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## Contribution of quality assurance practices by contractors on quality of public building projects in Kenya by devolved units: A case of Busia County in Western region, Kenya

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### ABSTRACT

*The activities of the construction industry are vital to the achievement of national socio-economic development goals of providing shelter, infrastructure, and employment. The sector accounts for five percent of the gross domestic product (GDP) in Kenya and employs about 13 percent of the country's total workforce. The devolved units (counties and constituencies) have invested the substantial amount of public funds in infrastructure development and yet social audit and media reports have raised the concern over the poor quality of the projects undertaken by these devolved units. This study, therefore, sought to investigate the contractors' operations in the quality assurance process and how they affect the quality of the public building projects. A case involving sixty-four projects sampled from Busia County and its seven constituencies was carried out. The study was a sample survey whose data was collected using questionnaires, interviews and physical observation exercise. The data were analyzed using descriptive statistics and Chi-square good-for-fit tests. The findings indicated the insufficient participation of the contractors as quality assurance providers in the construction process of the public building projects undertaken by devolved units. The participation rate was at 43% which implied that the projects were constructed with inadequate checks on quality through the assurance process. The physical observation assessment revealed the quality of the public building projects stood at 34% compliance to building specifications and standards which is inadequate to meet the required standards. It is concluded that the involvement of contractors in the quality assurance process in the construction management process of public building projects undertaken by the devolved units was inadequate and impacts negatively on the quality of the projects. In order to achieve the sustainable development as far as the infrastructural development is concerned, the involvement of contractors as quality assurance providers in the construction process was critical. This therefore called for the development of the legal and quality frameworks to guide the construction sector at the devolved units.*

**Keywords**— *Quality, Assurance, Public, Projects, Contractors*

### 1. INTRODUCTION

In the global perspective, the construction industry plays an important role in the global economy. The activities of the Construction industry are also vital to the achievement of national socio-economic development goals of providing shelter, infrastructure, and employment. The construction industry in the East African Region is the fastest growing sector however, the contractors face challenges of lack of capacity and professionalism giving the advantage to foreign contractors to do the bulk of construction works in the region. The construction sector is indisputably among the key pillars of the Kenyan economy. According to the Economic Survey of 2013, the sector is one of the fastest growing having recorded a growth of 4.8 percent in 2012 compared to 4.3 percent in 2011. The sector accounts for five percent of the gross domestic product (GDP) and employs about 13 percent of the country's total workforce. The level of the sector's importance to the economy is well demonstrated by the amount of money being pumped into it. In 2012, loans and advances to the sector increased by 36.2 percent from Sh50.8 billion in 2011 to Sh69.2 billion in 2012. Overall expenditure for the Ministry of Roads in 2011/2012 financial year stood at Sh91.5 billion and rose to Sh117.6 billion in 2012/13.

Devolution in Kenya brought about the rapid spread of public building projects all over the republic through devolved funds. The devolved public funds have reached citizens in the rural areas/settlement through the hire of contractors at the grassroots as well as the affirmative action for preserved tenders for Women, Youth, and Persons with Disabilities. The volume of construction works in Kenya has increased tremendously with a devolved system of governance. Quality is critical in achieving the structural integrity, functional, aesthetic and economic aspects of the building projects. Quality is one of the important key performance indicators of a construction project which may cause cost overrun and time delays. It is the foundation for attaining the socio-

economic development of the infrastructure for the society. The construction process under devolved units has glaring challenges on quality. The reports from the stakeholders and studies show that a large amount of money has been allocated to public building projects whose qualities are below expectations. Some money has been allocated to ghost public building projects through corruption (NTA, 2012). The reports further show how shoddy jobs of public building projects have been approved by the Ministry of Public Works officials through corruption where millions have been paid for poorly constructed projects. The devolved funds have been used in various projects with an aim of improving the lively hood of all Kenyans. Quite a substantial amount of these funds is invested in the building and construction sector which has experienced challenges in the quality management of the production/construction processes. The role of the contractor in the quality assurance process at the implementation stage of the project is critical to the achievement of the good quality projects. The contractor's capacity to carry out construction activities professionally is key to quality assurance. It is therefore of great interest to investigate the operations of the contractor in the implementation of the public building projects to determine how quality assurance process is observed during the construction period of the projects. This study, therefore, investigated the operations of the contractors during the construction period to determine the effect of quality assurance on the quality of public building projects.

The purpose of the study was to assess the level of quality assurance by the contractors for public building projects by devolved units to determine how it affects the quality of the projects. This was done by examining operations of the contractors during the construction period to establish compliance with quality assurance.

- i) To determine how the contractors carry out the construction activities during the construction period to meet the quality required in the project designs.
- ii) To establish the level of compliance to quality assurance by the contractor and how it affects the quality of the project.
- iii) To assess the contractors' capacities in ensuring the quality assurance during the construction of the public building projects.

The study was guided by the theoretical framework model developed to provide the linkages of the construction management process and the roles and responsibilities of the stakeholders in achieving the objective of the projects. The foundation of the study was based on the concepts of system theories that have been developed from the conception of European philosophy as described by Bertalanffy V.L (1968). In this model, the roles and responsibilities of the system are given alongside the actors. The focus of this study was the roles and responsibilities of the public works officers as project managers. The paradigm in this study took a divergence approach from the traditional system approaches/ theories where systems are viewed in general terms of an organization to a business approach where the concepts of economy, quality, and professionalism are the central nerve of a system. It is in this context that the paradigm of this study was functionalist. This paradigm has the dimension of objectivists and regulatory (Saunders, Lewis and Thornhill, 2012). Objectivism is the ontological position adopted in the functionalist paradigm. It is regulatory in that the study was concerned with a rational explanation about the influence of contractors on the quality of the projects.

Quality is viewed as "performance to standards or value paid for the price (Abas, Khattak, Maqsood & Ahmad, 2015). For construction, firm quality is nothing but the satisfaction of customers and fulfillment of their requirements within a specified budget. Quality assurance is a set of planned and systematic actions to ensure that products and services comply with specified requirements (ISO, 9001). It is referred to as a scheme adopted by a construction company to maintain the standard or quality consistent. It is primarily an internal management system of a construction company. Generally, a company maintains a quality assurance chart by specifying various checks at different levels as well as constantly improving its attributes. A quality assurance program may include; an arranging periodical training for its worker, a good safety Programme, a sound procurement system to get best quality material and suppliers and a reward scheme for innovative work and competitive career progress scheme. It is the responsibility of the contractor to take charge of Quality Assurance of the project under his contractual obligations. On the other hand quality control is the periodic inspection to ensure that the constructed facilities meet the standard specified in the contract. It is usually carried by a team of owner's engineers/consultants. The quality control begins with the owner's choice of the consultants led by an Architect. The quality control is seen as the responsibility of the client who sets the standards and desires of his or her project. Quality control is the part of quality management that ensures products and services comply with requirements. It is a work method that facilitates the measurement of the quality characteristics of a unit, compares them with the established standards, and analyses the differences between the results obtained and the desired results in order to make decisions which will correct any differences.

Hoonakker, Carayon&Loushine (2010) found out that contractors consider customer satisfaction, management commitment to quality, return business and a skilled workforce as the best measures of quality. They argue that contractors' own perceptions of quality and customer satisfaction are the aspects most often associated with quality. Meeting design codes and warranties are less important. The contractors see the lack of quality as a slightly less important problem than safety. The involvement of an employee, management commitment, a skilled workforce, and good communication are considered important characteristics for improving the quality of construction projects. Good quality performance makes the construction project successful. The performance can be increased by studying and improving the factors that affect the quality significantly (Abas et al, 2015). Ashokkumar (2014) enumerated nine (9) factors that affect the quality of the construction industry in terms of limitations. They include limitations to finance, communication, labor and wage, weather, building plan, and construction detail, materials and equipment, time, construction methodology and rule/regulation. Rad and Khosrowshahi (1998) examined the perspectives of the three parties involved in construction projects on quality. The parties involved are the Client/Owner, the Contractor and the Third party (quality assurance and local authorities). The results show that 35% of the contractors claimed to know about the requirements of the quality for construction projects. The results further showed that 39% of the clients/owners claimed over the quality and only 26% of the third party claimed over the quality of construction projects. The results showed that lack of concern on the side of parties involved in the construction industry on quality is above 60%. Memon, Abro &Mugheri (2011) through a survey found out that both consultants and contractors realized the importance of quality management in the design and

construction phase of the project. However, there is a lack of quality management procedures in the design and construction process. Consequently, the quality of design and construction is affected. Poor quality in design and construction affects the maintenance cost and level of service of the project. They concluded that the contractors should take some proactive measures in order to improve the quality in the execution phase of construction projects.

**2. METHODS**

The study was a sample survey carried out in Busia County in the Western Region of the Republic of Kenya. The philosophical view of pragmatism guided the study. Pragmatism is abductive and applies mixed research design and methods (Bristow, 2016). In seeking to address the problem of the effect of quality assurance by contractors on quality of public building projects, the pragmatism philosophy was, therefore, more appropriate. The study applied the strategy of mixed methods in looking for answers to the research questions. The study utilized a number of methods to achieve the objectives. The roles and responsibilities of the contractors as quality assurance party involved in the construction process of public building projects formed the independent variables and the quality of the project was the dependent variable. The review of the related literature and construction procedures in Kenya provided the ground upon which the factors assessed in the study were developed. The construction period phase in construction management process provided the roadmap for investigation carried out in the study. Based on observations made in the pilot study, corrections were made on research instruments (questionnaires, interview schedules, and observation checklist). The contractors were rated against the factors considered key for their participation in quality assurance. The objectives of the study were formulated in a way that they required quantitative data to be collected to facilitate the determination of the level of participation and compliance to procurement procedures. The data received from the field was analyzed. The study population was 70 building projects. The study used random and purposive sampling techniques. The descriptive statistics and the chi-square tests were applied in data analysis. The pilot study and triangulation techniques were used to test the internal and external validity of the study respectively. The Cronbach’s alpha and focused group discussions were used to test the internal and external reliability of the study respectively. The results obtained were used to draw the conclusions and recommendations of the study.

**3. RESULTS**

This study revealed that the contractors involved in the public building projects were of lower categories with low capacity. The affirmative action contractors had registered the businesses after the constitution of 2010 and therefore they lack experience and capacity to handle projects with a bigger scope of works beyond classrooms, simple health facilities, and administrative offices. The findings were found in agreement with those of Katende, Alinaitwe & Tindiwenzi (2011) and Kazawadi (2014) for on local contractors studies carried out in Uganda and Rwanda respectively. The results, therefore, show that the contractors for the public building projects by devolved units (Constituencies and Counties) in Kenya lack the capacity to effectively manage the quality assurance process during the construction period.

Quality assurance process is key to quality achievement by the contractor. A total of sixty-four projects were involved in the study. The county projects were eight and each of the seven constituencies had eight projects involved in the study. 89% of the questionnaires given to the contractors were received back and 79% found to be valid. Scholars have held varied response rates however the response rate of 60% has been found adequate in most of the studies. Fincham (2008) and Johnson & Owens (2013) agree that an average response rate of 60% is adequate enough for the surveys.

The table provides the summary of the factor considered at stages in construction management process and how they were scored as far as the participation of the contractors were concerned.

**Table 1: The summary of factors considered in construction period stage of the construction management process**

Stage	Factors considered	Factors scored by the contractors	Rank	Participation %	Remarks
Contractual Documents	4	2	2/4	50.00	Inadequate
Project Implementation	11	4	4/11	36.00	Inadequate
<b>Total</b>	<b>15</b>	<b>06</b>	<b>6/15</b>	<b>43.00</b>	<b>Inadequate (below average)</b>

Source: Field Survey 2017

The results show that the participation of contractors in the construction management process of the public building as being 50% and 36% for contractual documents and construction period, respectively. The results show the meaningful participation of 43% which was below average and inadequate to attain the required quality (value of money). The implication of these results was that the contractors are not committed to quality assurance process in the construction of the public building projects.

To examine the roles and responsibilities of the contractors involved in the construction management process of public building projects and how they contribute towards the quality of these projects, the chi-square goodness-of-fit-test was applied to the scores obtained from the questionnaires. The summary of the scores is presented in Table 2.

**Table 2: The scores for the participation of public works officers in the devolved construction process**

Stage	Score	
	Score(O)	Expected (E)
Contractual Documents	2	4
Project construction period	4	11

Source: Field Survey 2017

From the scores, the researcher tested whether the County procurement officers in construction management process of public building projects were involved fully as per laid down procedures. The research claim was that the County procurement officers were fully involved in all stages of the devolved construction process of public building projects. At  $\alpha=0.05$ , the claim was tested. The critical value was determined at the degree of freedom of  $2-1=1$  and  $\alpha=0.05$ . The critical value = 3.841 (chi-square distribution tables). The chi-square source table is as shown below.

**Table 3: The Chi-square source table for the results of public works officers' participation in the construction process.**

Stage	Scores				
	Score(O)	Expected (E)	O - E	(O - E) <sup>2</sup>	$\frac{(O - E)^2}{E}$
Contractual Documents	2	4	-2	4	0.00
Project Construction Period	4	11	-7	49	4.45
<b>Total</b>					<b>4.45</b>

Source: Field survey 2017

Decision: the decision was to reject the claim since  $4.45 > 3.841$

From the results, there was enough evidence to reject the claim that contractors in construction were fully involved in the quality assurance process of devolved construction management process of public building projects that requires their professional services.

The contractors' participation was at 43% which was very low showing how the construction of public building projects was being constructed with insufficient quality assurance process. At 43% participation of the contractors in public building projects implied that the projects were constructed quality assurance which led to poor quality. The study, therefore, established that the roles and responsibilities of contractors as project quality assurance providers have a great impact on the quality of the public building projects. Lack of full participation of contractors in the construction of the public building project contributes negatively to the quality of such projects. To authenticate the results of the study, the physical observation exercise was carried on selected projects from those involved in the study.

The physical observation was carried out on eight selected projects. It focused on the signs of failure (poor workmanship, cracks, lack of straightness, plumpness, and level). The observation checklist covered ten well-recognized factors considered as critical for physical observation. The factors were given one point for each and observation checklist scored accordingly.

The factors assessed were evidence of visible cracks and deformed structural members, exposed coarse aggregates, exposed reinforcement steel bars, leaking roofs and moisture content in walls, lack of plumpness and leveling, straightness, quality finishes, quality fittings, and quality painting.

The results from the physical observation exercise are given in table 4.

**Table 4: The Scores Obtained from the Physical Observation**

Projects	Factors		Rank	%
	Evidence of signs for failure/poor quality			
	Expected	Score		
1	10	7	7/10	70
2	10	2	2/10	20
3	10	3	3/10	30
4	10	1	1/10	10
5	10	3	3/10	30
6	10	8	8/10	80
7	10	1	1/10	10
8	10	2	2/10	20
<b>Total</b>	<b>80</b>	<b>27</b>	<b>27/80</b>	<b>33.75(34)</b>

Source: Field Survey 2017

The results show that only two projects (P1 and P6) had the quality level above 50%. They were 70% and 80% for projects 1 and 6 respectively. Project 6 was the best in terms of quality followed by project 1. They were found to have adequate quality. The rest of the projects were found to be below average quality (50%). Projects 4 and 7 were with the least adequate quality of 10%, followed by projects 2 and 8 with 20% and finally projects 3 and 5 with 30%. The results, therefore, showed that only 25% of the observed projects had the quality above average and 75% had the quality below average. The average of the quality assessment was 34% which is quite inadequate.

From the scores, the researcher tested whether there was evidence of signs of poor quality in the selected eight projects. The research claim was that there was no evidence of signs of poor quality exhibited by the projects that were physically observed against the factors in the observation checklist. At  $\alpha=0.05$ , the claim was tested.



The critical value was determined at the degree of freedom of  $8-1=7$  and  $\alpha=0.05$ . The critical value = 14.067 (chi-square distribution tables).

**Table 5: The Chi-Square source table for the results of Physical Observation**

Project	Score(O)	Expected (E)	$O - E$	$(O - E)^2$	$\frac{(O - E)^2}{E}$
1	7	10	-3	9	0.9
2	2	10	-8	64	6.4
3	3	10	-7	49	4.9
4	1	10	-9	81	8.1
5	3	10	-7	49	4.9
6	8	10	-2	4	0.4
7	1	10	-9	81	8.1
8	2	10	-8	64	6.4
Total					<b>40.1</b>

Source: Field survey 2017

Decision: the decision was to reject the claim since  $40.1 > 14.067$

From the results, there was enough evidence to reject the claim that there was no evidence of poor quality signs exhibited by the projects that were physically observed against the factors in the observation checklist. The results, therefore, show that there was evidence of signs of poor quality in the public building projects observed. The results agree with those of the questionnaires and interviews.

#### 4. CONCLUSIONS AND RECOMMENDATIONS

The study concludes that the roles and responsibilities of the contractors as public building project quality assurance providers were critical in the achievement of the quality of public building projects. The study revealed a great departure from the centralized construction management process by the devolved units. The devolved construction management process does not allow the full participation of contractors in the construction process. The construction process under devolved construction management process does not recognize the quality assurance process as stipulated in the building codes. The construction of the public building projects is done without proper quality assurance and control strategies which led to poor quality.

The study recommends the following:

- The roles and responsibilities of contractors on quality assurance should be outlined and the stakeholders in the construction of public buildings projects sensitized about them so as to bring professional quality assurance process in the construction management process by devolved units.
- The quality management framework should be developed by counties to check on the construction of the public building projects and other infrastructure development.
- The department of the supply chain at the county level should be given a full mandate to plan and procure the services for the public building projects to ensure the devolved construction management process acquire competent contractors.

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