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Influence of Total Quality Management Principles on the Success of Construction Projects Performance in Mombasa County

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Abstract

The construction industry is one of the most important wheels for the development of infrastructure and economy of a Nation and in realization of the Agenda 4. Four Agenda: It is a four-point agenda by President Uhuru Kenyatta, outlining what he will be focusing on in his last presidential term to improve the living standards of Kenyans, grow the economy and leave a lasting legacy. It is therefore important that adequate measures are put in place to ensure quality in the sector. Total Quality Management (TQM) is considered as one of the most important approaches to achieve quality in construction Industry in not only Kenya but the world over. This study investigated the influence of total quality management principles in context of project performance in the construction industry in Mombasa County. The study was guided by four specific objectives: to establish influence of strategic planning on success of project performance in the construction industry; to examine influence of process approach to management on success of project performance in the construction industry; to determine influence of customer satisfaction on success of project performance in the construction industry; to assess influence of supplier relationship on success of project performance in the construction industry. The study was premised on Deming's and Shewhart cycle theories on total quality management. The target

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population for the study is 60 active contractors' firms as registered by the National Construction Association (NCA) in Mombasa County. The sample size was established at 5 contracting firms. The study adopted random sampling procedure. A structured and semi-structured questionnaire was used to collect data for the study. Data analysis techniques used were central tendency (mean, standard deviations, percentages), correlation and chi-square analysis using SPSS. The data was presented in tables and researcher's interpretation. The findings showed that supplier relationships significantly influence the success of project performance, Strategic planning management was the most practiced TQM principle and procedural barriers are an impediment to TQM practices in the construction industry in Mombasa County. The study concludes that supplier relationships have a positive impact on TQM practices in the Mombasa County construction industry. The study recommends that customer focus management should be the focus of suppliers in practicing total quality management in their work. Through collaborating and cooperating with the client during the construction process means that suppliers can be able to meet the client quality requirements thus achieving total quality management.

Keywords: *Total quality control, statistical quality control, quality management, total quality management, construction industry, strategic planning, process approach, customer focus, supplier relationship*

1.1 Introduction

Rapid technological development is leading to expansion of the mass production and increasing the number of firms in the market. The increased number of alternatives in a market enables customers to make a comparison between products according to its quality besides the price. To survive in this competitive environment, firms must achieve customer satisfaction by ensuring the optimum in the triangle of time, price, and quality. Usually quality is perceived as 'the quality of final product' but in reality, it brings many benefits to firms, e.g. reduced waste, saved time, increased profit and reduced occupational health and safety problems.

The concept of TQM came into existence in 1970s when evolution of quality took a strategic shift from Quality Control to a strategic approach of quality to take care of the growing attention concern on quality. From then, quality management has evolved through Quality Inspection, to Quality Control, to Quality Assurance then to the current Total Quality Management (Kenya Institute of Management, 2009).

Globally, a number of organizations have adopted quality initiatives. Toyota company for instance developed the philosophies of 'customer first' and 'quality first'. They set up quality assurance systems across various divisions and departments (Omware, 2013). They introduced

statistical quality control (SQC) in 1949 followed by Total Quality Management (TQM) initiatives based on the unchanging principles of 'customer first' and 'total participation'.

The Kaizen's principles of 5S were adopted to improve the flow of people in workplaces, to put balance in assembly lines and to improve workplace layouts and to maximize space utilization. Most organizations in Kenya, especially the ones in service industry have in the recent past adopted quality programs. Most public companies have for instance adopted the ISO standards e.g. Agricultural Development Corporation, Coffee Research Foundation, University of Nairobi Enterprises and Services Ltd, Commission for Higher Education, Defense Forces Memorial Hospital, University of Nairobi, Egerton University, Kenya Pipeline Company, Kenya Ports Authority, just to mention a few. Therefore, in order to comprehend the need for improvement in the construction industry and to better manage our projects and construction companies, we need to look for a method to do so. Construction managers need to improve their performance. Construction costs are becoming far too high. Construction project management is more difficult than it should be. When turnaround at the end of a project becomes a gut-wrenching experience with unnecessary disputes (which must be settled) that arise due to insufficient quality or indifference to quality, settlement by negotiation, arbitration, or even litigation imposes a serious drain on the financial resources of a company and limits profit potential (The Role of ISO Standards in Kenya's Economy,2012).

Quality Management in the construction industry pertains to the efficient use of machinery, labor, and raw materials in industrial production. It is particularly important from the viewpoint of costs and economics of production, safety of human operators, and the most advantageous deployment of automatic machinery (McCaffer, 2002). Quality Management advocates giving workers a sense of empowerment, responsibility, and accountability and consistently reinforcing their good work. Harris (2002) stated that total quality management consists of all activities that managers perform to improve their quality and policy such as quality planning, quality control, quality assurance and quality improvement. It is a process of getting rid of poor quality from production rather than getting rid of poor quality products.

In the construction industry, contractors are selected by owner on a competitive basis. Even though the bid is considered to be the major criterion of selection, especially private sector companies also consider the contractors' safety record, technical support, equipment capabilities, integrity and especially reputation regarding the quality of the work performed. Contractors with a bad reputation are not likely to be awarded many projects in the existing competitive marketplace. It therefore pays for contractors to invest in measures to achieve high work quality in order to increase chances of winning contracts. Quality is also the cornerstone of competitive

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strategies for contractors seeking to expand or increase market share, as well as secure their clients. The global competitive arena has impelled contractors to constantly think of new ways to gain a competitive edge.

1.2 Statement of Problem

The issue of quality has become of great importance especially with the ever growing concerns and demands from various players in the market. These demands arise due to the increased number of reported quality issues like the frequent collapse of structures leads to injuries and deaths. The widespread collapse of building structures in Kenya that has resulted in deaths and injuries in the recent past is a matter of great concern. These accidents in construction sites has claimed the lives of innocent Kenyans robbing families of their breadwinners and loved ones, and causing permanent damage to the injured workers and people whose lives revolve around the construction environment. On various dates between now and 2006, reports of buildings collapsing have been reported in Nairobi, Kisii, Kiambu and Mombasa. These incidences have resulted in more than 50 fatalities and scores injured, maimed or permanently disfigured. The above statistics paint a grim picture, and looking closer at the reported causes of failure we can see that the collapse of buildings would have been prevented had building quality inspections been conducted during and after construction as part of routine maintenance Kagumba and Gongera (2013). In the current market economy, companies are constantly struggling to achieve a sustained competitive advantage that will enable them to improve performance, which results in increased competitiveness, and of course, profit (Nyangilo, 2012).

Among the few competitive advantages that can become sustainable competitive advantages, quality plays a crucial role. Recent research by Nielsen Global Survey shows that about 85% of buyers in the international market consider quality as having at least equal importance with price in making the decision to purchase. Total Quality Management is seen as a way to transform the economies of some countries to be more competitive than others (Ron Kurtus, 2007). However, Total Quality Management brings not and will not produce results overnight; it is not a panacea for all the problems facing the organization. Total Quality Management requires a change in organizational culture, which must focus on meeting customer expectations and increasing the involvement of all employees to meet this objective, as an expression of the ethics of continuous improvement. In general, research on quality aim to identify why an organization should adopt the principles of total quality management, but attempts to identify the failing companies' attempts to implement total quality management principles are not so visible (Thomas C. Powell, 1995). Concerns of companies to introduce quality management systems are becoming more pronounced, therefore, this study try to identify and present the influence of success of TQM

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principles in construction companies, main reasons that prevent achieving quality and implementation of total quality management system. This study aims to bridge this gap by looking at the success of TQM principles in Construction Companies in Kenya using Mombasa County as a case study. Mombasa County was chosen because it has well established Construction Companies of which some are already implementing TQM.

1.3 Objectives of the Study

The study was guided by the following objectives:

- **i.** To establish the extent to which strategic planning influence success of project performance in the construction industry.
- **ii.** To examine the extent to which process approach to management influence success of project performance in the construction industry.
- **iii.** To determine the extent to which customer satisfaction influence success of project performance in the construction industry.
- **iv.** To assess the extent to which supplier relationship influence success of TQM of project performance in the construction industry.

1.4 Research Hypothesis

This study tested the following hypothesis at 95% level of confidence

- **i.** H_0: Strategic planning significantly influences the success of project performance in construction industry.
- **ii.** H_0**:** Process approach to management significantly influences the success of project performance in construction industry.
- **iii.** H_0**:** Customer focus significantly influences the success of project performance in construction industry.

H_0**:** Supplier partnership significantly influences the success of project performance in construction industry.

2.0 Literature Review

2.1 Theoretical Review

2.1.1 Deming's Theory of profound knowledge

This theory was developed by Deming is a management philosophy grounded in systems theory. It is based on the principle that each organization is composed of a system of interrelated processes and people which make up system's components. The success of all workers within the system is dependent on management's capability to orchestrate the delicate balance of each

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component for optimization of the entire system (Bowen, 2010). The system of profound knowledge is based on system appreciation to understand the company's processes and systems, variation knowledge to understand the occurrence of variation and their causes, knowledge theory to understand quality programs and psychology knowledge to understand human nature. Deming viewed TQM as an approach in management which promoted continuous quality improvements of products and services by motivating all employees to participate in the process of change and to find fulfilment in being intimately involved in meeting customers' expectations in order to ensure the longer term viability of the company organization (Anderson et al. 1994). Although Deming is associated with cyclical problem solving method of Plan, Do, Check and Act (PDCA), some authors trace the provenance of this method to Walter Shewhart. In any case, the PDCA cycle of quality improvement requires top managers to become intimately involved in the internal activities of the organization. Deming placed the responsibility for quality improvement on managers whom he viewed as being tasked with inculcating a culture where errors and defects were unacceptable. The goal was to delight the customer. Accordingly, employees were encouraged to report any problems without any fear of being blamed. Quality control would be monitored by using statistical techniques (Beckford, 2010). Deming believed that quality was the key to gaining a competitive position in the market and, in order to achieve this, each and every employee had a role to play. Thus, at every stage of production or service provision, whether at design, planning or delivery of product or service, quality should be considered a core activity for an organization. In his fourteen points, he proposed were paramount in implementation of TQM. This study looked at, strategic planning, process approach, customer satisfaction and supplier relationship.

Total Quality Management Principles

While the scope of TQM can be viewed as infinite there are some basic underlying principles of this management philosophy. A study conducted by Mailing *et al*. compiled the survey based research on TQM published between 1995 and 2000. Their findings identified twenty-five different TQM factors all of which could be considered relevant and important. However, based on literature review some of the principles that pose the greatest impact can be limited to just a small few and they are detailed below.

2.2.1 The Influence of Strategic Planning on Project performance

Leadership plays a fundamental role in the strategic planning principle of TQM. Juran was the initiator of this principle because he is the one who brought the managerial dimension to quality which broadened it from its statistical origins. Juran`s contributions to this principle include the pareto principles which millions of managers rely on to help separate the "vital few" from the

"useful many" and the Juran Trilogy which defines three management processes: quality control, quality improvement and quality planning. To establish a strategy, it is up to leadership to produce documents which describe goals, both long and short range Tribus, M (1997). The long range goals should contain a strategy to achieve the goals Leonard and McAdam (2002). This strategy is essential because in today's business environment managers must plan strategically to maintain a hold on market share, let alone increase it Oakland (2011).

2.2.2 The Influence of Process Management on Project performance

A process is a way of getting things done. A process consists of tasks, procedures and policies necessary to carry out an internal or external customer needs Adrian, (1995). According to the TQM philosophy, if the process is correct, so will be the result (product). Thus, the organization should work to improve the process to improve the product or service Arditi and Gunaydin, (1997). A strong emphasis in process improvement centres on measurement, control and the knowledge of variation to seek improvement Ashford (2003). All organizational activities can be considered as processes. Therefore, if the aim of the Total quality management initiative is to achieve overall quality performance, then process management appears to be an essential requirement. Process management is the concern of quality of conformance. One important matter in process management is to ensure that process capability can meet production requirements (Zhang, Waszink & Wijngaard, 2000). Oakland (1993) believes that process management is the key to get employees responsible for what they are doing in relation to customer satisfaction. McAdam (1996) states that process management (process-based approach) improves customer satisfaction and overcomes the problems associated with management through functional based approach.

2.2.3 The influence of Customer satisfaction on project performance

The customer focus principle is defined by Foster (2010) as a proactive approach to satisfying customer needs that is based on gathering data about our customers to learn their needs and preferences and then providing products and services that satisfy those changing needs and preferences. Sirias et al. (2001) identify that having a profound knowledge of customer expectations is an important aspect of TQM because every activity is driven by this knowledge. Crosby, who is considered the founder of this principle, emphasizes the importance of determining customer requirements, defining those requirements as clearly as possible, and then producing products or services that conform to the requirements as established by the customers. Also, Customer retention is as important as attracting new customers and organizations need to consider the lifetime worth of a loyal customer Smith (2001).

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2.2.4 The Influence of Suppliers Partnership on Project performance

Integration of the supply chain is without a doubt an essential fundamental principle of TQM. Wallin *et al*. (20103) defines supply chain quality management as a systems-based approach to performance improvement that leverages opportunities created by upstream and downstream linkages with suppliers and customers. Hoffman *et al*. (2001) identify that it is believed "50 percent of a company's nonconformance are caused by defective purchased materials". Garvin (1998) points out that without acceptable components and materials, no manufacturer can produce high quality products. Buyer-seller partnerships are emphasized and by investing in these partnerships a reduction in the supplier base is necessary Smith (2001). This results in less suppliers and greater attention to detail. Supplier quality management is an important aspect of Total Quality Management since materials and purchased parts are often a major source of quality problems (Zhang, Waszink, & Wijngaard, 2000). Poor quality of supplier products results in extra costs for the purchaser. It follows that a substantial portion of quality problems will be due to the supplier. In order for both parties to succeed and their business to grow, a partnership is required.

2.3 Conceptual Framework

In this study, the dependent variable is TQM practices benefits or outcomes while the independent variables are the factors influencing implementation of TQM which are: Strategic planning, Process approach, Customer satisfaction and Supplier relationship. The relationship between independent and dependent variables is moderated by Government Policy and County governments while the intervening variable will be Organizational structure and policies. The variables and their relationship are as shown in Figure1

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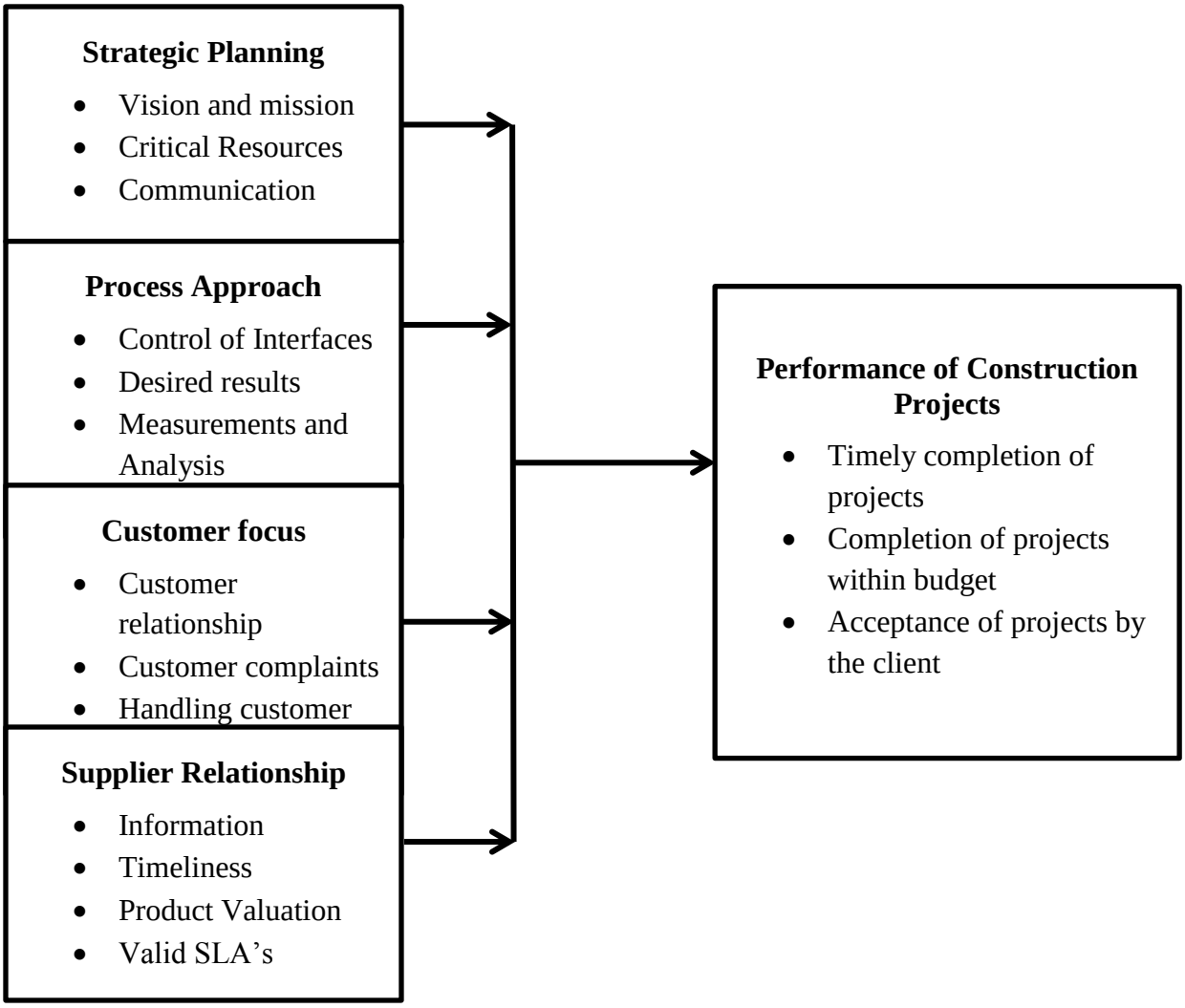

Figure 1: Conceptual Framework

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3.0 Research Methodology

In carrying out this study, the descriptive survey approach was used, where questionnaires were used to determine the opinion of the respondents on the issue under investigation. Yalams and Ndomi (1999) define survey research as the gathering of information about a large number of people or objects by studying a representative sample of the entire group through the use of questionnaires. In support of this, Nworgu, (1991) stated that research design is a plan which specifies how data relating to a given problem should be collected and analyzed. Therefore, the survey research was considered suitable since the study sought information from a targeted population using a questionnaire.

The target population of this study was 100 and comprised of the construction companies in Mombasa County while the respondents were the employees of the Construction Companies in Mombasa County. There are about 60 active construction companies. Simple random sampling was used to select 5 of the construction companies. The sample for this study comprised of selected employees from all levels and departments of the selected organizations. This is because implementation of TQM is everyone's business in the organization. The data collected was coded, and analyzed through SPSS (statistical package for social sciences). Descriptive statistics such as percentages, means and standard deviation were used to describe the factors influencing success of TQM in Mombasa County construction industry.

4.0 Results and Discussions

4.1 Hypothesis Testing

The testing was done based on the findings of chi-square test and was tested at the level of significance of 0.05

4.1.1 Inferential statistics on relationship of strategic planning and success of project performance

H_0: Strategic planning has no effect on the success of project performance in Mombasa County.

H_1: Strategic planning significant influences the success of construction project performance in Mombasa County.

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Table 1: Chi-square test association between strategic planning and success of project performance

Influence of Strategic Planning on success of TQM in construction projects performance	E	O	(O-E)	(O-E)	$(O-E)^2/E$
Firm top management has in place current mission, vision and policy statement and communicated to all employees	9	12	3	9	1.000
Firm top management has created an environment conducive to change through organizational culture of quality	15	27	12	144	9.600
Firm top management is fully participating In driving the TQM process and carrying out Periodic audits/reviews	12	5	7	49	4.083
Firm top management has organized approach to measuring performance through benchmarking	16	32	16	256	16.000
Firm top management has integrated goals and objectives established in all functions to support TQM initiative	30	6	24	576	19.200
$\sum(O-E)^2/E$					**49.883**

$Z^2=49.883 > X^2= 26.296$ at 16 degrees of freedom and 5% confidence interval.

Since the calculated chi-test value of 49.883 is more than the critical chi-square value at 5% confidence interval, we take the alternative hypothesis and reject the null hypothesis. Therefore, we secure the hypothesis that strategic planning has an influence in the success of Total Quality Management in construction projects performance and reject the hypothesis that strategic planning has no influence in the success of Total Quality Management in construction projects performance in Mombasa County.

4.1.2 Inferential statistics on the relationship between process approach in relation to success of project performance

H_0: Process approach has no effect on the success of project performance in Mombasa County.
H_1: Process approach significantly influences the success of project performance in Mombasa County.

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Table 2: Chi-Square test for the association between process approach and success of project performance

Influence of Process Approach on success of TQM in construction projects performance	E	O	(O-E)	$(O-E)^2$	$(O-E)^2/E$
Firm activities necessary to obtain the desired results are systematically defined	16	17	1	1	0.0625
Firm top management analyses and measures capability of key activities	20	10	10	100	5.000
Firm has control on interfaces of key activities between the functions of the organization	14	26	12	144	10.286
Firm top management has update risk matrix related to impacts of activities on customers, suppliers and other interested parties	8	17	9	81	10.125
Firm has focused resources, methods and materials that can improve key activities of the organization	24	12	12	144	6.000
$\sum(O-E)^2/E$					**31.4732**

$Z^2=31.4732>X^2=26.296$ at 16 degrees of freedom and 5% confidence interval.

Since the performed chi-square value of 31.4732 is greater than the critical chi-square value at 5% confidence interval, we accept the alternative hypothesis and reject the null hypothesis. We conclude with the hypothesis that process approach influences success of construction projects performance in the County of Mombasa and nullify the hypothesis that says, process approach has no influence on success of Total Quality Management in construction projects performance in the County of Mombasa.

4.1.3 Inferential statistics on the association between customer satisfaction and success of project performance

H_0: Customer satisfaction has no effect on the success of project performance
H_1: Customer satisfaction significantly influences the success of project performance

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Table 3: Chi-Square test on the association between customer satisfaction and success of project performance

Influence of customer satisfaction on success of TQM in construction project performance	E	O	(O-E)	$(O-E)^2$	$(O-E)^2/E$
The organization provides differentiated Services to clients in their construction projects	14	8	6	36	2.571
The organization maintains close contact with client during delivery of construction projects	12	26	14	196	16.333
My organization strives to meet and exceed customer needs and expectations	28	9	19	361	12.892
My organization incorporate customer needs in developing and offering them services	7	16	9	81	11.571
My organization conducts a customer Satisfaction survey	21	23	2	4	0.190
TOTAL					**43.557**

$Z^2 = 43.557 > X^2 = 26.296$ at 16 degrees of freedom and 5% confidence interval.

Since the performed chi-square value of 43.557 is greater than the critical chi-square value at 5% confidence interval, we accept the alternative hypothesis and reject the null hypothesis. We conclude with the hypothesis that customer satisfaction influences success of construction projects performance in the County of Mombasa and negate the hypothesis that say, customer satisfaction has no influence on success of Total Quality Management in construction projects performance in the County of Mombasa.

4.1.4 Inferential statistics on the Relationship between supplier relationship and success of project performance

H_0: Supplier relationship has no effect on the success of project performance
H_1: Supplier relationship significantly influences the success of project performance

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Table 4: Chi-Square test on association between supplier relationship and success of project performance

Influence of supplier relationship on success of TQM in construction project performance	E	O	(O-E)	$(O-E)^2$	$(O-E)^2/E$
The firm work with suppliers to improve quality of service	26	21	5	25	0.962
The firm practice outsourcing to cut costs of service	32	17	15	225	7.031
The firm has in place an organized system for handling customer complaints	3	10	7	49	16.333
The firm has a know your business partners system in place	13	24	11	121	9.308
The firm maintains an updated suppliers /team information data base	8	10	2	4	0.500
TOTAL					**34.134**

Z^2=34.134>X^2= 26.296 at 16 degrees of freedom and 5% confidence interval

Since the performed chi-square value of 34.134 is greater than the critical chi-square value at 5% confidence interval, we accept the alternative hypothesis and reject the null hypothesis. Based on the sample information, conclude with the hypothesis that supplier relationship influences success of construction projects performance in the County of Mombasa and negate the hypothesis that say, supplier relationship has no influence on success of Total Quality Management in construction projects performance in the County of Mombasa.

5.0 Conclusion

The study aimed at establishing the influence of TQM principles on success of project performance in the construction industry. Undeniably, TQM principles contribute significantly to the improvisation of project performance for any construction organization or industry.

In conclusion, it was important to assess this study in context of its limitation. The limitation of this study was that data used to test the hypotheses were collected from only five construction firms in the construction industry within Mombasa County.

The study examined the relationship between total quality management (TQM)'s principles and quality outcomes of the construction organizations using Chi-Square test and hypotheses was tested simultaneously. In Chi-Square test analysis, relationship between TQM principles and objectives of the study was, strategic planning (49.883), Process approach (31.472), Customer satisfaction (43.557) and Supplier partnership (34.134). All the performed Chi-Square values were greater than the critical Chi-Square value (26.296 at 16 degrees of freedom and 5% confidence interval).

6.0 Recommendations

The study established that influence of TQM principles had a positive and significant association with the success of the project performance in construction industry in Mombasa County. The study supports the hypotheses and is an indicator that implementation of TQM in construction industry is important for the success of construction projects performance in Mombasa County. Finally, the study recommended that the construction firm management in Mombasa County should support fully the implementation of TQM principles in all activities in relation to construction projects in order to efficiently execute organization strategic plan, process management, customer satisfaction management and supplier partnership management. Commitment and the support of the management are important to continue the process. Management should provide a base to collaborate all parties into the process in which the collaboration of all parties in quality management process is important to lead towards construction project success.

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