

# **Influence of Public Works Officers on Quality of Public Building Projects Undertaken by Devolved Units: A Case Study of Public Building Projects in Busia County**

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## **Abstract**

*The construction sector is a key player for sustainable development. Both levels of government in Kenya (National and County) have identified construction sector as a driver of the development agenda. The devolved units (counties and constituencies) have invested quite substantial amount of public funds in infrastructure development and yet social audit and media reports have raised the concern over poor quality of the projects undertaken by these devolved units. This study therefore sought to investigate the roles played by the public works officers as the consultants for public building projects. A case study involving sixty four projects randomly sampled from Busia County and its seven constituencies was carried out. Eight projects were randomly sampled from County projects and each of the seven constituencies giving a total of sixty four projects involved in the study. The study was a sample survey whose data was collected using questionnaires, interview schedules and physical observation exercise. The data was analyzed using descriptive statistics and Chi-square good-for-fit tests. The findings indicated very low participation of the public works officers in the construction process of the public building projects undertaken by devolved units. The participation rate was at 15% which implied that the projects were constructed without proper design, supervision and technical input by the consultants. The physical observation assessment revealed quality of the public building projects stood at 34% compliance to building specifications and standards which is inadequate to meet required standards. It is concluded that the involvement of public works officers in the construction management process of public building projects undertaken by the devolved units is inadequate and impacts negatively on quality of the projects. In order to achieve the sustainable development as far as the infrastructural development is concerned, more involvement of consultants in construction process will be critical. This therefore calls for development of the legal and quality frameworks to guide the construction sector at the devolved units.*

**Key words:** Quality, public building projects, devolved units.

## **INTRODUCTION**

Civilization of man started with provision of shelter and ever since human beings have indulged in some form of construction activity (Chiktara, 2002). Clifford and Richard (2004) argue that man's engineering efforts are recorded by constructed systems such as works to bring water to the population of a city. The purpose of those created systems and structures was to support civilization. The global construction industry currently represents about 13% of global Gross Domestic Product (GDP) and this number will increase to 15% in 2020. Construction in developing or emerging markets is set to increase by 110% and infrastructure

construction by 128% with China being the primary engine of growth accounting for 20% of this growth. These numbers are projected with the after effects of the financial crisis and subsequent global rescue packages factored in (David, 2013). Kenya Economic Survey (2014) indicates that new gross domestic product (GDP) figures show that the building and construction sector grew by 5.5 per cent in 2013 compared to 4.8 per cent in 2012. The Kenya National Bureau of Statistics (KNBS) (2013) attributed the expansion to an increase in the value of building plans approved in the sector, which rose to Ksh.243 billion from Ksh.181 billion in 2012. The construction industry is one of the main drivers of Kenya's economic growth and accounts for at least five per cent of the country's GDP. The construction industry provides employment to energetic population and its role in provision of construction products (infrastructure and buildings) cannot be over emphasized. The World Bank (2015) report projected a steady economic growth rate of 5.4 percent in 2015 and it was projected to reach 5.7 percent in 2016. This economic growth was attributed to the heavy investment by the government in construction industry both at the National and County Government levels.

In recent times, Kenya has experienced rapid spread of construction projects all over the republic through devolved funds. The Government has devolved public funds to reach citizens in the rural areas/settlement. Devolution of these funds has succeeded politically in the sense that the constituents are managing these funds. Economically in the sense, that the local people get employment through these projects. The reports from the stakeholders and studies show that large amount of money has been allocated to public building projects whose qualities are below expectations. Some money had been allocated to ghost public building projects through corruption (NTA, 2012). The reports further showed how shoddy jobs of public building projects had been approved by Ministry of Public Works officials through corruption where millions had been paid for poorly constructed projects. The devolved funds have been used in various projects with an aim of improving the livelihood of all Kenyans. Quite substantial amount of these funds is invested in building and construction sector which has experienced challenges in quality management of the production/construction processes. The devolved construction process comes with its effects or influence on the overall quality of the construction products and services. The impact of the devolved construction process can be traced from the time the Constituency Development Funds and other devolved public funds were established through legislation in the National Assembly (CDF Act, 2003). Hearn and Buffardi (2016) explain how impact is used in development programme/investments. They view an impact as an effect or influence of one thing to another.

Construction industry in Kenya has experienced persistent problems of buildings collapsing during and after the construction process. In a record of 15 months between 2015 and 2016, Kenya witnessed six instances of collapsing buildings as reported by the daily local newspapers (Daily Nation and Standard 3<sup>rd</sup> May, 2016). These experiences raised the concerns and ministry of public works was tasked to find the causes to persistency collapse of buildings and provide the solutions. The reports on collapse of buildings showed that the buildings were under private ownership where the greedy owners constructed them without following the right procedures. The plans were not approved and no professionals were involved in the implementation of such buildings. Nyakiongora (2015) established that the services

of qualified technical personnel in construction industry who could have detected early warning were not sought as per the requirement. The public buildings before devolution were designed, approved and implemented by the government professionals in construction. These projects stood the test of quality in all aspects. With devolution, the construction management process has been largely left to the local committees to run the process just as it has been the case of private buildings where the owners are left to hire the professionals to manage the construction process. The lack of participation of the government professionals (public works officers) in the construction of public building projects leads to un-procedural and uncoordinated construction process whose products exhibit poor quality. It is of great interest therefore to investigate the participation of the public works officers in the construction process of public building projects by devolved units to determine their influence on the quality of the projects.

The purpose of this study was to assess the influence of the public works officers on quality of public building projects. This was done through examining their participation in the construction management process of the projects to determine the level of compliance to professionalism by the devolved units during and after the construction of the public building projects. The objectives of the study were:

- i) To determine the participation of public works officers in project initiation, tendering, implementation and built environment management.
- ii) To establish if there exists the difference in terms of the technical input to construction of public buildings by the public works officers for projects undertaken by the National Government and those by the devolved units (Counties and Constituencies).
- iii) To carry out basic physical observation of some of the selected public building projects to determine the level of compliance to the building specifications and standards (quality).

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 Ludwig von Bertalanffy (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 in construction management which is a system involving various players (construction parties). 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 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 this study was concerned with a rational explanation about the influence of public works officers on quality of the projects.

The review of related literature shows that the construction industry plays an important role in the global economy. The activities of construction industry are

also vital to the achievement of national socio-economic development goals of providing shelter, infrastructure and employment. Raftery, Pasadilla, Chiang, Hui and Tang (1998) studied the globalization of construction industry in Asia and found out that increased foreign participation in domestic construction affected the technical, managerial and financial capabilities of the local contractors. They suggested that long term technology transfer via joint ventures between the foreign and local contractors could fill the gap. Katende and Tindiwensi (2011), Kazawadi (2014) and Osei (2013) agree with above findings in the studies carried out in Uganda, Rwanda and Ghana respectively.

Professionals view procurement as absolutely crucial to the delivery of a project on time, on budget and to a high quality, with 87% of respondents of the belief that good procurement is synonymous with a successful project (CIOB, 2010). United Nations (2017) defines public procurement as the purchase of goods, services and works by public authorities or civil service organizations using public funds.

In Kenya, the construction sector is among key pillars for her economy. It accounts for five percent of her GDP. Lidonga (2015) extensively reported on the following as the causes for the building failures; poor design and non-compliance, greedy property owners, cost cutting and use of sub-standard materials, lack of quality control system and incompetent contractors. The Nyakiongora report (2015) identified four causes of collapse of buildings in Nairobi which in principal agrees with what Lidonga (2015) reported.

*Quality* is defined as 'fitness to purpose' that is in terms of construction; it is providing a building which provides an appropriate quality for the purpose for which it is intended to (Fayol, 2016). Abas *et al.*, (2015) outlined the factors that affect the quality of construction projects in Pakistan, India, Gaza strip, Hong Kong and Malaysia. The factors in depth seemed to have emerged as a result of the roles played by different parties in construction process starting from the design stage, procurement and implementation of construction projects. Memon, Abro and 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 project. Sysoulath and Jokkaw (2015) found the top ten most significant factors that affect quality as per local respondent's perspective. The factors were ranked according to significance to the quality. The top on the significance scale was the skills of the operatives and at the bottom was the client's satisfaction.

## METHODOLOGY

The study was a sample survey carried out in Busia County in Western Region of the Republic of Kenya. The philosophical view of pragmatism guided the study. The pragmatists are seen as architects in research management. In this approach they are described as doers; problem solvers or outcome seekers. Pragmatism is abductive and applies mixed research design and methods (Bristow, 2016). Pragmatists argue that the most important determinant of the epistemology, ontology and axiology to adopt is the research question (Saunders, Lewis and Thornhill, 2012). Pragmatists' belief is that positivism, interpretivism and realism none of them will be appropriate to answer all the concerns/questions of a research problem. In seeking to address the problem of influence of public works officers 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 public works officers 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 literature related and construction procedures in Kenya provided the ground upon which the factors assessed in the study were developed. The phases in construction management process provided the road map 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 check list). The public works officers were rated against the factors considered key for their participation. The objectives of this study were formulated in a way that they required a quantitative data to be collected to facilitate the determination of level of participation and compliance to specifications, procedures and building standards. The data received from the field was analyzed. The study population was 70 building projects from which 64 were sampled using sample determination tables (The Research Advisors, 2006). 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 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.

## **RESULTS AND DISCUSSIONS**

The human resource is critical in construction management process of the public building projects. Among the human resource in construction are consultants. They are county public works officers who are the legally constituted professional team for public building projects in the county and other devolved units (constituencies). The study recognized the county works officer who is the head of the county public works department as a key respondent. Others were the county quantity surveyor, county mechanical engineer, county structural engineer, county electrical engineer, supervisors building, electrical and mechanical services. These were the consultants in the study. 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. 100% of the questionnaires given to the consultants were received back and found to be valid. Scholars have held varied response rates however the response rate of 60% has been found adequate in most of studies. Fincham (2008) and Johnson and Owens (2013) agree that an average response rate of 60% is adequate enough for the surveys.

The table provides the summary of the factors considered at every stage in construction management process and how they were scored as far as the participation of the public works officers are concerned.

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

Stage	Factors considered	Factors scored by the consultants	Rank	Participation %	Remarks
Project initiation	22	4	4/22	18.20	Inadequate
Project tendering	17	3	3/17	17.65	Inadequate
Project implementation	15	3	3/15	20.00	Inadequate
Built environment management	12	0	0	0	Nil
Total	66	10	10/66	15.00	inadequate

Source: Field Survey, 2017

The results show the participation of public works officers in the construction management process of the public building as being 18.20%, 17.65%, 20.00% and 0% for project initiation, tendering process, implementation and built environment management respectively. The total participation was at 15% which is very low and inadequate to attain the required quality. To examine the roles and responsibilities of the public works officers 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 are presented in table 2.

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

Stage	Score	
	Score(O)	Expected (E)
Project Initiation	4	22
Project Tendering	3	17
Project implementation	3	15
Built environment management	0	12

Source: Field Survey, 2017

From the scores, the researcher tested whether the public works officers in construction management process of public building projects were involved fully as per laid down procedures. The research claim was that the public works officers were fully involved in all stages of 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  $4-1=3$  and  $\alpha=0.05$ . The critical value = 7.815 (chi-square distribution tables). The chi-square source table is as shown in table 3.

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

Stage	Scores				
	Score(O)	Expected (E)	$O - E$	$(O - E)^2$	$\frac{(O - E)^2}{E}$
Project Identification and Design	4	22	-18	324	14.73
Project Tendering	3	17	-14	196	11.53
Project implementation	3	15	-12	144	9.60
Built environment management	0	12	-12	144	12.00
Total					<u>47.86</u>

Source: Field survey, 2017

Decision: the decision was to reject the claim since  $47.86 > 7.815$

From the results there was enough evidence to reject the claim that public works officers in construction were fully involved in all stages of devolved construction management process of public building projects.

The consultants' participation was at 15% which was very low showing how construction of public building projects were being constructed with minimal involvement of the consultants (public works officers). At 15% participation of the consultants in a building project implied that the projects were constructed without proper design, supervision and technical input, such projects exhibited poor quality. Failure to comply with professional construction process, automatically led to poor quality projects. The study therefore established that the roles and responsibilities of public works officers have a great impact on the quality of the public building projects. Lack of full participation of public works officers in the construction of the public building project contributed negatively to the quality of such projects.

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 check list 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
Total	80	27	27/80	33.75(34)

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 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			40.1

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.

The findings of this study showed how the devolved construction management process lacked the effective management team, uncoordinated construction process and poor implementation strategies of the public construction projects. The findings concurred with those of Rad & Khosrowshahi (1998) showing lack of concern on the side of construction parties on quality management and Abas *et al.* (2015) found that factors that affect the construction management in Hong Kong were poor participation of the client, lack of effective project management and effective construction team contributed towards poor quality projects. They also found out that in Malaysia lack of technical personality and lack of awareness about quality management system and lack of trained workers led to poor quality. In Gaza strip they found that the political environment and poor documentation were main challenges to quality management of the construction projects, a fact that this study also established. It was therefore established by this study that the roles and responsibilities of the construction parties in the construction of the public building projects contributed negatively on the quality of the projects. They contributed towards the poor quality public building projects funded by devolved funds.

## CONCLUSION AND RECOMMENDATIONS

The study concludes that the roles and responsibilities of the public works officers are critical in achievement of the quality 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 full participation of public works officers in construction process. The construction process under devolved construction management process does not recognize the supervision and inspection processes by Public Works Officers. The construction of the public building projects was done without sufficient technical and professional involvement which leads to poor quality.

This study recommends the following:

- i) The roles and responsibilities of the construction parties should be outlined and the stakeholders in the construction of public buildings sensitized about them so as to bring professionalism in the construction industry in devolved units.
- ii) The quality management framework should be developed by counties to check on the construction of the public building projects and other infrastructure development.
- iii) The department of the public works at county level should be given full mandate to plan and implement the public building projects to ensure the devolved construction management process is carried out professionally.

- iv) The county government should provide the supervision and inspection services to constructions projects at the county level. This will enhance the quality of the public projects. The clerk of works should be hired for public buildings and other construction works at the county to ensure the construction process complies with the building code.

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