

# Factors Associated with Quality Management Practices towards Performance of Construction Project: Analytical Study of Ayabaraya

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**Abstract**— This paper analyzed the influence of total quality management practices on performance of Ayabaraya construction project. The specific objectives were to examine the influence of customer focus on performance of Ayabaraya construction project in Kicukiro District; to analyse the influences of top management commitment on performance of Ayabaraya construction project in Kicukiro District; to assess the influence of Continuous improvement process on performance of Ayabaraya construction project in Kicukiro District; and to analyze the influence of supplier partnering practices on performance of Ayabaraya construction project in Kicukiro District. The population was 72 employees and suppliers dealt day to day with construction of Ayabaraya project in IDP of Kicukiro District (Kigali); this paper used stratified and simple random sampling techniques to select departments, and universal sampling technique to select 72 respondents in construction of Ayabaraya project as sample size. Data collection methods were questionnaire; and documentary review. Data analysis methods were descriptive statistical method, and correlation matrix. Findings showed the perception of respondents confirmed that they are providing differentiated services to clients help to success of Ayabaraya construction project, confirmed by 91.7% respondents. Findings perceptions of respondents confirmed that Ayabaraya construction has been setting up and serving on a quality committee, stated by 91.7% respondents; it has been formulating and establishing quality policies and objectives, confirmed by 87.5% respondents; Ayabaraya has been providing resources and training, confirmed by 90.3% respondents. Findings show the influences of continuous improvement process on performance of Ayabaraya construction project, as confirmed by how Ayabaraya construction works towards improving every face of the project stated by 86.1% respondents; Ayabaraya carries the research on construction industry at all levels, stated by 80.6% respondents. Findings in table 4.9 illustrates perceptions of respondents on the influences of supplier partnering practices on performance of Ayabaraya construction project, show that Ayabaraya works directly with suppliers to improve quality of service confirmed by 88.9% respondents; Ayabaraya shares the use of statistical controls with supplier partners, stated by 91.7% respondents. Based to the findings on correlation matrix show that there is moderate correlation between customer focus and performance of construction projects as Pearson correlation is 0.486. The p-value is 0.000, which is less than standard significance levels of 0.05. In this research, researcher confirmed a relationship between customer focus and performance of construction projects. The results show that there is strong correlation between continuous improvement process and performance of construction projects as Pearson correlation is 0.577. The p-value is 0.000, which is less than both standard significance levels of 0.05 and 0.01. Therefore, the stakeholders should have the duties like management skills in the site and use them effectively. The

actors in government should mostly visit to communities and provides advices on life style in construction housing projects, Kicukiro District.

**Keywords**— Total quality management, performance, IDP, construction project.

## I. INTRODUCTION

In developing a total quality culture in construction, one important step is to develop a construction team of a main contractor, subcontractors and suppliers who would commit to the quality process and develop a true quality attitude (Kasongo and Moono, 2010).

Quality improvement has developed a considerable force throughout the world. Although methods to improve and manage quality are numerous, it can be supposed that TQM has converted one of the most successful practices in helping companies enhance competitiveness and prosperity through ensuring sustainable growth (Osayawe and Mc Andrew, 2005).

In developed countries, although there is strong relationship between TQM and market orientation in the perspective of customer satisfaction, TQM is found to have a strong and positive impact on organizational project performance (Mehmet and Lenny, 2006). TQM is a serious determinant in the success of manufacturing organizations. In most highly industrialized countries of the world like United States, Japan, and the European Union, the implementation of total quality management has turn out to be a common practice and a preferred approach for enlightening quality (Hokoma, and Hussain, 2010).

In Africa, total quality management has increasingly been introduced into the construction industry across many countries of sub-Sahara as an improvement strategy, but there are many barriers impeding its effectiveness in implementation. It was found that partnering can facilitate TQM application, yet the quintessential nature on the linkage between the two techniques is still not clear due to a lack of rigorous verifiable empirical evidence (Ibrahim and Imtiaz, 2010).

In EAC countries, construction industry in Kenya is suffering from poor quality results. The construction projects face challenges such as the most critical of which are include gross safety violations evidenced by a number of cases of buildings collapsing around the country. The quality

management as a challenge for the Kenyan construction industry and long-established that majority of building contracts in Kenya suffer cost and time overruns (Dindi, 2004).

Tanzania's construction industry is a sector of the economy that transforms various resources into constructed physical economic and social infrastructure necessary for development (MoW, 2003). Construction sector creates about 9% of employment and an average construction in capital formation is about 57%. However, the quality of the construction product of Tanzania stays in traditional approach through various site inspection and approval of construction materials (MoID, 2006).

In Uganda, the quality of links remained reportedly poor as several national bridges have collapsed or been washed away by rain soon after construction. Several studies have been carried out on total quality management practices and product quality in bridge construction, however few studies are known about the relationship between total quality management and product quality in Uganda bridges (Kiwalabye *et al.*, 2020).

In Rwanda, total quality management within a construction project talk both the management of the project and the product of the project. Failure to meet quality requirements in either dimension have serious and negative consequences for any or all of the project stakeholders. Quality management complement modern project management as they both recognize the importance of customer satisfaction, prevention over inspection, management responsibility and processes within phases. Quality management remains the act of overseeing all activities and tasks needed to maintain a desired level of excellence (Abbidan, 2014).

Thus, the role of construction quality and continuous improvement is vital in the development of construction industry of growing nations. Construction quality and regular improvement is related with the adoption of quality management systems in construction companies. It is therefore important that satisfactory measures are put in place to safeguard quality in the sector. Total Quality Management (TQM) is measured as one of the most important approaches to achieve quality in construction Industry not only in Rwanda but the world over.

## II. RESEARCH PROBLEM

Despite the construction quality and regular improvement related with the adoption of quality management systems in construction companies; Total Quality Management (TQM) practices required for strengthening customer focus and satisfaction, management commitment, supplier associating practices, and improvement process of quality of products and services, capacity of the production line, market share, and competitive position.

TQM practices are reducing the production development time, waste of inventory, work in process, cost, delivery times, employee turnover and complaints resolution (Kubal and Fung, 2009).

A number of building projects in Rwanda have been reported to have abandoned and others collapsed due to quality issues, a building collapsed for example, in Nyagatare

District Eastern Province in 2013, killing six people and hurting 30 others, most of these buildings collapse due to poor supervision, poor construction procedures, and poor inspection (Auditor general report, 2019). On 17 November 2018, WASAC signed an agreement with contractor for construction works of Rebero Mageragere prison water supply system in Kicukiro and Nyarugenge Districts. On November 2019, Office of Auditor general visited the construction works in 20 days after completion expected date, and they found uncompleted works include construction works for 50 m<sup>3</sup> concrete water tanks at Ayabatanga village, construction of Kimisange to Nyarufunzo pipeline, construction of 250 m<sup>3</sup> reinforced concrete water tank in Nyarurama Village, construction of water taps on Rebero-Mageragere prison water supply system.

WASAC and REG were accused to never produce on time their financial statements, and the management seems not to be in charge of responsibility due to the lack of ownership and commitment in corporate governance that affected the construction works delay. According to the information above and the associated issues in construction projects, this paper was investigating the influence of total quality management practices on performance of Ayabaraya construction project of Kicukiro District-Kigali.

## III. PURPOSE OF THE STUDY

Generally, this paper analyzed the influence of total quality management practices on performance of Ayabaraya construction project. The specific objectives of this study are:

- 1) To examine the influence of customer focus on performance of Ayabaraya construction project in Kicukiro District
- 2) To analyse the influences of top management commitment on performance of Ayabaraya construction project in Kicukiro District
- 3) To assess the influence of Continuous improvement process on performance of Ayabaraya construction project in Kicukiro District
- 4) To analyse the influence of supplier partnering practices on performance of Ayabaraya construction project in Kicukiro District

## IV. RESEARCH HYPOTHESES

This study verified the following four hypotheses.

Ho1: There are no significant influences of customer focus on performance of Ayabaraya construction project in Kicukiro District

Ho2: There are no significant influences of top management commitment on performance of Ayabaraya construction project in Kicukiro District

Ho3: There are no significant influences of Continuous improvement process on performance of Ayabaraya construction project in Kicukiro District

Ho4: There are no significant influences of supplier partnering practices on performance of Ayabaraya construction project in Kicukiro District

## V. LITERATURE REVIEW

### 5.1 Total Quality Management Practices

Total quality management is another common way that companies are optimizing their supply of goods and products. TQM procedure allows businesses and companies to help increase the quality of their products while also reducing their total cost to obtain the supplies (Hassan, *et al.*, 2012).

There are various critical TQM practices which include the role of the quality department and employee relations, service and product design, supplier quality management, process management, top management commitment, quality policy and role of divisional top management and quality policy. This section of this paper discusses the TQM practices adopted in construction projects.

#### 5.1.1 Customer focus and management and performance of construction projects

The firms have implemented TQM practices focus on serving their customers. The organizations should first get to know their customers' requirements and expectation and should strive to offer the services and products (Sadikoglu and Olcay, 2014).

In construction, customer focus/management principle consists of achieving the project requirements in regard to the client specification and technical specification. It consists of maintaining a close relationship with the customer and to embrace the client focus in the quality management process, and developing a strategic alliance with the client (Low and Tan, 2002).

#### 5.1.2 Knowledge and process management and performance of construction projects

Knowledge and process management factors ensures that staff have access to reliable, timely, accurate, consistent and necessary information and data needed to do their job efficiently and effectively in the organization (Sadikoglu and Olcay, 2014).

In regard to the construction industry, the information collected from each construction project is important for implementing quality management standards in future construction projects.

#### 5.1.3 Strategic quality planning and performance of construction projects

Strategic planning contains the values, mission and vision of an organization. These are formed on the basis of introducing a quality concept. An effective strategic quality plan, staff are regarded as an input in developing the mission, vision, objectives and strategies.

This often facilitates support and acceptance of strategic quality plan by staff. Successful strategic quality planning efforts also consider the possibility effects of the plan to the environment before the production and this manifest itself in the improved social responsibility of the organization (Sadikoglu and Olcay, 2014).

#### 5.1.4 People management and performance of construction projects

People management revolves around the collaboration between no managers and managers, and suppliers and customers. This principle is related with the systems view of

firms and is based on advantages that can potentially be derived through partnerships among the parties (Dean & Bowen, 1994).

Furthermore, empowerment of staff emphasized whereby staff are motivated to inspect their own work and fix quality problems with the provision of necessary resources and supporting framework. Moreover, effective training improves staff loyalty to the organization, work performance and motivation (Low, and Koh, 2010).

#### 5.1.5 Leadership/top management and performance of construction projects

Top leadership commitment is an important aspect in management of quality which leads to increased performance in quality. The top management commitment remains a key driver of TQM practice, systems and values and establishing goals to meet and exceed client expectation and needs and enhance performance of the organization. Top management role is manifested in the commitment, involvement and leadership in driving TQM implementation thus top management creates firm quality goals and values (Jaafreh, 2013).

#### 5.1.6 Supplier management and performance of construction projects

The supplier management emanates from the realization that organizations rely on each other for resource allocation. The collaboration between suppliers and an organization thrive on the cooperative interdependence. A construction project often involves several suppliers and the culture of low bidders is often practiced but is looked down upon for a firm that is trying to achieve quality management.

### 5.2 Performance of Construction Projects

Organizational performance is an outcome of company's operation which eventually causes achievement of organizational goals. Organizational performance is equal to reduction in employee turnover, occurrence of costly accident and disorders, and improvement in employee's performance, teamwork, and many more (Chan & Tam, 2000). There are six variables that have been identified for measuring project performance. They are cost, time, quality, clients' satisfaction, health and safety and functionality.

*Cost performance*; cost is defined as the degree to which the general conditions promote the completion of a project within the estimated budget. The cost variance was the most common technique used to measure design performance (Salter & Torbett, 2003).

*Time performance* is very important for construction projects to be completed on time, as the clients, users, stakeholders and the general public usually looks at project success from the macro view where their first criterion for project success appeared to be the completion time (Lim and Mohamed, 2000).

*Quality performance*; in the construction industry, quality is defined as the totality of features required by a product or services to satisfy a given need, or fitness for purpose. In other words, the emphasis of quality in construction industry is on the ability to conform to established requirements.



*Clients' satisfaction*; satisfaction is regarded as a function of comparison between an individual's perception of an outcome and its expectation for that outcome. In the construction industry, client's satisfaction has remained an elusive and challenging issue for some considerable time (Contract Journal, 2004).

*Client's satisfaction* is therefore a fundamental issue for construction participants who must constantly seek to improve their performance if they are to survive in the global marketplace. In the construction industry, the measurement of client's satisfaction is often associated with performance and quality assessment in the context of products or services received by the client (Soetanto and Proverbs, 2004).

*Health and safety* are defined as the degrees to which the general conditions promote the completion of a project without major accidents or injuries. The measurement of safety is mainly focused on the construction period as most accidents occur during this stage. Throughout the world, construction industry is known as one of the most hazardous activities (Sousa and Teixeira, 2004).

**5.3 Theoretical Review**

Juran's theory elaborated Juran in 1992 where he associated with quality trilogy through proposing for organization to achieve and maintaining quality management. This trilogy consists of quality improvement, quality planning and quality control. The trilogy stresses the developing and changing of quality management in a firm's top-level management. Strengths of this theory is looked on how it showed ways of quality planning that comprises of designing a procedure that meets set goals.

This process needs to determine goals, performing a resource plan, creating a quality plan and planning implementation. The quality control process involves amending and operating the process so as to attain highest effectiveness by monitoring performance contrasting achievements made with set objectives and action to close any deviations.

Weaknesses of theory, this theory doesn't show effective factors of project performance as result of TQM in construction projects. However, this process entails comparing the actual performance with the intended goals and in case there is a major discrepancy there are changes and adjustments to the system are performed to make sure the achievement of set goals.

This paper used this theory to evaluate how Quality improvement seeks to take the organization performing to superior and new levels of customer satisfaction, enhancing employee morale, improving logistics, reduce waste and improving performance of construction project of Ayabaraya in Kicukiro.

Deming's philosophy of TQM which was a basis for this study, combines a paradigm shift in management capability with statistical methods and thinking in the operations of an organization (Leonard, 2010). The 14 points of management, developed by Deming in 1950 is a set of management practices to help companies increase their productivity and quality. These points are not static but keep on changing with the business environment.

These principles are: adopting and instituting leadership in the organization, ending the culture of awarding jobs on the basis of pricing alone by minimizing total costs by working with a one supplier; creating a constancy of purpose to improve services and products; removing barriers to staff workmanship in the firm and also eradicating merit system or yearly ratings.

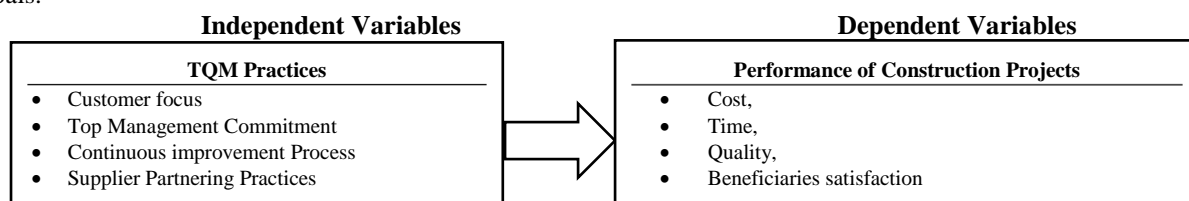
Adopting the TQM philosophy; driving out fear; constantly and continuously improve each process for production, service and planning; institutionalization of a vigorous training regime for self-improvement for all staff in the organization; elimination of exhortations, targets and slogans for the staff; managing the process and not the outcome, breaking down barriers between departments and staff and eliminating numerical goals for management and numerical quotas for the workforce. There are several principles which apply to the construction industry (Githenya and Ngugi, 2014).

Deming's principles provide a clear picture of how quality can be enhanced in organizations with the focus of this study being on the application of TQM in the construction industry.

**5.4 Conceptual Framework**

In order to solve the problem of this study, the researcher founds the relationship between independent variables in terms of TQM practices, and dependent variables is performance of Ayabaraya construction project.

The conceptual framework is revealed in the figure 1 as follows:



Source: Researcher compilation 2021

**VI. METHODOLOGY**

**6.1 Research Design**

This paper adopted a quantitative and correlative approaches to describe and draw interpretations from the

findings on influences of TQM practices on performance of Ayabaraya construction project.

6.2 Population

Target population of this survey was 72 employees and suppliers dealt day to day with construction of Ayabaraya project in IDP of Kicukiro District (Kigali).

6.3 Sample Size and Sampling Design

The study used the stratified and simple random sampling techniques to select all 72 respondents dealt day to day with construction of Ayabaraya project in IDP of Kicukiro District (Kigali).

6.4. Data Collection Instruments

Questionnaires were distributed to respondents selected from team management in construction of Ayabaraya construction project of Kicukiro District. The questionnaire was designed through five likert-scales. Questionnaire was composed by close end, and expected participation rate was 100% of responding the questions.

Document review was used by the researcher to obtain the information about a phenomenon. In this study, the documents targeted were the available reports related to construction processes of Ayabaraya construction project in Kicukiro District and its performance.

6.5 Data Processing and Analysis Methods

In data analysis, a cross tabulation and correlation analyses were carried out to present the background information against the study variables and established the strength of the relationship between variables respectively. Correlation matrix analysis was used to determine variance in the dependent variable that was explained by the independent variable.

helped to continue the study with editing, coding, recording, classifying and tabulating data in order to make statistical tables using SPSS IBM version 21.0. Distribution of respondents by gender which indicated 58.3% of respondents were males while 41.7% respondents were females in Ayabaraya construction project. Findings confirmed that single was 44.4%; married were 47.2%; while widow (er) was 8.3% of the respondents participated in the study. The age of respondents presented by 30.6% respondents have age between 21 and 30years while majority of 56.9% have ages between 31 and 40years; 8.3% respondents have age between 41 and 50years while 4.2% have ≥ 51years.

The age distribution of survey respondents showed that majority of the respondents were mature enough on age between 31 and 40 years and are over-represented in this survey sample, followed by young adults age between 21-30 years.

The education background of respondents is shown by 6.9% of respondents have masters and above; 27.8% of respondents have bachelor’s degree while majority of 48.6% of the respondents have secondary level but most of them confirmed that they are still studying university, and 16.7% of respondents have professional courses.

Findings presenting how long respondents have been knowing Ayabaraya construction project in Kicukiro District. Only 5.6% respondents have experience of less than 1 years; 22.2% have between 2-3years; majority of 48.6% respondents have experience between 4-5years, while 23.6% respondents have > 6years at Ayabaraya construction project in Kicukiro District.

7.1 Descriptive Statistics Results

VII. RESULTS AND DISCUSSIONS

The findings indicated the participation rate of 100.0% of answering the questions contents questionnaire, and this

Table 1: Perception of respondents on the influences of customer focus on performance of Ayabaraya construction project in Kicukiro District

Customer focus and performance of Ayabaraya construction project	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Providing differentiated services to clients help to success of Ayabaraya construction	27	37.5	39	54.2	2	2.8	1	1.4	3	4.2
Having customer focus usually a strong contributor to the overall success of Ayabaraya construction project in Kicukiro.	29	40.3	35	48.6	5	6.9	1	1.4	2	2.8
Running a customer focused welfare helps Ayabaraya project build a loyal customer base.	34	47.2	31	43.1	2	2.8	4	5.6	1	1.4
Having customer focus usually includes maintaining an effective customer relations and service program in Ayabaraya construction in Kicukiro.	21	29.2	43	59.7	1	1.4	1	1.4	6	8.3
The more loyal customers are to a business, the more likely they are to refer the products or services top friends, family and business associated.	29	40.3	37	51.4	2	2.8	3	4.2	1	1.4
Customers are more willing to purchase from companies that they feel consider their needs when they create products and services.	22	30.6	41	56.9	7	9.7	1	1.4	1	1.4
Ayabaraya construction provides differentiated services to clients in their construction projects successful.	27	37.5	38	52.8	2	2.8	3	4.2	2	2.8
They maintain close contact with client during delivery of construction project of Ayabaraya in Kicukiro.	29	40.3	34	47.2	3	4.2	4	5.6	2	2.8
They are providing indirect services to customers’ construction projects of Ayabaraya in Kicukiro.	29	40.3	34	47.2	3	4.2	4	5.6	2	2.8
There is effective communication between client and contractor in construction projects.	27	37.5	39	54.2	2	2.8	1	1.4	3	4.2
There is a teamwork philosophy in controlling ongoing construction projects.	34	47.2	31	43.1	2	2.8	4	5.6	1	1.4
The organization focuses on customer requirements in undertaking construction projects.	21	29.2	43	59.7	1	1.4	1	1.4	6	8.3

Source: Data from field, (2021)

They are providing differentiated services to clients help to success of Ayabaraya construction project, confirmed by 91.7% respondents strongly agreed and agreed on this statement; having customer focus usually a strong contributor

to the overall success of Ayabaraya construction project in Kicukiro confirmed by 88.9% respondents; running a customer focused welfare helps Ayabaraya project build a loyal customer base, confirmed by 90.3% respondents; having

customer focus usually includes maintaining an effective customer relations and service programme in Ayabaraya construction in Kicukiro, confirmed by 88.9% respondents; the more loyal customers are to a business, the more likely they are to refer the products or services top friends, family and business associated, confirmed by 91.7% respondents; customers are more willing to purchase from companies that they feel consider their needs when they create products and services, stated by 87.5% respondents; Ayabaraya construction provides differentiated services to clients in their construction projects successful, confirmed by 90.3%

respondents; they are providing indirect services to customers' construction projects of Ayabaraya in Kicukiro, stated by 87.5% respondents.

There is effective communication between client and contractor in construction projects, confirmed by 91.7% respondents; there is a teamwork philosophy in controlling ongoing construction projects, stated by 90.3% respondents; and the organization focuses on customer requirements in undertaking construction projects, confirmed by 88.9% respondents in Ayabaraya construction project.

Table 2: Perceptions of respondents on the influences of top management commitment on performance of Ayabaraya construction project

Top management commitment and performance of Ayabaraya construction	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Ayabaraya construction has been setting up and serving on a quality committee.	29	40.3	37	51.4	2	2.8	3	4.2	1	1.4
It has been formulating and establishing quality policies and objectives.	22	30.6	41	56.9	7	9.7	1	1.4	1	1.4
Ayabaraya has been providing resources and training	27	37.5	38	52.8	2	2.8	3	4.2	2	2.8
Evaluating and revising the policy in light of results achieve.	29	40.3	34	47.2	3	4.2	4	5.6	2	2.8
They are overseeing implementation at all levels of the project.	15	20.8	49	68.1	3	4.2	3	4.2	2	2.8

Source: Data from field, (2021)

Table 3: Perceptions of respondents on the influences of Continuous improvement process on performance of Ayabaraya construction project

Continuous improvement process and performance of Ayabaraya construction	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Ayabaraya construction works towards improving every face of the project.	24	33.3	38	52.8	6	8.3	2	2.8	2	2.8
Ayabaraya carries the research on construction industry at all levels.	40	55.6	18	25.0	7	9.7	5	6.9	2	2.8
Ayabaraya is able to achieve 100% customer satisfaction within construction industry.	27	37.5	39	54.2	2	2.8	1	1.4	3	4.2
Ayabaraya observes quality improvement at all levels.	29	40.3	35	48.6	5	6.9	1	1.4	2	2.8
Ayabaraya has created an effective quality assurance team.	34	47.2	31	43.1	2	2.8	4	5.6	1	1.4

Source: Data from field, (2021)

Table 4: Perceptions of respondents on influences of supplier partnering practices on performance of Ayabaraya construction project

Supplier partnering practices and performance of Ayabaraya	SA		A		N		D		SD	
	fi	%	fi	%	fi	%	fi	%	fi	%
Ayabaraya works directly with suppliers to improve quality of service.	21	29.2	43	59.7	1	1.4	1	1.4	6	8.3
Ayabaraya shares the use of statistical controls with supplier partners.	29	40.3	37	51.4	2	2.8	3	4.2	1	1.4
Ayabaraya practice outsourcing to cut costs of service delivery.	22	30.6	41	56.9	7	9.7	1	1.4	1	1.4
Ayabaraya seeks out feedback from suppliers.	27	37.5	38	52.8	2	2.8	3	4.2	2	2.8
Ayabaraya maintains contractor's information data base.	29	40.3	34	47.2	3	4.2	4	5.6	2	2.8

Source: Data from field, (2021)

Ayabaraya construction has been setting up and serving on a quality committee, stated by 91.7% respondents; it has been formulating and establishing quality policies and objectives, confirmed by 87.5% respondents; Ayabaraya has been providing resources and training, confirmed by 90.3% respondents; evaluating and revising the policy in light of results achieve, confirmed by 87.5% respondents; and they are overseeing implementation at all levels of the project, confirmed by 88.9% respondents in Ayabaraya construction project.

Ayabaraya construction works towards improving every face of the project stated by 86.1% respondents; Ayabaraya carries the research on construction industry at all levels, stated by 80.6% respondents; Ayabaraya is able to achieve 100% customer satisfaction within construction industry, confirmed by 91.7% respondents; Ayabaraya observes quality improvement at all levels, stated by 88.9% respondents; and Ayabaraya has created an effective quality assurance team, confirmed by 90.3% respondents.

Ayabaraya works directly with suppliers to improve quality of service confirmed by 88.9% respondents; Ayabaraya shares the use of statistical controls with supplier partners, stated by 91.7% respondents; Ayabaraya practice outsourcing to cut costs of service delivery, stated by 87.5% respondents; Ayabaraya seeks out feedback from suppliers, confirmed by 90.3% respondents; and Ayabaraya maintains contractor's information data base, confirmed by 87.5% respondents.

### 7.2 Correlation Matrix

A correlation matrix is a table showing correlation coefficients between variables. Each cell in the table shows the correlation between two variables. A correlation matrix is used to summarize data, as input into a more advanced analysis, and as a diagnostic for advanced analyses. Table 5 below shows correlation coefficient matrix between variables under study in this research paper

Table 5: Correlation matrix Test

		Customer focus	Top Management Commitment	Continuous improvement Process	Supplier Partnering Practices	Performance of Construction Projects
Customer focus	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	72				
Top Management Commitment	Pearson Correlation	.656**	1			
	Sig. (2-tailed)	.000				
	N	72	72			
Continuous improvement Process	Pearson Correlation	.588**	.185	1		
	Sig. (2-tailed)	.000	.120			
	N	72	72	72		
Supplier Partnering Practices	Pearson Correlation	.719**	.845**	.248*	1	
	Sig. (2-tailed)	.000	.000	.036		
	N	72	72	72	72	
Performance of Construction Projects	Pearson Correlation	.486**	.140	.577**	.124	1
	Sig. (2-tailed)	.000	.241	.000	.301	
	N	72	72	72	72	72

\*\**. Correlation is significant at the 0.01 level (2-tailed).*  
\**. Correlation is significant at the 0.05 level (2-tailed).*

From the correlation matrix table 5, the results show that there is a strong correlation between customer focus and top management commitment as Pearson correlation is .656 with the p-value of 0.000, which is less than both standard significance levels of 0.05 and 0.01. This indicates that, out of the considered other factors influence performance of construction project, only customer focus has significant influence on top management commitment in Ayabaraya construction project.

The results also show that there is strong correlation between customer focus and continuous improvement process as Pearson correlation is 0.588. The p-value is 0.000, which is less than both standard significance levels of 0.05 and 0.01. This indicates that, out of the considered other factors of performance of construction project, only the customer focus has significant relationship with continuous improvement process influencing performance of construction project.

The results show that there is very strong correlation between customer focus and supplier partnering practices stimulating performance of construction project as Pearson correlation is 0.719. The p-value is 0.000, which is less than both standard significance levels of 0.05 and 0.01. Table reveals that there is moderate correlation between customer focus and performance of construction projects as Pearson correlation is 0.486. The p-value is 0.000, which is less than standard significance levels of 0.05. In this research, researcher confirmed a relationship between customer focus and performance of construction projects. From the correlation matrix Table, the results also show that there is a very strong correlation between top management commitment and supplier partnering practices as Pearson correlation is 0.845 with the p-value of 0.000, which is less than both standard significance levels of 0.05 and 0.01.

The results show again that there is moderate correlation between continuous improvement process and supplier partnering practices as Pearson correlation is 0.248. The p-value is 0.000, which is less than both standard significance levels of 0.05 and 0.01. The results show that there is strong correlation between continuous improvement process and performance of construction projects as Pearson correlation is

0.577. The p-value is 0.000, which is less than both standard significance levels of 0.05 and 0.01.

VIII. CONCLUSION AND RECOMMENDATIONS

Conclusion

Based to the findings for this study, the problem of the study was solved, the research objectives were achieved, research questions were answered and research hypotheses were verified. Therefore, the results help to confirm that there is significant correlative between total quality management practices and performance of Ayabaraya construction project.

Recommendations

The recommendations are addressed to decision makers and implementers of IDP activities towards beneficiaries. During construction and post-constructive phase numerous trainings should be given especially to beneficiaries where these trainings should cover the ways the project management, natural resources management and catchment development.

The stakeholders should have the duties like management skills in the site and use them effectively. The actors in government should mostly visit to communities and provides advices on life style in construction housing projects, Kicukiro District. For this reason, further empirical investigations in different regions and countries are needed. The methodology that has been chosen to achieve the research objectives was limited to questionnaires. Then, the researcher open the door to further researchers to consider other factors which influence performance of construction project in Rwanda.

REFERENCES

- [1] Buckley & Logan, (2016). *World green building trends 2016: developing markets accelerate global green growth*. Bedford (MA): Dodge Data & Analytics.
- [2] Chen (2004). *ISO 14001, EMAS, or BS 8555: An Assessment of the Environmental Management Systems for UK Businesses*. Norwich, University of East Anglia.
- [3] Chen (2005) *Incorporating green purchasing into the frame of ISO 14000*. J. Clean. Prod. 2005, 13, 927–933.
- [4] Christinia, H. (2004). *Environmental management systems and ISO 14001 certification for construction firms*. Journal of Construction Engineering and Management, 130(3), 330-336.



- [5] Dixon (2010). *The impacts of construction and the built environment*. Briefing notes, Wilmott Dixon Group.
- [6] Floraand M., (2000). *Driving Market Demand for Green Buildings in Pittsburgh*. In Green Building Alliance, Proceedings from the International Conference on Sustainable Building (pp. 70-72).
- [7] Guidance, (2011). *The green book. Appraisal and Evaluation in Central Government*, London
- [8] Jana, (2007) *Environmental management systems and construction SMES: A case study for Slovenia*, Journal of Civil Engineering and Management, 13:3, 217-226
- [9] Johnstone & Labonne (2009). *Why do manufacturing facilities introduce environmental management systems? Improving and/or signaling performance*. Ecological Economics, 68(3), 719-730.
- [10] Massoud (2010). *Environmental management system (ISO 14001) certification in developing countries: challenges and implementation strategies*.
- [11] Maurel (2013). *Study on Environmental Management Systems in construction companies* (Bachelor's thesis, Universitat Politècnica de Catalunya).
- [12] Ofori & Briffett, (2002). *Implementing environmental management systems in construction: lessons from quality systems*. Building and environment, 37(12), 1397-1407.
- [13] Sachs, & Teksoz, (2016). *SDG Index and dashboards a global report*. New York: Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN).
- [14] Šelih, (2007). *Environmental management systems and construction SMES: a case study for Slovenia*. Journal of Civil Engineering and Management, 13(3), 217-226.
- [15] Stapleton & Davis, (2001) *Environmental management systems: An implementation guide for small and medium-sized organizations*. Technical Rep., NSF International, Ann Arbor, Mich.