ISSN 2278 – 0211 (Online)

Influence of Contractor Preparedness on Completion of Road Construction Projects: A Case of Selected Road Contractors in Nairobi County Kenya

Shadrack Otieno

Student, Department of Open and Distance Learning (ODEL),
University of Nairobi, Kenya

Dr. John Mwaura Mbugua

Lecturer Department of Open and Distance Learning (ODEL),
University of Nairobi, Kenya

Abstract:

Road construction projects are rarely completed in time which causes immeasurable costs to society. Evidence exists of projects in Nairobi that are not completed within the stipulated time.

Purpose: the purpose of this study was to determine the influence of contractor preparedness on the completion of road construction projects in Nairobi County Kenya.

Methodology: The study employed a descriptive research design. The study used stratified sampling with a total sample size of 96. Questionnaire return rate was 86%. Data obtained from the study was analyzed using descriptive and inferential statistics.

Findings: Findings revealed that there is a positive and significant relationship between project materials, project funding, competency of the project manager, technical competency of staff and project completion with co-efficient of 0.749, 0.755, 0.833 and 0.724 respectively. ANOVA showed that contractor preparedness significantly influences the completion of road construction projects at $F(4, 78) = 127.746, p < .005$. From the coefficient of determination, it was evident that 86.1% of project completion can be explained by contractor preparedness.

Recommendations: The study recommends that contractors must hire adequate and technical staff who must be trained. Besides that, contractors must ensure that there is proper funding and be ready to fund a project when needed. At the planning stage, contractors must ensure that project managers that are brought on board are qualified and experienced. Proper materials management and handling procedures must be put in place to avoid shortages and escalation in costs of material prices.

Keywords: *Project manager, project materials, project funding, technical competency of staff, project, project management*

1. Introduction

The construction sector not only has a high potential for employment creation but also stimulates the growth of the agricultural sector and also expands the export market (Mahamid, Bruland & Dmaidi, 2012). The Kenyan government has a plan of completely revamping the road, rail, and port transport infrastructure (Competition Authority of Kenya, 2017). This, therefore, makes roads infrastructure one of the most important public assets. Research that was undertaken in Egypt revealed that road construction delay is a problem that is experienced all over the world. (Aziz & Abdel-Hakam, 2016). Amer (1994) revealed that a shortage of materials like steel and cement were responsible for projects being completed out of the initial contract period. A study by Chileshe, Berko, and Haupt (2010) in Ghana revealed that delays in payment to road contractors resulted in project cost overruns. A study that was done in Zambia to understand "cost escalation and schedule delays" linked 75% of the delays to payment delays (Kaliba, Muya & Mumba, 2009). In Uganda, Mulla and Waghmare (2015) maintained that road construction delays stem from financial indiscipline or dishonesty, incompetent project team, inadequate management of the project site, inadequate site supervision and inappropriate methods of road construction. In Tanzania road construction projects have experienced cost and time overruns (Rwakarehe & Mfinanga, 2014).

A study by Ngacho and Das (2014) revealed that 153 out of 175 construction projects experienced delays that ranged from 6 months to over 12 months which is in stark contrast to only 12% of road construction projects in the United States and Indiana that had experienced an average delay of 3 months. In Nairobi Most civil engineering projects experience delays (Aziz & Abdel-Hakam, 2016). Most road construction works are not completed on schedule. The delay frustrates development plans and also impacts negatively on the country due to the associated cost implications (Seboru,

2015). As planners of projects, contractors are required to estimate various project issues such as personnel, equipment, and materials that are required and forecast any potential changes to the project (Lock, 2017). This, therefore, means that the preparedness of a project contractor is an important factor in road construction projects since a project contractor acts as a planner and a manager.

2. Problem Statement

Road projects are seldom completed within the contract duration (Relich, 2012). Most road projects are finished 2-5 years after the initial contract duration and some of the road construction projects end up stalled (Nyabaro, 2015). The delay in the construction projects translates into immeasurable cost implications to society (Seboru, 2015). The problem of road construction has been so serious that the National Assembly's Public Investment Committee questioned the Kenya National Highways Authority (KeNHA) in 2018 over overspending and delays in road projects. KeNHA was compelled to pay contractors over KSh 50 million in interest due to delays in project completion (Mwere, 2018). In 2018, some contractors were put on the spot for abandoning road construction projects after receiving payment (Mweru, 2018). A problem of funding was associated with the move by 60 road contractors to abandon road construction projects due to lack of payment (Thionga, 2018). Some of the projects that were abandoned included John Osogo, Runda Drainage, rehabilitation of California Estate Roads, Muigai Kenyatta roads in Dandora and Ole Sangale road (Thionga, 2018). Although there are several studies that have focused on the role that is played by different stakeholders in construction projects (Muhwezi, Acai & Otim, 2014; Mulla & Waghmare, 2015; McCord, McCord, Davis, Haran & Rodgers, 2015; Yaman, Abdullah, Mohammad & Hassan, 2015; Marzouk, El Kherbawy & Khalifa, 2013), few studies have concentrated on the preparedness of the project contractor and how it influences the completion of road construction projects in Nairobi. This study, therefore, attempted to fill the void of evidence that currently exists by establishing how contractor preparedness in terms of technical competency of staff, competency of project managers, funding and project materials influences the completion of road construction projects in Nairobi.

3. Objective of the Study

The objective of the study was to establish how the preparedness of the project contractor influences the completion of road construction projects in Nairobi County.

4. Literature Review

Most project cases reveal that fewer than half of the projects meet cost and schedule targets. Projects that do not meet their cost and schedule targets result in dissatisfaction among the project owners (Relich, 2012). Technical competencies are specific to a given job (Detsimas, Coffey, Sadiqi & Li, 2016). Detsimas, Coffey, Sadiqi, and Li (2016) stated that employee performance is a key success factor in any construction project. Competent human resources have been equated to successful construction projects (Shahhosseini & Sebt, 2011). Othman and Ahmed (2013) opined that major construction companies in developing countries require high design skills, technical skills, managerial capabilities, competent staff, and excessive investment costs. However, the developing countries experience shortages of a lot of the mentioned factors thereby obstructing the development of mega construction projects (MCPs). Zou, Zhang, and Wang (2007) whose study was done in China revealed that most of the construction laborers in China are farmers and workers who are unemployed which results in poor quality and safety of the final project, especially where contractors lose control of the work that has been sublet to a subcontractor. Going by the findings of Detsimas, Coffey, Sadiqi, and Li (2016), it would imply that the challenge of engineering and human development hampers MCPs in the developing countries which therefore means that a project contractor who wishes to be successful must be prepared to have competent staff on board. Lack of design experience results in the inability to understand client requirements which results in incomplete achievements of the objectives of the project (Detsimas, Coffey, Sadiqi & Li, 2016). Informal training is common in the construction sector. Only 47% of construction workers engage in formal training within a period of 12 months. Role-specific technical skills are frequently trained using informal than formal methods (Shang, Sui Pheng & Jia Hui, 2018). Detsimas, Coffey, Sadiqi, and Li (2016) recommended training in both practical and theoretical training to improve the competency of the employees in their roles.

Fewings and Henjewe (2019) state that project managers oversee every aspect of the project and therefore, to achieve a better rating, project contractors must get qualified project managers on board. Additional critical success factors and success attributes for project contractors include management capability, staff qualification, and length of time in business, type of past project completed, experience in the region and past record of conflict and disputes. Yang, Huang, and Wu (2011) revealed that several studies have proven that the role that is played by a project manager is crucial for the success of projects. However, the researchers acknowledge that there is a gap in the literature on the impact of a project manager and his or her style of leadership on the success of a project. Study findings by Hwang and Ng (2013) revealed that the key areas that are critical for project managers are the management of risk, communication and schedule. Project managers must also be good at planning and scheduling of projects. A study by Gudienė, Banaitis, Podvezko, and Banaitienė (2014) that was done in Lithuania singled out the competence of the project manager and experience among the ten critical factors for construction projects. Wambui, Ombui, and Kagiri (2015) maintained that a lot of importance has to be given to factors such as management of project team and project staff. Ondari and Gekara (2013) established that poor supervision was the most significant factor that influenced the completion of projects. Failure by the contractors to pay attention to the required feasibility studies before construction stage may result in the emergence of many structural and construction problems which may cause a delay in project schedules and may lead to project defects after construction.

Research has shown that there is a positive relationship between cost deviation and the delivery time of projects (Belay & Torp, 2017). A study by Seboru (2015) linked delayed payments to inability to deliver projects in time. Larsen, Shen, Lindhard and Brunoe (2015), echoed the sentiments of Seboru (2015) when they ranked delayed payment, financial problems of the contractor and cash flow problems among the key factors that make it impossible to deliver projects within the set timelines. The findings also mirror a study in Zambia that linked 75% of delays in road construction projects to delayed funding and 57% to modifications (Kaliba, Muya & Mumba, 2009). Zou, Zhang, and Wang (2007) maintained that regardless of the financial problems of the client, funding problem infers a problem of poor management of the contractor. The study which focused on China revealed that the contractors in the country suffer from the problem of reimbursement due to lack of proper policies governing reimbursement of funds. Belay and Torp (2017) also revealed that clients do not have enough financial stability to run projects on their own. From the findings by Zou, Zhang and Wang (2007) it is clear that failure of the contractor to ensure that project adheres to budget and that the project adheres to the original plan could result in overspending which may result in funding problems. Failure by the contractor to raise the funds that are required for project operation and maintenance can also result in funding problems which therefore implies that contractors must be properly prepared. However, the study by Zou, Zhang, and Wang (2007) was done in China and therefore the results may not apply to the situation in Kenya. Frimpong, Oluwoye, and Crawford (2003) established that failure to fund completed works makes it hard for the contractors to deliver as expected. In certain instances, contracts are awarded to the lowest bidders who may lack the required human and financial resources needed to execute a road construction project. Delayed payments to project contractors affect the activities of the contractors, suppliers, and sub-contractors. The contractors, in turn, transfer the burden of the accumulated interest to the client which results in cost overruns (Iqbal, Choudhry, Holschemacher Ali & Tamošaitienė, 2015).

Kamanga and Steyn (2013) linked delays in road construction projects to a shortage in materials like bitumen, steel, and sand. Insufficient equipment was also linked to delays in construction projects. Rahman, Memon & Karim (2013) whose study was done in Malaysia ranked fluctuations in the prices of materials as the most significant project delay factor. The researchers maintained that the fluctuations were reflected in increased prices of raw materials, machinery, and other ancillary services. A study by Mahamid (2013) that was undertaken in Palestine revealed that the political situation in the country results in shortage in equipment, materials, and limits the importation of materials which delays road construction projects. The study further linked road project delays to changes in the type of materials and the specifications of materials in the process of road construction. Delays were also linked to delays in the approval of sample road construction materials. The researcher revealed that contractors rank materials and equipment among the most significant factors that cause time overruns in construction projects. The location of a project has also been seen as a factor that affects the transportation of materials since it is very difficult to transport materials and locate cranes and other equipment in certain areas which results in the stoppage of work at the peak time of the project thereby resulting in project delay (Shanmugapriya and Subramanian (2013).

5. Research Methodology

The study employed a descriptive research design which enabled the researcher to observe and describe phenomena without influencing it anyway (Cantrell, 2011). The target population was road contractors. The study population was 241 comprising project managers, contractors and technical staff taking part in road construction. The study sample was made up of 96 respondents. Gay (1996) maintains that a sample of 10-40% is representative in descriptive research design. The study considered a sample size of 40% of the study population to give a representative sample. The study used stratified sampling in which the study population was partitioned into subpopulations (Etikan & Bala, 2017). The final sample was made up of 20 road contractors, 55 technical project staff and 21 project managers. Data were collected using structured questionnaires. Piloting of the questionnaire was done on 10% of the sample size which was equivalent to 10 respondents who had similar characteristics to those of the study population. The questionnaire was also reviewed by the research supervisor and professional peers of the researcher to determine the strengths and weaknesses of the wording, order, and format. The research adopted content validity. The research instruments were reviewed by the research supervisor to ensure that the content addressed the purpose of the study and the questions were in line with the research questions and objectives. This as Heale and Twycross (2015) opine ensured that the understanding of the content of the questionnaires was common to all respondents. Reliability of the instrument was determined through a pilot study that involved 10 respondents. Reliability analysis was done using Cronbach's Alpha. Cronbach's alpha was determined for every objective; project funding had the highest reliability ($\alpha=0.937$), followed by project materials ($\alpha=0.893$), technical competency of staff ($\alpha=0.868$) and competency of the project manager ($\alpha=0.723$). Therefore, all the variables were highly reliable since they exceeded the prescribed threshold of 0.7.

6. Findings

83 out of the 96 questionnaires that were distributed were filled and returned which represented 86% success rate. Majority of the respondents were between 20-29 years at 27.7%. 25.3% of the respondents were aged between 30-39 years, 25.3% of the respondents were aged between 40-49 years while 18% of the respondents were over 50 years of age. The majority of the respondents were male at 73.5% while females made up 26.5% of the respondents. Majority of the respondents were the project technical staff at 59%, followed by the contractors at 21% and project managers at 19.3%. Majority of the respondents had between 5 to 10 years in the road construction industry. 25% of the respondents had less than 5 years of experience, 19.3% had between 10 to 15 years of experience while 20.5% had over 15 years of experience. Majority of the respondents had a bachelor's degree at 54.2% followed by a master's degree at 25.3% and a diploma at 20.5%. 72.3% of the respondents indicated that in their opinion the status of skilled manpower was inadequate

while 27.7% of the respondents believed that road construction projects were staffed with skilled manpower. Majority of the respondents at 33.7% reported that no security is provided to road construction materials. This was followed by 28.9% of the respondents that indicated there is an average level of security for road construction materials. 25.3% and 12% of the respondents. Majority of the respondents at 42.2% indicated that projects experience a frequent delay in the delivery of construction materials. 9.6% of the respondents maintained that there is an occasional delay. 32.5% of the respondents maintained that projects rarely experience delays in delivery of construction materials while 15% of the respondents maintained that road construction projects never experience delays in road construction projects.

The majority of the respondents (43.4%) reported that road construction projects experience theft of materials sometimes. 27.7% of the respondents indicated that road construction materials often experience theft of materials. 25.3% of the respondents indicated that road construction materials seldom experience theft of materials while 3.6% reported that construction projects never experience theft of materials. Majority of the respondents at 57.5% reported that project costs are not prepared accurately while 32.5% of the respondents opined that project costs are prepared accurately. According to the findings, only 14.5% of the respondents reported that projects are adequately funded. 34.9% stated that projects are intermittently funded while 25.3% stated that projects are funded in phases. 25.3% of the respondents stated that projects are insufficiently funded. Majority of the respondents at 32.5% stated that projects averagely adhere to budgets. 22.9% of the respondents reported a level of adherence as very high. 18.1% reported the level of adherence as high, 15.7% reported that there is no adherence to project budgets while 10.8% of the respondents were not sure. Only 34.9% of the respondents agreed that road construction projects are completed on time. 65.1% of the respondents stated that road construction projects are not completed on time. Majority of the respondents at 77.1% opined that the completed road construction projects were of medium quality. 13.3% stated that the completed road construction projects were of low quality. Only 9.6% of the respondents maintained that the completed road construction projects were of high quality. Majority of the respondents (44.6%) opined that only 50% to 75% of road construction projects are completed in time. 41% of the respondents stated that 25% to 50% of road construction projects are completed in time. 8.4% of the respondents reported that less than 25% of road construction projects are completed in time. Only 6% of the respondents stated that over 75% of road construction projects are completed in time.

Statement	Mean	Std. Deviation
The contractor ensures that adequate and qualified technical staff are hired before the project commences.	1.6	0.748
The contractor ensures that the hired technical staff are constantly trained	2.29	1.065
The contractor ensures that generic skills such as teamwork and communication are incorporated in the training of technical staff to improve the speed of work.	2.61	1.779
The contractor ensures that an ideal environment is created to encourage employees to seek training.	2.36	1.132
Training assessment is regularly done to determine the training needs of technical staff	2.76	1.679

Table 1: Technical Competency of Staff and Completion of Road Construction Projects

From table 1, the respondents disagreed at a mean of 1.61 on contractor's preparedness in terms of making sure that adequate and qualified staff are hired before a project commences. Further, the respondents disagreed on contractor's preparedness in terms of making sure that the hired technical staff are constantly trained at a mean of 2.29. The respondents also disagreed at a mean of 2.61 when asked whether the contractor ensures that generic skills such as teamwork and communication are incorporated in the training of technical staff to improve the speed of work. The respondents disagreed at a mean of 2.36 when asked whether the contractor ensures that an ideal environment is created to encourage employees to seek training. The respondents were neutral at a mean of 2.76 in response to whether training assessment is regularly done to determine the training needs of technical staff.

Statement	Mean	Std. Deviation
The contractor undertakes proper planning at the beginning of the project to ensure that there are adequate materials for road construction	2.25	1.135
The contractor acquires all the materials required for road construction in good time to avoid escalation in the prices of materials.	2.2	1.614
The contractor ensures that all the materials are inspected to ensure that the materials are of high quality.	1.98	1.047
The contractor makes prior delivery arrangements to ensure that there are no delays in delivery of materials	1.99	0.943
The contractor ensures that there is a proper material handling the procedure in place to avoid the destruction of construction materials	2.9	1.743
The contractor ensures that all the project equipment is in good working condition before the project commences	1.53	0.502
Year-wise requirements for key materials are entered into in advance and the contractor ensures that the allocating agencies commit by it.	2.05	1.505

Table 2: Project Materials and Completion of Road Construction Projects

From the study findings on table 2, the respondents disagreed regarding whether the contractor undertakes adequate planning at the start of the project to ensure that there are adequate materials for road construction at a mean of

2.25. When asked whether the contractor acquires all the materials required for road construction in good time to avoid escalation in the prices of materials, the respondents disagreed at a mean of 2.2. The respondents also disagreed at a mean of 1.98 when asked whether the contractor ensures that all the materials are inspected to assure quality. The respondents disagreed at a mean of 1.99 when asked if the contractor makes prior delivery arrangements to ensure that there are no delays in delivery of materials. The respondents remained neutral at a mean of 2.9 when asked if the contractor ensures that there is a proper material handling procedure in place to avoid the destruction of construction materials. The respondents further disagreed when asked if the contractor ensures that all the project equipment is in good working condition before the project commences at a mean of 1.53. The respondents disagreed at a mean of 1.53 when asked whether the year-wise requirements for key materials are entered into in advance and the contractor ensures that the allocating agencies commit by it.

Statement	Mean	Std. Deviation
The contractor checks with the client at the start of the project to ensure that appropriate funding levels have been identified to avoid delays in progressive payments to the contractor.	1.94	1.028
The contractor takes adequate measures to ensure that there are availability and proper flow of contractor funds to fund the project when needed.	2.34	1.096
The contractor determines year-wise requirements for funds to ensure that there are no delays in construction due to funding problems. The plan is updated at each annual plan.	2.73	1.719
The contractor ensures that there is enough cash flow to complete the work and ensures that there is no diversion to non-project activities to avoid being cash-strapped during the execution of works	2.29	1.164
The contractor pays close attention to the requirements of the assignment during the pre-contract period and only goes for tasks that they have a competitive advantage.	3.12	1.678

Table 3: Project Funding and Completion of Road Construction Projects

When asked whether contractor checks with the client at the start of the project to ensure that appropriate funding levels have been identified to avoid delays in progressive payments to the contractor as shown in table 3, the respondents disagreed at a mean of 1.94. The respondents also disagreed at a mean of 2.34 when asked whether contractors take adequate measures to ensure that there are availability and proper flow of contractor funds to fund the project when needed. The respondents were neutral at a mean of 2.73 when asked if the contractor determines year-wise requirements for funds to ensure that there are no delays in construction due to funding problems. The respondents further disagreed at a mean of 2.29 when asked if the contractor makes sure that there is enough cash flow with no diversion of funds for none project-related activities. The respondents were neutral at mean 3.12 when asked if the contractors ensure that they only go for tasks that they can handle.

Statement	Mean	Std. Deviation
The contract ensures that the project manager that is hired to undertake the project has adequate experience for the required assignment.	1.92	0.978
The contractor ensures that there is proper project planning and scheduling by the project manager before the project commences.	2.13	0.985
The contractor ensures that the project manager has a proper plan in place to take care of the unforeseen events which may prolong the period of construction.	2.6	1.732
The contractor ensures that there are proper plans in place for sight supervision and communication with other stakeholders to avoid delays occasioned by poor communication and poor site supervision.	2.19	1.109
The contractor ensures that there is a proper plan for managing human resources to avoid strikes and go-slows which delays road construction projects.	3.02	1.682

Table 4: Competency of the Project Manager and Completion of Road Construction Projects

From the findings in table 4, the respondents disagreed at a mean of 1.92 when asked if the contractor ensures that a qualified and experienced project manager is hired by the contractor before the project starts. Besides that, the respondents disagreed at a mean of 2.13 when asked if the contractor ensures that the project manager undertakes proper planning and scheduling before a project starts. The respondents were neutral at a mean of 2.6 when asked whether the project contractor ensures that the project manager has a proper plan in place to mitigate risks. The respondents disagreed at a mean of 2.19 when asked if the contractor ensures that the project manager has a proper plan in place for

sight supervision and stakeholder management before a project starts. The respondents remained neutral when asked if the contractor ensures that the project manager has a proper plan for managing human resources to avert strikes and go-slows that could slow down a project.

Statement	Mean	Std. Deviation
Weather conditions	4.89	0.35
Government policies	4.86	0.387
Project funding	4.92	0.28
Competency of technical staff	4.89	0.35
Competency of Project manager	4.95	0.266
Project materials	4.87	0.375

Table 5: Completion of Road Construction Projects

From the findings in table 5, the respondents strongly agreed that weather conditions, government policies, project funding, competency of technical staff, competency of the project manager and project materials influence the completion of road construction projects at a mean of 4.89, 4.86, 4.92, 4.89, 4.95 and 4.97 respectively. This infers that a project manager has to be prepared in terms of project funding, technical staff, competent project manager(s) and project materials.

6.1. Inferential Analysis

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.931a	0.868	0.861	0.24038

Table 6: Coefficient of Determination

From the findings as shown in table 6, 86.1% of the change in the project completion can be explained by a change in project funding, project materials, technical competency of staff and competency of the project manager. This implies that contractor preparedness in terms of the four factors is critical to the completion of road construction projects.

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	29.525	4	7.381	127.746	.000b
Residual	4.507	78	0.058		

Table 7: Analysis of Variance (ANOVA)

The results as shown in table 7, indicate that the independent variable; contractor preparedness in terms of project materials, project funding, technical staff and competent project manager significantly influences the completion of road construction projects in Nairobi, $F(4,78) = 127.746$, $p < .005$.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-0.147	0.113		-1.307	0.195
Project Materials	0.293	0.06	0.27	4.926	0.003
Project Funding	0.166	0.063	0.194	2.63	0.01
Competency of the Project Manager	0.308	0.073	0.343	4.233	0.001
Technical Competency of staff	0.28	0.044	0.322	6.34	0.001

Table 8: Multiple regression analysis

From the findings (table 8), a unit increase in project materials would increase project completion by 0.293. A unit increase in project funding would increase project completion by 0.166. A unit increase in the competency of the project manager would increase project completion by 0.308 and a unit increase in technical competency of staff would increase project completion by 0.280. All the variables were significant as their p-values were less than $p < 0.05$.

		Project Materials	Project Funding	Competency of the Project Manager	Technical Competency of staff	Project Completion
Project Materials	Pearson Correlation	1	.515**	.606**	.533**	.749*
	Sig. (2-tailed)		.000	.000	.000	.000
	N	83	83	83	83	83
Project Funding	Pearson Correlation	.515**	1	.830**	.427**	.755*
	Sig. (2-tailed)	.000		.000	.000	.000
	N	83	83	83	83	83
Competency of the Project Manager	Pearson Correlation	.606**	.830**	1	.512**	.833*
	Sig. (2-tailed)	.000	.000		.000	.000
	N	83	83	83	83	83
Technical Competency of staff	Pearson Correlation	.533**	.427**	.512**	1	.724*
	Sig. (2-tailed)	.000	.000	.000		.000
	N	83	83	83	83	83
Project Completion	Pearson Correlation	.749**	.755**	.833**	.724**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	83	83	83	83	83

Table 7: Pearson's correlation analysis
 **. Correlation is significant at the 0.01 level (2-tailed)

The researcher conducted Pearson's Correlation analysis at 95% confidence interval and a 5% confidence level for a 2 tailed test. The results infer that having a competent project manager contributes most to the completion of road construction projects (p-value=.833). This is then followed by project materials (p-value=.749), project funding (p-value=.755) and technical competence of staff (.724).

7. Discussion of Findings

The questionnaire return rate was 86% which according to Olive and Abel (2010) was suitable for further analysis. 27.7% of the respondents were between 20-29 years, 30-39 (25.3%), 40-49 (25.3%) and over 50 years (18%). Therefore, respondents were fairly spread in terms of age. Males dominated the industry at 73.5% which calls for a need to rally up more females to take up engineering courses. In terms of experience, the majority of the respondents at 34.9% had between 5 to 10 years in the industry. In terms of education, the majority of the respondents at 54.2% had a bachelor's degree. 20.5% had a diploma while 25.2% had a master's degree which shows that most of them were educated and qualified to work in the construction sector.

The study findings revealed that road construction projects do not have adequate skilled staff to work on the projects. The findings are in line with the findings by Othman and Ahmed (2013) who established that road construction projects in developing countries face shortages of technical skills and competent human resources. From the findings, it was also evident that contractors do not put adequate measures in place to ensure that they hire adequate and qualified staff before road construction projects commence. Moreover, contractors do not provide training and also fail to create an environment that would encourage staff to seek training. This therefore negatively hampers the completion of road construction projects as confirmed by Detsimas, Coffey, Sadiqi, and Li (2016) who revealed that the challenge of engineering and human development hampers mega construction projects in developing countries. Shang, Sui Pheng and Jia Hui (2018) justify the need for training of technical staff by stating that most of the construction workers mainly acquire technical skills during the actual implementation of the projects. Training of staff has high importance in the success of construction projects (Detsimas, Coffey, Sadiqi & Li, 2016) and therefore contractors must put adequate measures in place to ensure that there is adequate training. Training is further supported by Shahhosseini and Sebt (2011) who assert that developing the project team results in an improvement in technical competencies, skills of the project staff, overall team environment and the performance of the project. Therefore, part of the preparedness of the contractor should be to ensure that they hire adequate and qualified staff who should be properly trained.

Correlation analysis showed that there is a positive and significant relationship between project materials and completion of road construction projects. Regression analysis showed that a unit change in project materials increases project completion by 0.293. However, from the study findings, it was evident that contractors do not do a better job to ensure that they have adequate materials before starting work. Road contractors also fail to ensure that all the materials are inspected and ensure that there are prior delivery arrangements to avoid delays. Road contractors do not ensure that all the equipment is in good working condition before a project commences. 33.7% of the respondents opined that no security is provided to project materials. Frequent delays of construction materials were also noted as a problem. Theft of project materials was also observed as a key concern in road construction projects with the majority of the respondents (43.3%) stating that they experience theft of materials sometimes. The findings from the study mirrored the findings by Mahamid (2013) and Aziz and Abdel-Hakam (2016) who noted that contractors rank materials and equipment among the most significant factors that cause time overruns in construction projects. Failure by contractors to plan and have sufficient materials can result in delays in road construction projects (Shanmugapriya and Subramanian, 2013; Aziz & Abdel-Hakam, 2016). Poor handling of road construction materials results in damage which causes delays in completion of road construction projects (Aziz & Abdel-Hakam, 2016). Fluctuation in the prices of materials has been termed as one of the factors that influence the completion of road construction projects (Haseeb, Bibi & Rabbani, 2011). The present study reveals that contractors in Nairobi do not acquire project materials in time which according to Haseeb, Bibi, and Rabbani (2011) negatively influences the completion of road construction projects. A study by Kithinji (2017) that was done in Qatar revealed that escalation in prices of materials resulted in delays in road construction projects.

Correlation analysis revealed that there is a strong and positive relationship between the competency of project managers and the completion of road construction projects. Regression results revealed that a unit change in the competency of project manager improves project completion by 0.308 units. The study findings are supported by findings by Hwang and Ng (2013) who maintained that there is a positive and significant relationship between the achievement of the success of a project and project management competencies. Findings revealed that project contractors do not take adequate measures to ensure that a qualified project manager is hired before a project starts. It was also evident that proper scheduling and planning is not done before starting projects. Findings also revealed a lack of proper risk management in road construction projects. Failure to hire qualified project managers can result in poor project implementation since according to Henjewe (2019) project managers play a key role in road construction projects. Alzahrani and Emsley (2013) and Yang, Huang, and Wu (2011) also assert that for successful completion of projects, contractors must get qualified project managers on board. Risk, management communication management, scheduling and planning have been found to be three key knowledge areas for project managers (Hwang & Ng, 2013). Hwang and Ng (2013) maintained that there is a need for proper planning by project managers before a project commences to ensure that projects are completed in time. Project managers are supposed to have good stakeholder management skills to manage relations with clients (Hwang & Ng, 2013).

Findings revealed that there is a positive and significant relationship between project funding and project completion. Regression analysis revealed that for a one-unit change in project funding, project completion improves by 0.166 units. The findings are supported by Belay and Torp (2017) who established that there is a positive relationship between project funding and the success of construction projects. The findings are also supported by Iqbal, Choudhry, Holschemacher Ali and Tamošaitienė (2015) and Seboru (2015) who revealed that there is a positive association between delayed payments and time overruns in projects. Majority of the respondents (34.5%) stated that projects are funded intermittently. This was followed by 25.3% who maintained that projects are not sufficiently funded. 15.7% of the respondents maintained that projects do not adhere to budgets. The findings revealed that contractors do not check with clients at the start of the projects to ensure that there is adequate funding. The contractors also do not take adequate measures to ensure that they have adequate own funds to complete the projects when needed. Year-wise requirements for funds is also not done by project contractors to avert delays due to funding. The contractors also divert funds to non-project related activities which causes funding problems. It is therefore evident that contractors are not properly prepared in terms of funding to avert project delays. Belay and Torp (2017) maintain that project funding problems stem from inaccurate project forecasting and planning of the project at the feasibility stage which means that part of the planning by the contractor should be to ensure that the contractor has adequate funds to run the project. Failure by a contractor to ensure that the project adheres to the budget could result in overspending which could cause funding problems and eventual delays (Zou, Zhang & Wang, 2007). Zou, Zhang and Wang (2007) also maintain that contractors should be prepared to raise the required funds when needed to avoid delays that are caused by funding problems. The findings are also supported by Kaliba, Muya and Mumba (2009) who linked delays in construction projects to the protracted release of funds. Aziz (2013) linked funding problems to progressive payments which indicated the financial problem of the project owner.

8. Conclusion

Competent staff in a road construction project improves project completion. Contractors must, therefore, attract adequate and qualified staff and ensure that they are trained to improve their competence. Project managers oversee several aspects of a project and therefore a project contractor should hire qualified and competent project managers. Road project contractors must also ensure that proper planning and scheduling is carried out by project managers at the start of the project to avoid delays occasioned by planning and scheduling challenges. The contractor must also ensure that the project manager has an adequate plan at the start of the project for the management and supervision of staff and managing relations with the project stakeholders. The project contractor must also be prepared in terms of project funding and must ensure that the client has sufficient funds to run the project. Apart from only going for projects that they can manage;

contractors must also have proper plans in place to fund the projects on their own when needed. Weather conditions and government policies were found to be a key moderator between the independent variables and the completion of road construction projects, the dependent variable.

9. Recommendations

Project contractors should ensure that adequate and skilled technical staff are hired before a project commences. Project contractors should put measures in place to ensure that they have sufficient materials and proper equipment before engaging in road construction projects. Project contractors should ensure that the project managers hired to work in road construction project are qualified and have adequate experience. At the planning stage, contractors should be proactive and confirm with the clients if there are adequate funds to finance the project. The contractors should also have their own sources of funds when needed to avoid delays that are related to a shortage of funds. Contractors should enter into proper agreements with the clients to ensure that there is a proper release of funds.

10. References

- i. Alzahrani, J. I., & Emsley, M. W. (2013). The impact of contractors' attributes on construction project success: A post-construction evaluation. *International Journal of Project Management*, 31(2), 313-322.
- ii. Amer, W. H. (1994). *Analysis and evaluation of delays in construction projects in Egypt* (Doctoral dissertation, MSc. thesis, Zagazig University, Egypt).
- iii. Aziz, R. F. (2013). Factors causing cost variation for constructing wastewater projects in Egypt. *Alexandria Engineering Journal*, 52(1), 51-66.
- iv. Aziz, R. F., & Abdel-Hakam, A. A. (2016). Exploring delay causes of road construction projects in Egypt. *Alexandria Engineering Journal*, 55(2), 1515-1539.
- v. Belay, A. M., & Torp, O. (2017). Do Longer Projects Have Larger Cost Deviation Than Shorter Construction Projects? *Procedia Engineering*, 196, 262-269.
- vi. Cantrell, M. A. (2011). Demystifying the research process: Understanding a descriptive comparative research design. *Pediatric Nursing*, 37(4), 188-190.
- vii. Chileshe, N., Berko, P. D., & Haupt, T. (2010, July). Causes of project cost overruns within the Ghanaian road construction sector. In *Proceedings: The 5th Built Environment Conference*.
- viii. Competition Authority of Kenya. (2017). THE CONSTRUCTION INDUSTRY ANALYSIS OF THE STATE OF COMPETITION.
- ix. Detsimas, N., Coffey, V., Sadiqi, Z., & Li, M. (2016). Workplace training and generic and technical skill development in the Australian construction industry. *Journal of Management Development*, 35(4), 486-504.
- x. Etikan, I., & Bala, K. (2017). Sampling and sampling methods. *Biometrics & Biostatistics International Journal*, 5(6), 00149.
- xi. Fewings, P., & Henjewe, C. (2019). *Construction project management: an integrated approach*. Sydney: Routledge.
- xii. Frimpong, Y., Oluwoye, J., & Crawford, L. (2003). Causes of delay and cost overruns in the construction of groundwater projects in developing countries; Ghana as a case study. *International Journal of project management*, 21(5), 321-326.
- xiii. Gay, L. R. (1996). *Student guide to accompany Educational research: Competencies for analysis and application fifth edition*. Merrill.
- xiv. Gudienė, N., Banaitis, A., Podvezko, V., & Banaitienė, N. (2014). Identification and evaluation of the critical success factors for construction projects in Lithuania: AHP approach. *Journal of Civil Engineering and Management*, 20(3), 350-359.
- xv. Haseeb, M., Bibi, A., & Rabbani, W. (2011). Problems of projects and the effects of delays in the construction industry of Pakistan. *Australian Journal of business and management research*, 1(5), 41-50.
- xvi. Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-based nursing*, 18(3), 66-67.
- xvii. Hwang, B. G., & Ng, W. J. (2013). Project management knowledge and skills for green construction: Overcoming challenges. *International Journal of Project Management*, 31(2), 272-284.
- xviii. Iqbal, S., Choudhry, R. M., Holschemacher, K., Ali, A., & Tamošaitienė, J. (2015). Risk management in construction projects. *Technological and Economic Development of Economy*, 21(1), 65-78.
- xix. Kaliba, C., Muya, M., & Mumba, K. (2009). Cost escalation and schedule delays in road construction projects in Zambia. *International journal of project management*, 27(5), 522-531.
- xx. Kazaz, A., Ulubeyli, S., & Tuncbilekli, N. A. (2012). Causes of delays in construction projects in Turkey. *Journal of Civil Engineering and Management*, 18(3), 426-435.
- xxi. Kithinji, R. G. (2017). Factors Influencing Completion of Government Road Infrastructure Projects in Kenya: A Case of Meru County. *Strategic Journal of Business & Change Management*, 4(4).
- xxii. Larsen, J. K., Shen, G. Q., Lindhard, S. M., & Brunoe, T. D. (2015). Factors affecting schedule delay cost overrun, and quality level in public construction projects. *Journal of Management in Engineering*, 32(1), 04015032.
- xxiii. Lehne, J., Shapiro, J. N., & Eynde, O. V. (2018). Building connections: Political corruption and road construction in India. *Journal of Development Economics*, 131, 62-78.
- xxiv. Lock, D. (2017). *The essentials of project management*. London: Routledge.
- xxv. Mahamid, I. (2013). Contributors to schedule delays in public construction projects in Saudi Arabia: owners' perspective. *Journal of Construction Project Management and Innovation*, 3(2), 608-619.
- xxvi. Mahamid, I. (2013). Frequency of time overrun causes in road construction in Palestine: Contractors' view. *Organization, technology & management in construction: an international journal*, 5(1), 720-729.
- xxvii. Mahamid, I., Bruland, A., & Dmaid, N. (2012). Causes of delay in road construction projects. (Author abstract) (Report). *Journal of Management in Engineering*, 28(3), 300-310.
- xxviii. *Management*, 33(4), 784-796.
- xxix. Marzouk, M. M., El Kherbawy, A. A., & Khalifa, M. (2013). Factors influencing sub-contractors' selection in construction projects. *Hbrc Journal*, 9(2), 150-158.

- xxx. McCord, J., McCord, M., Davis, P. T., Haran, M., & Rodgers, W. J. (2015). Understanding delays in housing construction: evidence from Northern Ireland. *Journal of Financial Management of Property and Construction*, 20(3), 286-319.
- xxxi. Muhwezi, L., Acai, J., & Otim, G. (2014). An assessment of the factors causing delays in building construction projects in Uganda. *International journal of construction engineering and management*, 3(1), 13-23.
- xxxii. Mulla, S. S., & Waghmare, A. P. (2015). A study of factors caused for time & cost overruns in construction project & their remedial measures. *International Journal of Engineering Research and Applications*, 5(1), 48-53.
- xxxiii. Mwera, D. (2018). MPs to question Kenha over delayed road projects. Retrieved from <https://www.nation.co.ke/news/National-Assembly-MPs-Kenya-road-projects/1056-4319404-sakb2xz/index.html>
- xxxiv. Mweru, D. (2018). Contractors stall Sh9bn roads after payment. Retrieved 24 July 2019, from <https://www.businessdailyafrica.com/economy/Contractors-stall-Sh9bn-roads-after-payment/3946234-4784874-biuhj7z/index.html>
- xxxv. Ngacho, C., & Das, D. (2014). A performance evaluation framework of development projects: An empirical study of Constituency Development Fund (CDF) construction projects in Kenya. *International Journal of Project Management*, 32(3), 492-507.
- xxxvi. Nyabaro, K. (2015). Factors Influencing Implementation of Major Road Infrastructure Projects in Kenya: A Case of The Southern Bypass Project, Kenya (Masters). The University of Nairobi.
- xxxvii. Olive, M. M., & Abel, G. M. (2010). Research methods. Laba Graphic Services: Nairobi
- xxxviii. Oloo, R. O. (2016). Challenges facing timely completion of road projects managed by Kenya national highways authority. *Strategic Journal of Business & Change Management*, 3(4).
- xxxix. Ondari, P. O., & Gekara, J. M. (2013). Factors influencing successful completion of roads projects in Kenya. *International Journal of Social Sciences and Entrepreneurship*, 1(6), 26-48.
- xl. Othman, E., & Ahmed, A. (2013). Challenges of mega construction projects in developing countries. *Organization, technology & management in construction: an international journal*, 5(1), 730-746.
- xli. Rahman, I. A., Memon, A. H., & Karim, A. T. A. (2013). Significant factors causing cost overruns in large construction projects in Malaysia. *Journal of Applied Sciences*, 13(2), 286-293.
- xl. Rand, G. K. (2000). Critical chain: the theory of constraints applied to project management. *International Journal of Project Management*, 18(3), 173-177.
- xl. Relich, M. (2012). Evaluation of project completion with the application of fuzzy set theory. *Management*, 16(1), 216-229
- xl. Routledge.
- xl. Rwakarehe, E. E., & Mfinanga, D. A. (2014). Effect of inadequate design on cost and time overrun of road construction projects in Tanzania. *Journal of Construction Engineering and Project Management*, 4(1), 15-28.
- xl. Seboru, M. A. (2015). An investigation into factors causing delays in road construction projects in Kenya. *American Journal of Civil Engineering*, 3(3), 51-63.
- xl. Shahhosseini, V., & Sebt, M. H. (2011). Competency-based selection and assignment of human resources to construction projects. *Scientia Iranica*, 18(2), 163-180.
- xl. Shang, G., Sui Pheng, L., & Jia Hui, W. (2018). Drivers and barriers for multiskilling workers in the Singapore construction industry. *International Journal of Construction Management*, 1-16.
- xl. Shanmugapriya, S., & Subramanian, K. (2013). Investigation of significant factors influencing time and cost overruns in Indian construction projects. *International Journal of Emerging Technology and Advanced Engineering*, 3(10), 734-740
- l. Thionga, J. (2018). 60 road projects worth Sh1.7b abandoned by contractors: The Standard. Retrieved 23 July 2019, from <https://www.standardmedia.co.ke/article/2001275030/60-road-projects-worth-sh1-7b-abandoned-by-contractors>
- li. Wambui, D. N. U., Ombui, K., & Kagiri, A. (2015). Factors Affecting Completion of Road Construction Projects in Nairobi City County: Case Study of Kenya Urban Roads Authority (KURA). *International Journal of Scientific and Research Publications*, 5(11), 2250-3153.
- lii. Yaman, S. K., Abdullah, A. H., Mohammad, H., & Hassan, F. (2015). Technical competency of construction manager in the Malaysian construction industry. In *Applied Mechanics and Materials* (Vol. 773, pp. 1053-1059). Trans Tech Publications.
- lii. Yang, L. R., Huang, C. F., & Wu, K. S. (2011). The association among project manager's leadership style, teamwork and project success. *International journal of project management*, 29(3), 258-267.
- liv. Zou, P. X., Zhang, G., & Wang, J. (2007). Understanding the key risks in construction projects in China. *International Journal of Project Management*, 25(6), 601-614.