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INFLUENCE OF TECHNICAL CAPACITY ON COUNTY ROAD CONSTRUCTION PROJECTS PERFORMANCE IN BUSIA COUNTY, KENYA

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ABSTRACT

This study investigated the influence of technical capacity on road construction projects performance in Busia County, Kenya. The study adopted descriptive survey design and targeted 123 officers consisting of prequalified contractors in Busia County, local community leaders (ward administrators, youth leaders), area MCAs, employees from County Transport and Infrastructure department, Contractors technical staff, Government road engineers, KeRRA officers, KURA officers, technical staff from surveying department, Civic education leaders from civic education department and engineers from National Construction authority (NCA). A pilot study was done in an established road contractors firm in Bungoma County to test instrument validity and reliability. Data was collected by structured questionnaires. The study concluded that technical capacity significantly influences performance of road construction projects, thus, any improvement in the road contractors' technical capacity would yield a significant progress in performance of road construction projects in Busia County. The study recommended that that all road contractors, road maintenance personnel and regulatory authorities linked to county road constructions must possess requisite technical capacity in road construction and maintenance so as to improve county road construction projects quality and performance.

Key Words: *Technical Capacity, Road Construction*

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INTRODUCTION

The construction process involves many different activities as well as participants from initial planning through execution (Gray & Larson, 2008). The requisite tasks, and the roles and responsibilities of the owner, architect engineers, construction managers, contractors, and subcontractors can be organized in a number of different ways to deliver a construction project. Despite these many options, building a major construction project today without experiencing schedule delays and cost overruns is often an exception (Wang, 2013). While there are many factors that can contribute to these poor results, there are two key success factors: effectively managing time and change for timely completion of any project (Wang, 2013).

Traditionally, infrastructure projects in Kenya were owned and managed by the government or a government undertaking. Given the massive investments required in infrastructure, which plays an important role in economic development, there is now broad consensus that County Government's participation in this activity is vital. For many infrastructure projects, such as irrigation, rural roads, electricity and water systems the active involvement of local community organizations in infrastructure planning, construction and maintenance decision was found to be critical to project success and sustainability. Theoretically, projects implemented by County government agencies have reasonable prospects for financial sustainability because such agencies are able to cover recurrent project costs from their budget (KRB, 2016).

Further, with specific reference to road construction in Kenya, a number of roads have been reported to have failed due to lack of Proper Technical supervision and management incompetence. For example dualling of Nyamasaria-Kisian Road in Kisumu, in the year 2016, showed bitumen bleeding defects soon after surface dressing. Expansion of Kisumu International Airport, Road works, 2015, which was earmarked to be completed in fifteen months, ended up being completed in twenty-five months and experienced a lot of cost overruns, the project therefore end up being unsuccessfully completed,(Kenya Engineer Magazine,2016). To respond to these failures, most organizations have resorted to adopt and implement operations management strategies that have been seen to work elsewhere in as much as project construction management is concerned. However, this has not been successful (Kenya Engineer Magazine, 2016).

Statement of the problem

Road transport is cardinal in Kenya's transportation sector as it caters for over 93% of all freights and passenger traffic in the country; and with the implementation of the roads subsector investment programmes and strategy, Kenya stands to reap immense benefits as a result of high quality road network (Ministry of Transport, 2014). However, road projects in Kenya have been facing numerous challenges, including completion delays, the associated cost overruns as well as the demolition of residential and business houses and abortive works to pay for such projects (Maina, 2013).

Further, evidence from enterprise surveys suggest that infrastructure constraints are responsible for about 30% of productivity handicap faced by Kenyan firms while poor governance, red tape and financing constraints are the major contributing factors to infrastructure constraints. Power is the infrastructure constrain that weighs most heavily on Kenyan firms, with transport a close second (World Bank, 2016). The Kenya governments on the other hand strive to allocate enough funds to ensure the road are maintained and improved. This is because it is clearly understood that the existence of good and well-functioning road network is vital for economic growth, poverty reduction, and wealth and employment creation, but rod construction performance in Kenya is still quite poor.

More so, estimated projected collections of the Road Maintenance Levy Fund during the Financial Year, 2013 was too high. Similarly, the estimated

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collections of the Transit Tolls during that same Financial Year was high and these two primary sources of funds; contribute to more than 99% of the funds deposited into KRBF. Additionally, large collection was received from agricultural cess. However, despite immense allocation of the fund by the government in all its financial budget, the sector face a challenge with poor management of funds, completion delays and poor delivery of services to the road user being mostly cited as the major drawback in the performance of the road sector (Ministry of Roads and Public Works, 2013).

Therefore, performance of road construction projects is generally considered to be done in on-schedule (time criterion), comes in on-budget (monetary criterion), achieves basically all the goals originally set for it (effectiveness criterion), and is accepted and used by the clients for whom the road project was intended (client satisfaction criterion), but road construction performance in Kenya is still below expectations. Thus, little empirical studies exist to ascertain key factors influencing rural performance of road construction projects and why some road construction projects succeed while others do not in Busia County is a gap that motivated this study to investigate the influence of technical capacity on road construction projects in Busia County, Kenya.

Objective of the study

The objective for this research project was to investigate the influence of Technical County on road construction projects performance in Busia County, Kenya. The study hypothesis was;

H_0: There is no significant relationship between technical capacity and county road construction projects performance in Busia County, Kenya.

LITERATURE REVIEW

Theory of constraints

The theory of constraints (TOC) is an overall management philosophy introduced by Eliyahu M. Goldratt in his 1984 book titled The Goal that is geared to help organizations continually achieve their goals. Goldratt adapted the concept to project management with his book Critical Chain, published in 1997.

The underlying premise of the theory of constraints is that organizations can be measured and controlled by variations on three measures: throughput, operational expense, and inventory. Inventory is all the money that the system has invested in purchasing things which it intends to sell. Operational expense is all the money the system spends in order to turn inventory into throughput. Throughput is the rate at which the system generates money through sales (Eliyahu & Goldratt, 2004).

Before the goal itself can be reached, necessary conditions must first be met. These typically include safety, quality, legal obligations, etc. For most businesses, the goal itself is to make money. However, for many organizations and non-profit businesses, making money is a necessary condition for pursuing the goal. Whether it is the goal or a necessary condition, understanding how to make sound financial decisions based on throughput, inventory, and operating expense is a critical requirement (Eliyahu & Goldratt, 2004). Theory of Constraints is based on the assumption that just like the value chain there is the weakest link, in any multifaceted system at any given time, in most cases there is a limiting factor that hinders the achievement of certain goal or objectives. Therefore, for any system to achieve the intended objectives and goals, this constrain must be identified and analyzed critically.

In this regard, project managers need to assess the constrains in the entire project that may hinder effective objective selection and proper implementation of policies and programs and thus enabling the project to achieve the intended goals and objectives. Theory of constrain provides an adequate paradox method of solving a problem in an organization. It provides solution of a construction constrain, business constrain and supplier constrains. In conclusion, the theory was useful in explaining project planning where proper

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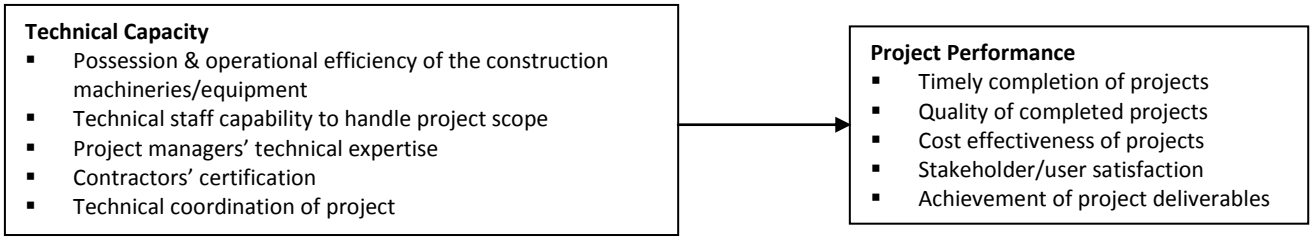
objective selections, policy implementation and procedure alignment should be done in order to check any constrains; and constraints relating to local politics and technical capacity of contractors can affect timely completion of quality road construction projects in Busia County.



Independent Variable **Dependent Variable**

Figure 1: Conceptual Framework

Empirical Review

Kent (2011) asserted that based on informed contractors or consultancy firms' opinion, a range of estimates for the minimum required skill mix and the number of required staff with requisites skills per unit can be established as points of reference. To translate a project's staff skills and expertise into effective action, staff members must have the motivation and willingness to discharge their responsibilities and perform mandated functions according to norms of professional behavior. Staff motivation and will to act is not directly observable, but it is linked to incentives and rewards for good performance within a project team.

The relative attractiveness of the agency's compensation package and prospects for professional growth and promotion can motivate staff and serve as incentives for good performance. Norms of professional behavior set standards and expectations on how staff members ought to conduct themselves in the course of their work. The degree to which these standards are adhered to also provide some indication of quality of staff performance and how effectively an agency is managed (Kent, 2011).

Gardner (2003) also found that skilled personnel staff entrusted with project execution should have required technical expertise in the area. Where necessary, skill levels should be augmented to meet the needs and with ongoing investments in developing such capacity within the office as necessary.

In a study conducted by Assaf et al. (2014) it was found that difficulty in coordination between the parties is one of the factors that contribute to project completion delay. That is, coordination problems due to incompetency of project manager may cause project delays. In a road construction project, there are many parties involved such as contractor, consultant, sub-contractor and client. Often, it may be difficult for these various separate parties to coordinate well in order to complete the project.

Further, Ali et al. (2008) found that that lack of coordination between contractors and subcontractors will lead to delay, for example in the situation that newly revised contractions drawings of a project may be issued later by the contractors to the subcontractors. This leads to construction mistakes and the work requiring to be redone. Reconstruction work takes additional time, therefore impacting upon the completion time of the project.

According to Sambasivan and Yau (2007), most of the unskilled laborers used in the Malaysian construction industry are foreign laborers. These foreign laborers have little formal education (Santos *et al.,* 2003). Thus, coordination is very important to guide and instruct these laborers to perform their work correctly. Without coordination, the project will be delayed due to rectifying defective works and low productivity of laborers.

Juliet and Ruth (2014) did an evaluation of factors affecting performance of construction projects in

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Niger state. The variables used in this study focused on experience and qualification of personnel, quality of equipment and raw materials as well as conformance to specifications. The research recommended further studies on continuous coordination and relation between project participants in order to develop project performance.

Enshassi, Mohamed and Abushan (2009) also did a study on factors affecting the performance of construction projects in the Gaza strip. Their variables focused on delays due to road closures, qualification of personnel and availability of quality raw materials. The researchers recommended that further studies should focus on developing human resources in the construction industry through proper and continuous training programs about construction project performance.

METHODOLOGY

In this study, the researcher used descriptive research survey design. Descriptive research involves collecting data that answers questions about the participants of the study. The target population was 123 respondents that is, those cases that contain the desired information comprised of prequalified contractors in Busia County, local community leaders (ward administrators, youth leaders), area MCAs, Employees from County Transport and Infrastructure department, Contractors technical staff, Government road engineers, KeRRA officers, KURA officers, technical staff from surveying department, Civic education leaders from civic education department and engineers from National Construction authority (NCA). The study's sample size was determined using Taro Yamane's proportional sampling technique formula. The data analysis in this study involved the use of descriptive and inferential statistics. SPSS version 23 is the computer analysis tool that was used in this study.

FINDINGS

Descriptive statistics are responses on conceptualized study variables based on statements measured on Likert scale where; 1.strongly disagree, 2.disagree, 3.uncertain, 4.agree, 5.strongly agree. The results in tables were thus frequencies, their corresponding percentages in brackets, means and standard deviations. This study assessed whether technical capacity influences county road construction projects performance in Busia County, Kenya. The results were shown in table 1 with frequencies and percentages in brackets.

Table 1: Descriptive statistics: Technical Capacity

Statement	5	4	3	2	1	mean	Std.dev
1.Most road contractors have genuine certification from NCA	5(5.9)	47(55.3)	3(3.5)	26(30.6)	4(4.7)	3.78	0.783
2.Most road contractors have technical staff capability to handle project size and time limits	9(10.5)	40(47.1)	6(7.1)	25(29.4)	5(5.9)	3.63	0.879
3.Project managers' technical expertise influence project quality	10(11.8)	59(69.4)	5(5.9)	8(9.4)	3(3.5)	3.81	0.982
4.The construction machineries/equipment owned by certified road contractors work very well without frequent breakdowns	7(8.2)	41(48.3)	12(14.1)	17(20.0)	8(9.4)	3.61	0.871
5.Technical coordination of road construction projects influence construction quality and timely completion	12(14.1)	57(67.1)	7(8.2)	6(7.1)	3(3.5)	3.94	0.912
Valid listwise 85							
Grand mean = 3.754							

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First, from table 1, most respondents agreed (55.3%) and strongly agreed (5.9%) that most road contractors have genuine certification from NCA, while interestingly 30.6% disagreed to the statement implying that some road contractors do not have genuine certification from NCA, thus could be reasons for poor performance of some roads in the county. Secondly, while 47.1% of respondents agreed that most road contractors have technical staff capability to handle project scope, 29.4% of respondents disagreed to this statement meaning that there are cases where some road contractors do not have technical staff capability to handle project scope, thus affects road construction quality.

Thirdly, most respondents agreed (69.4%) agreed that project managers' technical expertise influence project quality, which was also reinforced by 48.3% of respondents who agreed that there is operational efficiency of the construction machineries and equipment owned by certified road contractors. This generally implied that project managers' technical expertise combined with operational efficiency of the construction and equipment owned by certified road contractors really influences road construction quality and performance.

Lastly, most respondents (67.1%) agreed that technical coordination of road construction projects influence construction quality and timely completion of road construction projects. This is supported by Kent (2011) who asserted that based on informed contractors or consultancy firms' opinion, a range of estimates for the minimum required skill mix and the number of required staff with requisite skills per unit can be established as points of reference. Thus, to translate a project's staff skills and expertise into effective action, staff members must have the motivation and willingness to discharge their responsibilities and perform mandated functions according to norms of professional behavior.

Inferential statistics

This assessed the direct influence of technical capacity on county road construction projects performance in Busia County, Kenya. The results were shown in table 2.

Table 2. linear influence of technical capacity on road projects performance

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.733[a]	.538	.532	.26016	.538	96.466	1	83	.000

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.529	1	6.529	96.466	.000[a]
	Residual	5.618	83	.068		
	Total	12.147	84			

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.480	.161		9.183	.000
	Technical capacity	.446	.045	.733	9.822	.000

a. Dependent Variable: Road construction projects performance

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The model summary in table 2 indicated R^2 = 0.538 implying that 53.8% variation in the county road construction projects performance in Busia County, is explained by technical capacity while other factors not in the conceptualized study model accounts for 46.2% variation in the county road construction projects performance in Busia County. Further, coefficient analysis indicates that there exists a positive and significant effect of technical capacity on county road construction projects performance in Busia County (β= 0.446 (0.045); *at p<.01*). This implied that a single improvement in the road contractors' technical capacity would yield 0.446 unit improvement in county road construction projects performance in Busia County. Therefore, the linear regression equation is;

$y = 1.480 + 0.446X_1 + \varepsilon$

Where;

y = county road construction projects performance in Busia County

X_1 = technical capacity

ε = error term

CONCLUSIONS AND RECOMENDATIONS

- **H_{01}**: There is no significant relationship between technical capacity and county road construction projects performance in Busia County, Kenya.

H_{A1}: There is significant relationship between technical capacity and county road construction projects performance in Busia County, Kenya.

t-test statistics results: t = 2.089; *p=0.040 significant at p*< 0.05)

Verdict: Null hypothesis one (**H_0**) was rejected.

We accept the alternative hypothesis **(H_{A1}):** There is significant relationship between technical capacity and county road construction projects performance in Busia County, Kenya.

The study concluded that technical capacity significantly influences road construction projects performance; thus, any improvement in the road contractors' technical capacity would yield a significant progress on performance of road construction projects in Busia County, Kenya.

The study recommended that all road contractors, road maintenance personnel and regulatory authorities linked to county road constructions must possess requisite technical capacity in road construction and maintenance so as to improve county road construction projects quality and performance.

Areas for further research

Another study can be done on urban road construction projects in Kenya so as to compare results. A similar study can also be done on selected EU or World Bank funded road construction projects in Kenya so as to compare results.

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