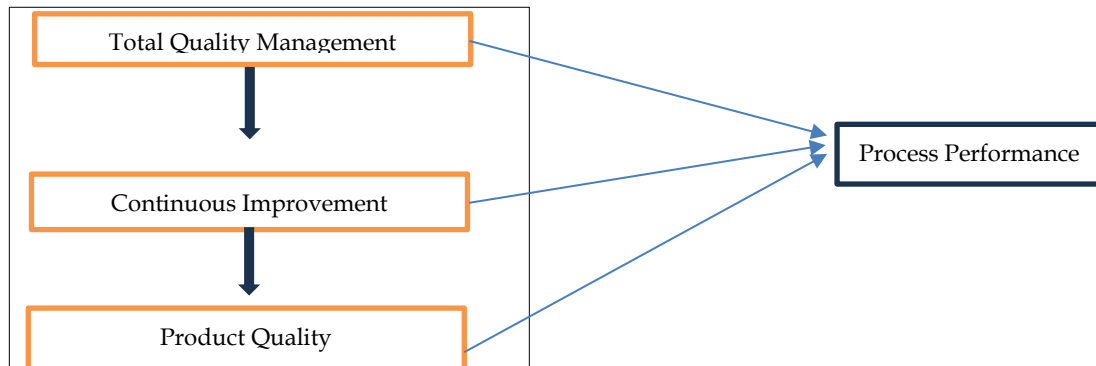


Figure 1 A Model Representing Total Quality Management, Continuous Improvement, and Process Performance

The researcher created Figure 1 to illustrate the relationship between total quality management, continuous improvement, and process performance.

3. Conclusion

The study on total quality management, continuous improvement, and process performance was reviewed holistically. By creating a conceptual framework and model of comprehensive quality management, continuous improvement, and process performance, this study fills the gap. Below are study recommendations that were made based on the conclusion.

Recommendations

In light of the foregoing, the suggestions that follow were made.

(a). Managers are recommended to standardize the TQM operating principles throughout all of their departments and units in order to reap the rewards of this strategy. To achieve this degree of attention in TQM, it is very difficult and expensive without the participation of all levels of management. Without the involvement of all levels of management in TQM, it is extremely difficult and expensive to reach this level of focus.

(b). Businesses are recommended to keep operating while actively seeking out novel ways to increase performance through the adoption of best practices for continuous improvement. (c). A project manager must be aware of the need of completing a body of work on schedule to prevent cost overruns. (d). Project managers can save costs and avoid overruns by using forecasting software. (e). Project management offices can improve their overall performance for the organization by forecasting (rather than estimating) if a project's limitations are likely to be broken.

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