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DETERMINANTS OF ROAD CONSTRUCTION PROJECT COMPLETION IN NAIROBI COUNTY, A CASE OF KENYA URBAN ROADS AUTHORITY (KURA) LISTED CONTRACTORS

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ABSTRACT

The main objective of the research study was to establish the determinants of road construction project completion in Nairobi City County. The study specific aim was to evaluate how project manager's competence influence road construction projects completion in Nairobi City County, to determine how project funds influence road construction projects completion in Nairobi City County, to examine how project equipment influence efficient road construction projects completion in Nairobi City County and to examine how Technology adoption influence efficient road construction projects completion in Nairobi City County. The study was undertaken on all KURA offices in Nairobi. The target population comprised of all members of staff in all IT, Finance, and construction departments. The fact that the organizations' head offices were all based in Nairobi made the collection of data more convenient, reliable and accurate. The study applied a descriptive research design. The study population comprised of 1,200 members of staff working in KURA in Nairobi. The study applied a stratified random sampling technique to select a sample size of 138 respondents. The gathered data were analysed using descriptive statistics aided by Statistical Package for Social Scientists (SPSS) version 22 and findings presented on tables. Inferential statistics using multiple regression analysis was applied to determine the relationship between the research variables. The study found out that project manager' competency, project fund, project automated equipment and project technology have positive and significant effect on road construction project completion. Based on the findings above the study concluded that project manager' competency, project fund, project automated equipment and project technology have an influence in road construction project completion in Nairobi county. The study recommended that project managers should be actively involved in the project from start to the end and that they require to be trained effectively to sharpen their skills hence successfully executes their duties. The study also recommended the implementation of technological systems since it can either act as a medium for change or be the means of achieving a desired change in a project therefore good to employ technology to enable successful completion of construction project.

Key Words: *Competence, Project Funding, Equipment, Technology, Road Construction*

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INTRODUCTION

Gaturu and Muturi (2014) stated that the completion of projects in a timely manner is often a critical factor and measure of project success and the success of any project is highly dependent on its completion time from start to delivery of results. Kariungi (2014) similarly stated that completion of projects within schedule is a major contribution towards the competitive edge in organizations. This is based on the realization that the achievement of the targeted objectives is determined by the ability to deliver the targeted output within the stipulated time. Also according to World Bank (2014) most construction projects usually suffer delay and surpass the outlined contract sum. The result of such overrun can at time lead to abandonment of a project. Ideally projects are supposed to run continuously without delays and the responsibilities to keep this in check lies squarely with the project manager and other stakeholders who are linked directly with the projects.

Construction Industry is the backbone for economic development. Kenny (2017) conducted his study in USA on construction sector role in economic development. In view of its importance, large investments were made by governments all across the globe for many years. The engineering division, construction process and practices have evolved over the centuries. A Study by Leesard (2015) in Netherlands established that during last 100 years, technology in construction has developed drastically paving way for modern buildings and scientific designs.

Hussin and Omran (2011) state that in Nigeria, seven out of ten roads construction projects in Borna and Kano Plains surveyed suffered delays in their execution. Also Fugar & Agyarkwa (2010) observed that in Nigeria 5-10% of construction pre-contract cost is based on contingency. This has been found inadequate which means extra financial commitments occasionally beyond the capacity of the owner.

Work on providing construction services in Nairobi has made considerable progress since the ministry of transport assumed responsibility for them, but the construction companies have had to build from a low base, including a huge backlog of rehabilitation and development work, few institutions, and very little funding. So, they have had to work in every difficult physical, social, political, economic and institutional circumstance. For a number of reasons, the performance of construction projects has not been as impressive, fundamentally because of the government failure to establish a coherent institutional and policy framework (World Bank, 2016).

Kenya Urban Roads Authority, commonly abbreviated as KURA is a state corporation whose mandate is to offer guidance in the construction, maintenance and management of the urban road network in the country. KURA is a state parastatal under the Ministry of Transport and Infrastructure established under the Kenya Roads Act 2007. KURA has 47 Regional Offices spread in each of the 47 counties as stipulated in the current constitution. Each office is headed by a Regional Manager (RM) who represents the Director General (DG) in each County. The Finance Act 2009 set up Constituency Roads Committees in each constituency in Kenya which, under the assistance of each Member of Parliament, advices KURA on the formulation of an annual roads program and the roads to be included in it.

Statement of Problem

In Kenya, Construction projects are facing challenges of non-completion and many construction projects fail due to factors like time in efficiency, lack of adequate funds and lack of advance working equipment (Dokic, Müller, & Meyer, 2015). According to GoK (2017) report many of the road construction projects are not completed within the schedule, more than 17% road connecting Nairobi in 2010 were closed for expansion, in 2015 majority 13% were still not in operation. Akanni, Oke and Akpomiemie (2015) conducted a study on impact of environmental factors on building project performance in Delta State, Nigeria. Chan, Wong and Scott, (2014)

studied on managing construction projects in Korea, the transitional period in the millennium. Wang and Huang (2016) conducted a study on the relationships between key stakeholders' project performance and project success a perceptions of Chinese construction supervising engineers.

Owour (2016) conducted a study on factors influencing completion of construction projects in Kenya and looked on government buildings construction projects in Nairobi County, Kenya. Langat (2015) conducted a study on factors influencing completion of construction projects in public secondary schools in Bomet east sub-county, Bomet County, Kenya. Seboru (2015) established a study on investigation into factors causing delays in road construction projects in Kenya. The study established that most studies on determinants of road construction project completion were conducted in developed countries and few studies were conducted in Kenya. Therefore this study sort to fill the existing gap on determinants of road construction project completion in Nairobi County, A case of Kenya Urban Roads Authority (KURA).

Objectives of the Study

The determinants of road construction project completion in Nairobi County, A case of Kenya Urban Roads Authority (KURA). The specific objectives were;

- To evaluate how project managers competency influence road construction projects completion in KURA, Nairobi City County.
- To establish how project funds influence road construction projects completion in KURA, Nairobi City County.
- To examine how project automated equipment influence road construction projects delivery in Nairobi KURA, City County.
- To examine how project technology adoption influence road construction projects completion in KURA, Nairobi City County.

LITERATURE REVIEW

Management Theory

Management is the process of designing and maintaining an environment in which individuals, working together in groups, efficiently accomplish selected aims (Ross, 2008). In its expanded form, this basic definition means several things. First, as managers, people carry out the managerial functions of planning, organizing, staffing, leading, and controlling. Second, management applies to any kind of organization. Third, management applies to managers at all organizational levels. Fourth, the aim of all managers is the same to create surplus. Finally, managing is concerned with productivity this implies effectiveness and efficiency (Shandler, 2016).

Agency Cost Theory

Agency theory is the branch of financial management theory that looks at conflicts of interest between people with different interests in the same assets. This most importantly means the conflicts between shareholders and managers of companies, shareholders and bond holders (Easterbrook, 1984). The theory explains the relationship between principals, such as a shareholders, and agents, such as a company's managers. In this relationship the principal delegates (or hires) an agent to perform work. The theory attempts to deal with two specific problems: how to align the goals and principal of funds management so that they are not in conflict (agency problem), and that the principal and agent reconcile different tolerances for risk (Jensen & Meckling, 1976).

Change Agency Theory

Change agency theory has been found to be of particular relevance to understanding innovation associated with electronic construction project, where financial, managerial, informational and technological constraints tend to restrict innovativeness and entrepreneurship agents can either be internal or external (Donaldson, & Davis, 1991). Internally the owner of institutes and other sectors forces can act as champions, advocates and leaders of change (Adams, 1994). According to Ross, (2008) says technology simplifies and reduces task needing manual skill and strengths especially in factories and either forms of production property

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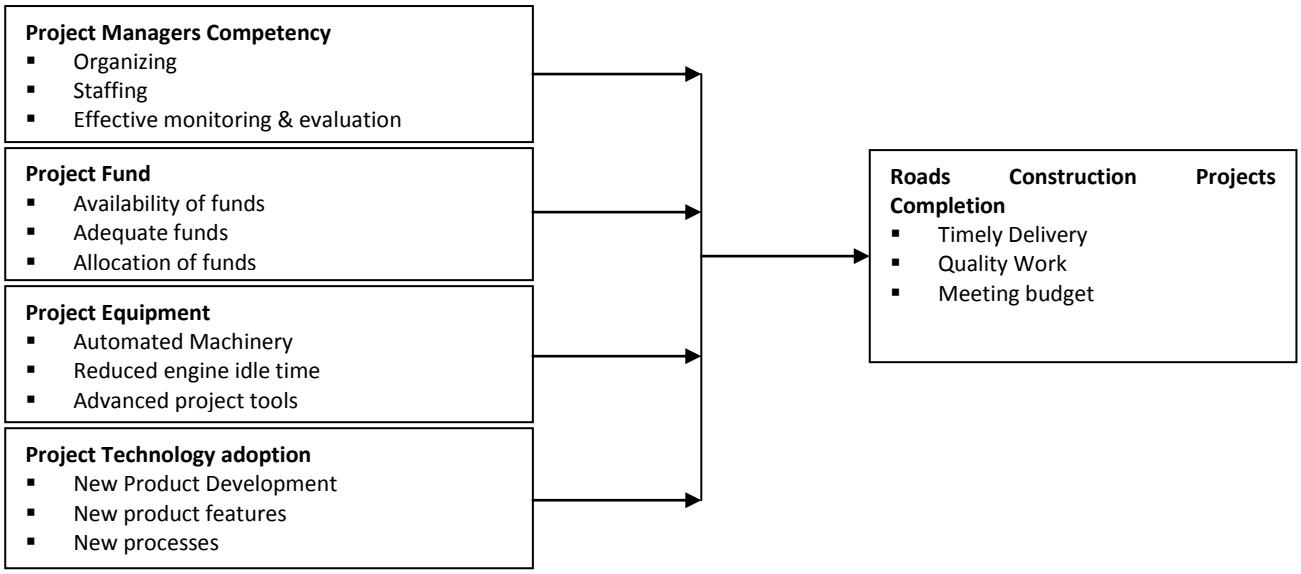
applied can increases productivity. The use of reprogram able robots for such tasks as welding spraying material handling and other helps to eliminate dirty or harassers and repetitive work robots and computer aid manufacturing (CAM) as well as reducing costs improving quality and the consistency of finished quality and the consistency of finished products. The unused technology requirements enhance problem solving skills and the ability to interpret, and is thus likely to lead to widening gap between skilled and non-skilled workers (Leslie, 2005).

Technology Adoption Theory

Hoenig (1995) as well as Lai (2016) noted that the rate at which payment systems develop depends largely on a struggle between rapid technological change and natural barriers to new product or service acceptance. A number of theories have proposed to explain consumers' acceptance of new technologies and their intention to use. These included, but were not restricted to, the Theory of Diffusion of Innovations (DIT) (Rogers, 1995) that started in 1960, the Theory of Task-technology fit (TTF) (Goodhue, and Thompson, 1995), among others.



Independent Variables **Dependent variable**

Figure 1: Conceptual Frame Work

Empirical Review

Becerik (2017) mentions that apart from project management practices, there has to be equal importance to other factors such as personnel and team management. Also, apart from decision making tools, construction industry depends on the manager's ability to take decisions. The main reason for the challenger disaster is that the decision makers did not heed the warnings from engineers about the ice on the launch pad (Dubois & Rothwell, 2017). A similar experience from USA, where the crew went on a strike for 24 hours against the wishes of ground control staff, demonstrates the need for exemplary decision making skills to avert disasters. Though systems and process are in place, both the disasters are due to failure of human abilities. In practice, construction managers such as project managers, project controllers are the drivers of the project and the success of the project depend on their ability to take corrective actions appropriately. Gunduz and Hanna (2015) mentions that project success factors had ignored the qualities of project manager and it was concluded that the competence of the project manager has a measurable impact on the performance of the project.

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Becerik (2017) mentions that for a project to be successful there should be adequate fund allocated to finance its completion. He added that project funds availability is an important factor that influences delivery of a project. Chan and Kumaraswamy (2016) stated that reports are an essential way of keeping everyone informed and therefore managers should manage the project, plan for the project and monitor. Also the structure of the industry is fragment with increasing number of small companies and consolidation of large companies. Strenman, (2012) says that the international construction is dominated by very large contracting firms such as Bechtel, Skanska and Taisei Corporation, who undertake large volumes of work. Construction process is labor intensive includes management of difficult site condition, bulky materials.

Construction companies are diversified, have low fixed assets, have positive cash flow, and subcontract extensively (Gyula, 2013). According to Nitithamyong and Skibniewski, (2016) construction projects are inherently complex and dynamic. Also, every construction project is unique having its own set of stakeholders and unique environment. Construction industry is diverse with projects ranging from small to large and very large contracts such as $14.7 billion Channel Tunnel Project and $20billion Hong Kong International Airport. Collis, & Hussey, (2015) indicated that management in construction, on the other hand, has always been based on experience and organizational talent. In most of the construction projects, technicalities are frozen during design phase. Dai, Cao, & Su, (2016) mentions that the important category in constructions is construction firm i.e. Contractor because, Contractor gives real shape to the product following the design. So, the main issue lies in managing resources, material, equipment, stakeholders effectively by the contractor.

Project automation management is one of the most important factors in construction industry. Productivity can be affected if required materials, tools, or construction equipment for the specific are not available at the correct location and time (Lewis, Hagstrom, & Herweijer (2014). Selection of the appropriate type and size of construction equipment often affects the required amount of time it is, therefore, essential for site managers to be familiar with the characteristics of the major types of equipment most commonly used in construction. In order to increase job-site productivity, it is beneficial to select equipment with the proper characteristics and a size most suitable for the work conditions at a construction site. Laborers require a minimum number of tools and equipment to work effectively to complete the assigned task. If the improper tools or equipment is provided, productivity may be affected (Lam & Tsang 2017). Peansupap and Walker (2015) mentioned that project equipment is necessity and should influence performance by saving cost, also he added that project equipment enhances increased production. Vandevoorde and Vanhoucke, (2016) has elaborated that a loose project management can result in a project getting out of control and on the other hand extreme and over reactive control can bring the project to a standstill. They further mentioned that controlling a project too tightly makes team members nervous and may lead to be less creative.

Kamau and Mohamed, (2015) conducted a study on efficacy of monitoring and evaluation function in achieving project success in Kenya. He reported that factual and quantitative information should be computerized to speed preparation, collation and assimilation. He added construction is technology shy and does not extensively use information technology. Seboru, (2015) conducted an investigation into factors causing delays in road construction projects. He reported that construction sector uses extensive information for decision making process, but does not use much information available elsewhere for example internet and other software products. Shandler, (2016) mentions that there are large variety of software project management product, which can be used effectively for monitoring process. Apart from stochastic

curves and network charts, monitoring practice today has become advanced using latest Information Technology (IT) tools.

Leesard (2015) stated that project completion is a key indicator for the level of performance a company is able to provide correct and in-time deliveries to its customers. It is a quantitative measure to benchmark an organization against, when it comes to translate project management and performance. Lewis, (2017) defines project completion as Controlling process that ensures that project objectives are met by monitoring and measuring progress regularly to identify variances from Plan, so that corrective action can be taken when necessary and further identifies controlling process to have links with planning and executing process. Marasini, and Dawood, (2016) reported controlling as a three step process measuring progress, evaluating what remains to be done, and corrective action to achieve or exceed the objectives. Payne and Turner, (2014) stated the performance monitoring subsystem is charged with observing the transformation process and reporting deviations from the expectations to the decision making subsystem so that it can initiate corrective action where necessary. Reschke and Schelle, (2013) argued that project management, control is based on a comparison of baseline plans and contracts with actual events, and deciding what to do (re-planning) when the two do not match.

METHODOLOGY

The study employed descriptive research design in examining the factors. The target population of this study consisted of employees from the nineteen KURA Road Contractors in Nairobi County hence departments in KURA Road Contractors: IT, Finance, and Construction departments within Nairobi region. The IT department comprised of 19 employees; Finance department comprised of 19 employees; the project managers comprised of 19 while others from construction department comprised of 1,143 employees. Therefore, the target population of the study comprised of 1200 employees. The study used simple random sampling procedure to select a sample that represents the entire population. In this study the main data collection instruments was the questionnaires containing both open ended and close ended questions with the quantitative section of the instrument utilizing both a nominal and a Likert-type scale format. The data was collected using both primary and secondary methods. The SPSS (version 22) computer software was used to aid the analysis as it is more users friendly and most appropriate for analysis of Management related attitudinal responses (Martin & Acuna, 2002). Descriptive statistics was employed to analyse the data. The regression model was used as follows:

$$\mathbf{Y= a + B_{1*}X_1 + B_{2*}X_2 + B_{3*}X_3 + B_{4*}X_{4\,+} + B_{5*}X_{5+}\, e}$$

Where;

Y= Construction Project Completion (Dependent Variable)

a = Constant

b_1, b_2, b_3 and $b_{4=}$ coefficients

$X_{1=}$ Managers competency (Independent Variable)

$X_{2=}$Funds (Independent Variable)

$X_{3=}$ Equipment (Independent Variable)

$X_{4=}$ Information technology (Independent Variable)

e = error term

RESULTS

Correlation Analysis

The correlation analysis results revealed that there was a positive and a significant association between manager's competency and the completion of road construction projects (r=0.467, p=0.000). The results indicated that there was a positive and a significant relationship between project fund and project completion (r=0.445, p=0.000). The result also indicated that the there was a positive and a significant relationship between project automated equipment and project completion (r=0.469, p=0.000). Finally the result indicated that there was a positive and significant relationship between project technology adoption and project completion(r=0.503, p=0.000) therefore this findings agreed with Stake, who stated that the use of technology improves better coordination and

communication among project teams and participants. It increases the speed of communication and decreases documentation errors.

Table 1: Correlation analysis

		Mean project completion	Mean managers competency	Mean Project fund	Mean project automated equipment	Mean project technology adoption
Mean project completion	Pearson Correlation	1				
	Sig. (2-tailed)					
Mean manager's competency	Pearson Correlation	.467**	1			
	Sig. (2-tailed)	0				
Mean Project fund	Pearson Correlation	.445**	.368**	1		
	Sig. (2-tailed)	0	0			
Mean project automated equipment	Pearson Correlation	.469**	.283**	.332**	1	
	Sig. (2-tailed)	0	0.002	0		
Mean project technology adoption	Pearson Correlation	.503**	.412**	.372**	.364**	1
	Sig. (2-tailed)	0	0	0	0	

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

Regression Analysis

Overall regression analysis was performed using the composites of all the key variables. The data was input to the SPSS software. Results were then presented in Tables below.

Table 2: Model Fitness for the Regression

Indicator	Coefficient
R	0.657
R Square	**0.432**
Adjusted R Square	0.412
Std. Error of the Estimate	0.503

The result from model fitness for the regression of table 2 explained the study phenomena of all the variables. This was supported by coefficient of determination also known as the R square of 43.2%. This means that managers' competency, project fund, project automated equipment and project technology adoption explained 43.2% of the

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variations in the dependent variable which is project completion on road construction.

Table 3: Analysis of Variance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	22.579	4	5.645	22.23	**0.000**
Residual	29.710	117	0.254		
Total	52.289	121			

Table 3 provided the results on the analysis of the variance (ANOVA). The results indicated that the overall model was statistically significant. Further, the results implied that the independent variables were good predictors of the completion of road construction projects. This was supported by an F statistic of 22.23 and the reported p=0.000 which was less than the conventional probability of 0.05 significance level.

Table 4: Regression of Coefficients

Variable	B	Std. Error	Beta	t	Sig.
(Constant)	1.17	0.24		4.879	**0**
managers' competency	0.148	0.052	0.225	2.828	**0.006**
Project fund	0.132	0.056	0.186	2.349	**0.021**
project automated equipment	0.199	0.061	0.253	3.272	**0.001**
project technology adoption	0.162	0.053	0.249	3.062	**0.003**

Regression of coefficients results in table 4 showed manager's competency has a positive and significant effect on the completion of road construction projects. (r=0.148, p=0.006). The table further indicated that project fund has a positive and significant effect on the completion of road construction projects. (r=0.132, p=0.021). Project automated equipment was also found to have a positive and significant effect on the completion of road construction projects. (r=0.199, p=0.001). Project technology adoption had a positive and significant effect on the completion of construction projects. (r=0.162, p=0.003).

The specific model before moderations was;

Project Completion = $1.17 + 0.148X_1 + 0.132X_2 + 0.199X_3 + 0.162X_4$

Where:

X_1 is managers' competency

X_2 is Project fund

X_3 is project automated equipment

X_4 is project technology adoption

DISCUSSION

The first objective of the study was to establish the influence of project managers' competency on road construction projects completion in KURA, Nairobi City County. From regression analysis, manager's competency has a positive and significant effect on the completion of road construction projects. This indicated therefore that an improvement in project managers' competency will lead to a positive variation in the completion on road construction projects. Project managers should be able to select a wide range of management practices and tools that will improve the performance of infrastructure projects. Highly skilled project managers can effectively apply different strategies to different projects to optimize project performance.

Project managers should possess project management competencies such as being able to; integrate various processes of the project, ability to meet the scope, time, cost and quality of the required project, manage and mitigate project risks and manage the physical and human resources

involved in project implementation. Therefore intellectual leadership competencies like leadership skills and behaviour contribute to enhance the likelihood of project success in an organization. Development of intellectual competency based approach to deal with project at large can increase and helps in building up recent era of project managers.

The second objective was to establish how project funds influence road construction projects completion in KURA, Nairobi City County. Regression results revealed that project fund has a positive and significant effect on the completion of road construction projects in KURA, Nairobi City County. This means that an increase in project fund will have a positive influence on road construction projects completion. Construction projects typically involve a sponsor who funds and owns the project. The sponsor/ sponsors are normally large public bodies such as local government or multilateral agencies who sponsor the construction of roads.

The third objective of the study was to examine how project automated equipment influence road construction projects delivery in Nairobi KURA, City County. From the regression analysis carried out project automated equipment was found to have a positive and significant effect on the completion of road construction projects. This means that an improvement in project automated equipment will result to a positive variation in road construction project delivery. Selection of the appropriate type and size of construction equipment affects the required amount of time it is, therefore, essential for site managers to be familiar with the characteristics of the major types of equipment most commonly used in construction. In order to increase job-site productivity, it is beneficial to select equipment with the proper characteristics and a size most suitable for work conditions at a construction site.

The fourth objective was to examine how project technology adoption influence road construction projects completion in KURA, Nairobi City County. Regression results revealed that project technology adoption has a positive and significant effect on the completion of road construction projects. This means that an improvement in project technology adoption leads to a positive variation in road construction project completion. This was also supported by the responses in the statements in the questionnaire. The use of Technology improves better coordination and communication among project teams and participants. It increases the speed of communication and decreases documentation errors. This is true to many medium and large construction companies and can be overcome by establishing standardized technology tools across various departments.

The overall study was to determine how Project managers' competency, Project funds, Project automated equipment and Project technology adoption impacted on road construction project Completion in Nairobi KURA, City County. The regression results revealed that they all had a positive and significant effect on the effective road construction project delivery in Nairobi KURA, City County.

CONCLUSIONS

The main purpose of this study was to examine the determinants of road construction project completion in Nairobi County, A case of Kenya Urban Roads Authority (KURA). Based on the findings above the study concluded that project manager' competency, project fund, project automated equipment and project technology have an influence in road construction project completion in Nairobi county.

The construction industry is a key industry in the economy of any country worldwide. It is one of the biggest industries in the world contributing to around 10% of the global GDP. The completion of road construction projects in the country is therefore an essential aspect for the growth and development of the country and cannot be avoided.

It was concluded that manager's competency has a positive and significant effect on the completion of road construction projects in Nairobi County. As a

project manager you're responsible not only to lead the project to a successful completion, but also responsible for leading a team to achieve that goal. To manage everything efficiently requires managers to motivate and mediate when necessary. According to the study, managers' competency has an influence on the project team therefore it is very important for project managers to go for training since, through successful training it is possible to learn the skills to become a good leader. Also from the study, it was found that monitoring and evaluation should be done regularly by managers for successful road construction project completion.

It was concluded that project fund has a positive and significant effect on the completion of road construction projects in KURA, Nairobi City County. Therefore the availability of funds and also management of the available funds will greatly influence the completion of road construction projects.

It was concluded that project automated equipment was found to have a positive and significant effect on the completion of road construction projects. Plant & machinery has an influence on road construction projects completion therefore good and latest automated machine should be used to effectively complete construction of roads within time and budget.

It was concluded that project technology adoption has a positive and significant effect on the completion of road construction projects.

RECOMMENDATIONS

The study recommended that project managers should be actively involved in the project from start to the end. The managers therefore require to be trained effectively to sharpen their skills hence successfully execute the duties.

The study recommended that funds for the project should be availed early enough to necessitate proper planning and execution of the project. Likewise, the project managers need to adequately manage the funds and use according to the budget.

Project managers need to be aware of their project technology preferences and provide the tools and equipment to the project team as they can be more motivated. Implementation of technological systems can either act as a medium for change or be the means of achieving a desired change in a project therefore it is good to employ technology to enable successful completion of construction project.

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