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INFLUENCE OF VALUE MANAGEMENT ON CONSTRUCTION QUALITY OF ALL-WEATHER ROAD PROJECTS IN KISUMU COUNTY, KENYA

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ABSTRACT

The main purpose of this study was to evaluate the influence of project contracting terms, project site management, project coordination and conflict management on construction quality of all-weather road projects in Kisumu County, Kenya. The study used explanatory survey design and targeted mainly persons charged with ensuring quality of road construction projects in Kisumu County, Kenya. The study used structured questionnaires to collect primary data. From both descriptive and inferential statistics all conceptualized independent variables (project contracting terms, project site management, project coordination and conflict management) significantly influenced construction quality of all-weather road projects in Kisumu County (dependent variable). The study concluded that one, the county government must ensure there are feasible project contracting terms in terms of clear estimation of contract costs, scope, time, funding sources and compensations agreement to enhance construction quality of all-weather road projects; Secondly, effective project site management to ensure availability of quality materials can boost construction quality of all-weather road projects and three, effective project coordination that ensures seamless flow of communication influences construction quality of all-weather road projects. The study recommended that one, county government must ensure there are feasible project contracting terms in terms of clear estimation of contract costs, scope, time, funding sources and compensations agreement to enhance construction quality of all-weather road projects. Secondly, to boost construction quality of all-weather road projects, contractors should ensure there is secure project site management to guarantee safety and quality of construction materials. Thirdly, road construction project coordinators should ensure that there is seamless and timely communication with relevant liaison officers and supervises construction duty allocations so as to ensure there is timely completion of quality all-weather roads. The study recommends that another study can be done to assess the effect of procurement process on timely completion of all-weather roads.

Key Words: *Project Contracting Terms, Project Site Management, Project Coordination, Conflict Management, Construction Quality*

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INTRODUCTION

Quality management, which is a concept that had referred to simple inspections in the early 20th century, has continued to evolve to total quality management (TQM), Six-sigma, and so on. Recently, quality places emphasis on the strategic direction, systematic approach, and organizational efforts (Kwak & Ibbs, 2004). There is a difference between a producer's perspective and customer's perspective with respect to quality. Quality from the producer's perspective is the quality of conformance, making sure that a product or service conforms to the described design standards and quality specifications. Normally the design activities, the starting point of quality management, are completed before the products are manufactured, and design standards and quality objectives are set up according to the corporate strategy and customer needs. To assure that the quality is maintained throughout the whole product life cycle and not confined to a simple product quality, quality of goal achievement and quality of conformance to meet the specification can be applied for the construction project management (UN Habitat, 2018).

The quality of road construction projects in Kenya attracted a lot of public concern since most completed projects required reworks barely less than a year after completion. In this regard, NCA come up with regulations requiring that a contractor, whether foreign or local, be registered under the category of construction works they propose to undertook. The works are classified under eight categories; NCA-1 to NCA-8, ranging in monetary value from unlimited value contracts (NCA-1 contract) to contracts valued for Kenya Shillings five million and below (NCA-8). Registration under each category of the Works is on a point basis pegged on criteria such as financial capacity, experience, available equipment and technical expertise (G.O.K., 2018).

County code number 42 came into existence after the promulgation of the new constitution of Kenya, 2010. The county is made up of seven (7) sub counties namely; Kisumu west, Kisumu central, Kisumu east, Muhoroni, Nyando, Nyakach and Seme. The sub counties are decentralized units for delivery of services at county level headed by a sub county administrator. The county has 35 electoral wards headed by ward administrators to ensure county services reach citizens at ward level.

From the County Integrated Development plan 2018-2022 reports, the county's strategic position serves as a gateway for Kenya into the rest of the African Great Lakes region. It is located on the shores of Lake Victoria and served as the main commercial and transport hub for the Western part of Kenya and the East African region. The county hosts the third largest city in Kenya, Kisumu city, which serves as the County's headquarters. There are five major urban centers; Ahero, Katito, Muhoroni, Chemilil, and Maseno. Other emerging fast-growing centers include Awasi, Pap-Onditi, Holo, Kombewa and Sondu.

In terms of road construction projects, a number of roads were reported to have failed due to lack of technical supervision, coordination 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 ended up being unsuccessfully completed with disputable quality (Kenya Engineer Magazine, 2016).

Further, County Integrated Development plan 2018-2022 reports, show that as per the conditional allocation for roads maintenance fuel levy fund; the budget for financial year 2015-2016 was Ksh 2,170,965/=; the actual was Ksh72,170,965/=; the budget for financial year 2016-2017 was ksh164,024,920/= while the actual amount was ksh

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94,189,837/= (CIDP report, 2019). Despite the large allocation for roads maintenance fuel levy fund, the road network in Kisumu county still remained poor with some poorly constructed urban and rural county roads that got dilapidated shortly after completion and use.

In fact County revenue streams for the year 2016-2017 for roads, transport and public works was ksh 60,000,000/= but its percentage efficiency use was not indicated despite other revenue streams categories recording a better performance in terms of percentage efficiency (CIDP report, 2019); thus, pointing to poor utilization of roads, transport and public works revenues which translated to existing poor county government road construction quality.

Statement of the problem

The quality of completed road construction projects is fundamental for economic growth of counties in Kenya since they heavily rely on effective road infrastructural set up for trade and commerce. However, road infrastructure projects in the Lake Basin Region as constructed by local construction firms awarded by county governments have reported substandard quality.

For instance, from Kisumu County government roads department, a work plan showed that in the year 2019, the county was to spend substantial amount to improve road network in the county's 35 wards (CIDP report, 2019). Yet, there are reported cases of poor state and quality of roads like poor roads in Nyalenda, Nyando, Muhoroni, Seme, just to mention a few. For example, due to floods in the year, 2018, river Nyando broke its banks and swept poorly constructed rural roads rendering several places inaccessible (UN Habitat, 2018).

Further, despite the large allocation for roads maintenance fuel levy fund, the road network in Kisumu county still remains poor with some poorly constructed urban and rural county roads that get dilapidated shortly after completion and use. In fact County revenue streams for the year 2016-2017 percentage efficiency for roads, transport and public works was not indicated despite other revenue streams categories recording a better performance in terms of percentage efficiency (CID Preport, 2019).

More so according to (CIDP report,2019), transport and infrastructure indicate that budget versus expenditure absorption rates were quite low; which has translated to poor and inefficient road network within urban and rural areas of the county and under-utilization of the Lake as mode of transport.

In as much as poor road construction can be adequately addressed by Kisumu County government--roads, transport and public works department, there are reported cases of conflicts in Kisumu county assembly on particular road preference and awarding of road construction contracts(CIDP report, 2019) which consequently affect quality of county government roads;

Therefore, poor road network and road construction quality in Kisumu county emanating from low road budget and absorption rate, low performance percentage efficiency of road revenue streams and Kisumu county assembly conflicts on contracting of county road construction projects motivated this study to evaluate the influence of project contracting terms, project site management, project coordination and conflict management on quality of county government road construction projects in Kisumu County, Kenya.

Objectives of the study

The general objective of this study was to examine influence of value management on construction quality of all-weather road projects in Kisumu County. The specific objectives were;

- To examine the influence of project contracting terms on construction quality of all-weather road projects in Kisumu County, Kenya

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- To examine the influence of project site management on construction quality of all-weather road projects in Kisumu County, Kenya
- To evaluate the influence of project coordination on construction quality of all-weather road projects in Kisumu County, Kenya
- To assess the influence of conflict management on construction quality of all-weather road projects in Kisumu County, Kenya

The study was guided by the following hypotheses;

- **H_{01}:** There is no significant relationship between project contracting terms and construction quality of all-weather road projects in Kisumu County, Kenya.
- **H_{02}**: There is no significant relationship between project site management and construction quality of all-weather road projects in Kisumu County, Kenya.
- **H_{03}**: There is no significant relationship between project coordination and construction quality of all-weather road projects in Kisumu County, Kenya.
- **H_{04}**: There is no significant relationship between conflict management and construction quality of all-weather road projects in Kisumu County, Kenya.

LITERATURE REVIEW

Contingency theory

This theory by Fred Edward Fiedler asserts that when managers make a decision, they must take into account all aspects of the current situation and act on those aspects key to the situation at hand. Each construction project is unique and with its own complexities and therefore should be managed according to its specific characteristics and environment in that particular period of time (Sawega, 2015). The contingency theory recognizes this aspect and attempts to identify practices that best suit the unique demands of different.

Further, contingency theory recognizes that there are a range of contextual variables also referred to as risk factors which influence the project objectives differently. Examples of these variables are: external environment, technology, organizational structure and size, cost, culture, people involved and strategy. Contingencies for both budgets and schedules provide the project manager with the estimating caution they need to protect their projects from cost and time overruns (PMI, 2015). That is, effectively allocating these contingencies can help project managers control much of the projects uncertainties. The contingency theory is therefore related to this study in the sense that project quality is contingent on a number of factors that can contribute to road construction quality.

Stakeholder theory

Stakeholder theory (Freeman, 1984) and is defined as "any group of people who are defined by the objectives of the organization". Thus, in the stakeholder theory, the idea is that 'holders who have stakes' interact with the organization and thus make its operation possible (Blair et al., 1998).

It is a theory that explains how organizations function with respect to various constituencies with whom they are inextricably embedded. Stakeholder theory development has centered on defining the stakeholder concept and classifying stakeholders into categories that provide an understanding of individual stakeholder relationships.

Theory of constraints

The theory of constraints 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 (Eliyahu & Goldratt, 2004).

The underlying premise of the theory of constraints is that organizations can be measured and controlled by

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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).

This theory of constraints connected to this study in the sense that improper project coordination and project site management can lead to low material supply and quality, poor utilization of project equipment and project team conflicts management which can negatively constrict road construction project completion and compromised road construction quality.

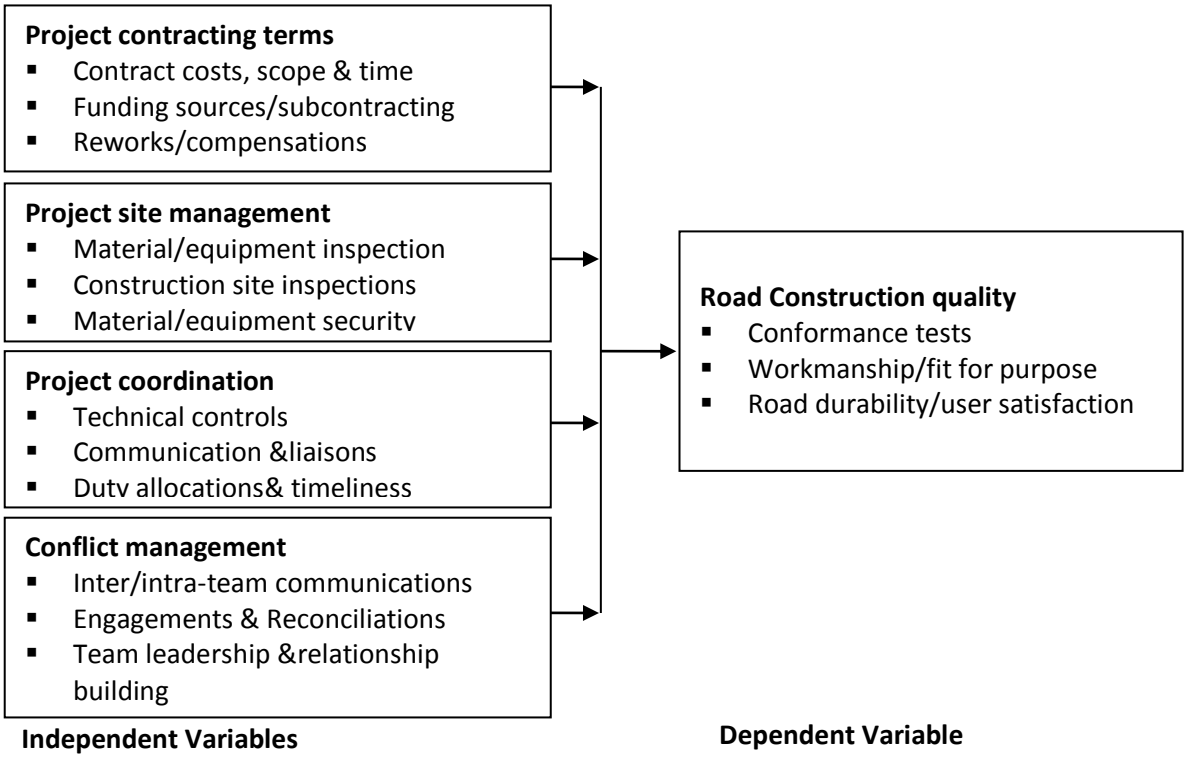

Figure 1: Conceptual Framework

Empirical Review

(Yang, 2013) study in Malaysia, found that inadequate resources due to lack of capital, unclear contracting terms arising from exceptionally low bids as the major factors that cause construction project delay and quality.(Al-Momani, 2011) study on construction projects in Jordan identified the main causes of construction project delay and quality as poor project design, subcontracting, change orders due to lack of adherence to contracting terms. Change orders refer to design changes by the owner or his agent during the course of the construction. Subcontracting was mentioned as a major cause of poor construction quality because some outsourced sub-contractors comprise construction quality.

More so, (Mubarak, 2014) when investigating the causes of delay and construction quality in Egyptian construction projects cited financial problems of the contractor and delays in payment by project sponsor. These problems slowed project progress and resulted in the suspension of ongoing work and the delay of both critical activities and the quality of the

completed construction projects, since contract terms were either not well articulated.

(Fugar and Agyakwah-Baah,2010) study in Ghana found that poor site management, under estimating the project's expected completion time, shortage of materials, ever rising cost of materials collectively and individually led to project time overrun in building projects. Little experience and poor site management were attributed to the contractors which affected quality of completed projects.(Ameh and Osegbo, 2011) studied causes of delay and quality of construction projects and found that poor site management; inadequate finances scuttled the construction speed in Nigeria's commercial city. Most projects halted mid-stream as clients ran short of funds to see projects through to the end arising from poor site management which necessitated high cost overruns.

(Smith and Walmsley, 2012) study in UK found that poor site management led to pilferage and theft of construction materials. That is, theft of materials interrupted construction speed and quality because replacing some of the lost materials and equipment could not be immediate and sometimes substituted with poor quality materials.

(Chen and Partington, 2016) study on the coordination between the successive trades in construction coordination found that, coordinate installation of different project components to ensure high performance and accessibility for next installation, affect significantly on the progress, the project completion status and project quality.(Chen and Partington, 2016) further studied on project coordination in construction sites; the most important aspect of their work was, coordination between every successive task on site, and found that coordination improves the implementation sequence and minimizes the waste. They concluded that, an efficient solution procedure must be developed to illustrate the coordination duties to maximize the net value of the project resources and the final quality of the any construction project.

(Wesam and Mohd, 2015) study on construction projects in Gaza and the study survey was conducted by filling 184 arbitrated questionnaire. An exploratory factor analysis was applied to categorize the coordination duties into clusters. Case study was investigated to verify the questionnaires results. The results showed the rank of coordination groups as below; contract implementation group (79.34%), quality and performance group (78.95%), planning and scheduling group (78.90%), health and safety group (78.14%), budget and cash flow group (77.85%) and resources and team management group (76.11%). The most important duties were, contributing in plan preparing for project procurement, implementation and tracking, 87.89 %. Then, follow up the implementation of all contractual commitments, 87.09%. The study recommended the project coordinator must underscore the role of each party including donors, owners, consultants and contractors, so as to improve the coordination strategies in the constructions industry.

(Chan and Kumarasway, 2007) identified client's managerial ability and decision-making as factors of delay and quality of completed construction projects. They observed that the client as a leader was instrumental in solving project team conflicts. As a leader, the client influences the whole construction team towards speedy delivery of project mission and by mobilizing the said team towards project success. They found that leadership failure manifested itself in poor supervision, slowed decision-making process and indecision in conflict resolutions.

(Kalsen, 2014) study suggested how project managers can influence and encourage team members in order to achieve construction quality results. They based their argument on positive psychology theory that is an optimistic human vision. They listed use of signature strength, positive meaning, positive

emotions and positive relations to create positive results. Thus, the project manager leads and influences his/her employees by influencing their thought, meaning through amiable communication skills so as to address any inter or intra team conflicts.

METHODOLOGY

In this study, explanatory survey design was employed since the design was suitable for exploring associations that are conducted in order to explain any behaviour or reactions of people to a given phenomenon in the society; The explanatory survey design was therefore used to determine an association between the conceptualized independent and dependent variables as shown in the study's conceptual model (Peshkin, 1990). The study targeted mainly persons charged with ensuring quality of road construction projects in Kisumu County, Kenya. These comprised of Road contractors, county inspector of Roads, Road foreman, public works officers, County Transport and Infrastructure officers, contractors technical staff, NCA engineers, KeRRA officers, KURA officers since they were charged with ensuring quality of road construction projects in Kisumu County, Kenya. The study employed stratified random sampling technique. This ensures that it has minimized sample selection bias and ensures that certain elements of the population are not over represented or underrepresented (Mugendaand Mugenda, 2008). Primary data was collected by means of self-administered structured questionnaires. All collected data was coded, cleaned, tabulated and analyzed using descriptive and inferential statistics with the aid of specialized Statistical Package for Social Sciences, version 24. Descriptive analysis such as frequencies, means, standard deviation was utilized whereas analyzed data presented in tables and graphs.

FINDINGS

The descriptive statistics presented in this section were summarized responses on the statements measuring the study's independent variables (project contracting terms, project site management, project coordination, conflict management) and dependent variable (road construction quality) using Likert scale with values ranging from 5 to 1; that is; 5=Strongly Agree, 4=Agree, 3= Uncertain, 2=Disagree and 1= Strongly Disagree. The results were presented in the table form showing frequencies of responses as per each statement and its corresponding percentage score in brackets, plus means and standard deviations.

Descriptive statistics: Project contracting terms and road construction quality

These were summarized responses on the perceptive influence of project contracting terms on construction quality of all-weather road projects in Kisumu County. The descriptive results were presented in table 1.

Table 1: Descriptive Statistics; Project Contracting Terms

Statement	5	4	3	2	1	Mean	Std.dev
There are contract stipulations on realistic project costs of all-weather road projects in Kisumu County	14(15.4)	45(49.5)	14(15.3)	10(11)	8(8.8)	3.52	0.915
There are contract provisions for construction scope of all-weather road projects in Kisumu County	17(18.7)	42(46.2)	11(12.0)	11(12.1)	10(11.0)	3.49	0.924
There are effective contract agreements on project timeliness of construction of all-weather road	16(17.5)	43(47.3)	15(16.5)	8(8.8)	9(9.9)	3.54	0.918

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projects in Kisumu County							
Contract agreements on road construction funding sources and subcontracting influence construction quality of all-weather road projects in Kisumu County	15(16.5)	42(46.2)	12(13.2)	12(13.2)	10(11.0)	3.44	0.923
There are effective construction agreements on construction reworks and related compensations during construction of all-weather road projects in Kisumu County	16(17.6)	46(50.5)	13(14.3)	8(8.8)	8(8.8)	3.59	0.914
Generally, road construction contracting terms and conditions influence construction quality of all-weather road projects in Kisumu County	10(11.0)	51(56)	11(12.1)	10(11)	9(9.9)	3.47	0.917
Valid list wise=91							
Grand mean =3.51							

From table 1, most respondents agreed (49.5%) and strongly agreed (15.4%) that there were contract stipulations on realistic project costs of all-weather road projects in Kisumu County; while a further 46.2% and 18.7% agreed and strongly agreed respectively that there were contract provisions for construction scope of all-weather road projects in Kisumu County; implying that contract stipulations and scope as aspects of contracting terms influence construction quality of all-weather roads in Kisumu County.

More so, while 47.4% agreed, 16.5% were uncertain while 8.8 disagreed that there were effective contract agreements on project timeliness of construction of all-weather road projects in Kisumu County; implying some contact agreements could just be on paper but not effective since some road were not completed within the stipulated time.

In terms of agreements on funding sources, 46.2% agreed while 13.2 disagreed that contract agreements on road construction funding sources and subcontracting influence construction quality of all-weather road projects in Kisumu County.

Further, while most respondents agreed (50.5%), 8.8% disagreed that there were effective construction agreements on construction reworks and related compensations during construction of all-weather road projects in Kisumu County, implying that there are cases where road construction quality is compromised due to lack of construction reworks.

Lastly, most respondents agreed (56.0%) and strongly agreed (11.0%) that generally, road construction contracting terms and conditions influence construction quality of all-weather road projects in Kisumu County. This was supported by (Al-Momani, 2011) study on construction projects in Jordan that identified the main causes of construction project delay and quality as poor project design, subcontracting, change orders due to lack of adherence to contracting terms.

Project site management and road construction quality

These were summarized responses on the perceptive influence of project site management on construction quality of all-weather road projects in Kisumu County. The descriptive results are presented in table 2.

Table 2: Descriptive statistics; Project Site Management

Statement	5	4	3	2	1	Mean	Std.dev
There are real time inspection of material quality at both material sourcing and road construction sites during construction of all-weather road projects in Kisumu County	14(15.4)	44(48.4)	13(14.3)	11(12.1)	9(9.8)	3.47	0.919
There are continuous inspection of road construction equipment quality during construction of all-weather road projects in Kisumu County	19(20.9)	40(44.0)	10(11.0)	12(13.1)	10(11.0)	3.51	0.927
There are impromptu inspections of road construction sites during construction of all-weather road projects in Kisumu County	14(15.4)	47(51.6)	11(12.1)	10(11.0)	9(9.9)	3.52	0.918
There are consistent inspection of construction material security during construction of all-weather road projects in Kisumu County	12(13.2)	45(49.5)	13(14.2)	11(12.1)	10(11.0)	3.42	0.919
There are constant inspection of construction equipment security to determine road construction quality	15(16.5)	46(50.5)	12(13.2)	10(11.0)	8(8.8)	3.55	0.916
Generally, regular inspection of road construction sites for material/equipment quality and security influences road construction quality	13(14.3)	49(53.8)	11(12.1)	9(9.9)	9(9.9)	3.53	0.923
Valid list wise=91							
Grand mean =3.5							

From table 2, most respondents agreed (48.4%) and strongly agreed (15.4%) while 12.1% disagreed that there are real time inspection of material quality at both material sourcing and road construction sites during construction of all-weather road projects in Kisumu County, implying there are incidences where there are no real time inspection of material quality at both material sourcing and road construction sites thus compromising construction quality.

More so, while 44.0% agreed, 13.1% disagreed that there are continuous inspection of road construction equipment quality during construction of all-weather road projects in Kisumu County; 51.6% agreed and 11.0% disagreed that there are impromptu inspections of road construction sites during construction of all-weather road projects in Kisumu County; implying that there are incidences where continuous and impromptu inspections are not done thus compromising construction quality of all-weather road projects in Kisumu County.

Further, while 49.5% agreed, 12.1% disagreed that there are consistent inspection of construction material security during construction of all-weather road projects in Kisumu County; and 50.5% agreed, while 11.0% disagreed that there are constant inspection of construction equipment security to determine road construction quality; implying that there are cases where consistent and constant inspections are not done thus compromising

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construction quality of all-weather road projects in Kisumu County.

Lastly, most respondents agreed (53.8%) and strongly agreed (14.3%) that generally, regular inspection of road construction sites for material/equipment quality and security influences road construction quality. This is supported by (Smith and Walmsley, 2012) study in the UK who found that poor site management led to pilferage and theft of construction materials. That is, theft of materials interrupted construction speed and quality because replacing some of the lost materials and equipment could not be immediate and sometimes substituted with poor quality materials.

Project coordination and road construction quality

These were summarized responses on the perceptive influence of project coordination on construction quality of all-weather road projects in Kisumu County. The descriptive results were presented in table 3.

Table 3: Descriptive statistics; Project Coordination

Statement	5	4	3	2	1	Mean	Std.dev
There are constant project coordinator's connection with client, consultant and contractor to assess road construction quality	12(13.2)	45(49.5)	13(14.3)	12(13.2)	9(9.9)	3.44	0.918
Project coordinator's timely respond to emerging construction issues on road construction quality	12(13.2)	49(53.8)	13(14.3)	9(9.9)	8(8.8)	3.42	0.912
There are frequent project coordinator's communication with liaison officers to monitor road construction quality	13(14.3)	50(54.9)	11(12.1)	9(9.9)	8(8.8)	3.56	0.913
Most project coordinator's belief in team playing spirit to monitor road construction quality	14(15.4)	45(49.5)	12(13.2)	11(12.1)	9(9.9)	3.48	0.917
Most project coordinators have technical knowledge on construction quality	15(16.5)	42(46.2)	13(14.3)	7(7.7)	14(15.4)	3.41	0.929
Generally, project coordinator's facilitation and resource utilization skills influence road construction quality	14(15.4)	46(50.5)	10(11.0)	11(12.1)	10(11.0)	3.48	0.921
Valid list wise=91							
Grand mean =3.47							

From table 3, there were mixed reactions because while 49.5% of respondents agreed, 13.2% disagreed that there were constant project coordinator's connection with client, consultant and contractor to assess road construction quality; thus cases of lack of project coordinators' connection with relevant officers could definitely compromise construction quality of all-weather road projects in Kisumu County.

More so, while 53.8% agreed, 9.9% disagreed that project coordinator's timely respond to emerging construction issues on road construction quality; and this as reinforced by 54.9% who agreed and 8.8% of respondents who disagreed that there are frequent project coordinator's communication with liaison officers to monitor road construction quality. This implies that there are cases where project

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coordinators do not timely respond to emerging construction issues due to poor communication with liaison officers, thus compromising construction quality of all-weather road projects in Kisumu County.

Further, 49.5% agreed, 12.1 disagreed that most project coordinator's belief in team playing spirit to monitor road construction quality; while 46.2% and 15.4% strongly disagreed respectively that most project coordinators have technical knowledge on construction quality; implying that lack of technical knowledge and team management spirit form project coordinators may negatively affect construction quality of all-weather road projects in Kisumu County.

Lastly, most respondents (50.5%) agreed that generally, project coordinator's facilitation and resource utilization skills influence road construction quality; thus lack of it could have negatively affected construction quality of all-weather road projects in Kisumu County. This is supported by (Jha, 2005) who reported that most researchers assert that for successful completion of quality construction projects most dominant skill possessed by the project coordinators of successful projects are relationship with client, consultant and contractor, timeliness, and technical knowledge of the subject, belief in team playing spirit and coordination for achieving construction quality.

Conflict management and road construction quality

These were summarized responses on the perceptive influence of conflict management on construction quality of all-weather road projects in Kisumu County. The descriptive results were presented in table 4.

Table 4: Descriptive statistics; Conflict Management

Statement	5	4	3	2	1	Mean	Std.dev
There are timely checks on inter-team communications to help identify and resolve any emerging inter-team conflicts	14(15.4)	44(48.4)	13(14.3)	11(12.1)	9(9.9)	3.47	0.919
There are appropriate checks on intra-team communications to assist in identifying and resolving any emerging intra-team conflicts	18(19.8)	42(46.2)	12(13.2)	10(11.0)	9(9.9)	3.55	0.923
The project managers engages all pertinent project teams to reduce team conflicts and boosts team commitment to construction quality	19(20.9)	43(47.3)	10(11.0)	9(9.9)	10(11.0)	3.57	0.924
There is a well-structured team reconciliation framework to assist in timely resolution of construction team conflicts	16(17.6)	41(45.1)	12(13.2)	12(13.2)	10(11.0)	3.45	0.917
Project manager's team leadership and relationship building skills assist in construction teams' commitment to road construction quality	18(19.8)	43(47.3)	13(14.3)	9(9.9)	8(8.8)	3.59	0.915
6.Generally, effective team conflict resolution mechanisms influence construction teams' commitment to road construction quality	15(16.5)	45(49.5)	12(13.2)	10(11.0)	9(9.9)	3.52	0.913
Valid list wise = 91							
Grand mean 3.53							

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From table 4, 48.4% of respondents agreed, 14.3% were uncertain while 12.1% disagreed that there are timely checks on inter-team communications to help identify and resolve any emerging inter-team conflicts. More so, 46.2% agreed, while 11.0% disagreed that there are appropriate checks on intra-team communications to assist in identifying and resolving any emerging intra-team conflicts.

In regard to reducing team conflicts, 47.3% agreed while 11.0% disagreed that the project managers engages all pertinent project teams to reduce team conflicts and boosts team commitment to construction quality. More closely, 45.1% of respondents agreed while 13.2% disagreed that there is a well-structured team reconciliation framework to assist in timely resolution of construction team conflicts, implying that any existence of poor conflict management mechanism negatively impact on construction quality of all-weather road projects in Kisumu County.

Lastly, most respondents agreed (49.5%) and strongly agreed (16.5%) that generally, effective team conflict resolution mechanisms influence construction teams' commitment to road construction quality. This is supported by (Nixon et al., 2012) assertion that through shared vision, a transformational project leader can mobilize commitment and improve the performance of both the individual project team members and the project as a whole. This is because transformational leaders are said to show charisma, as a means of motivating project team member to integrate into the collective vision, and a strong consideration of and support for individual team member needs. Thus, developing connections between the project manager and individual team members is also thought to help individuals achieve their full potential and thus impact positively on their collective contribution to construction quality.

Inferential Statistics

Table 5: Correlation Analysis

		Project Contracting Terms	Project Site Mgt	Project Coordination	Conflict Management	Road Quality
Project contracting terms	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	91				
Project site management	Pearson Correlation	.444**	1			
	Sig. (2-tailed)	.000				
	N	91	91			
Project Coordination	Pearson Correlation	.448**	.487**	1		
	Sig. (2-tailed)	.000	.000			
	N	91	91	91		
Conflict management	Pearson Correlation	.493**	.536**	.582**	1	
	Sig. (2-tailed)	.000	.000	.000		
	N	91	91	91	91	
Road Quality	Pearson Correlation	.716**	.771**	.835**	.723**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	91	91	91	91	91

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

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Multiple Regression Analysis

Analysis of multiple regressions was done after compulsory assumptions of multiple regression analyses were checked and met. The results in table 6 showed an R square of 0.843, thus we infer that the study model explains 84.3% of the variations in the construction quality of all-weather road projects in Kisumu County, while other factors not in this study model accounts for 15.7% of variations in the construction quality of all-weather road projects in Kisumu County, thus, it is a good model.

Table 6: Multiple Regression Analysis

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	.918[a]	.843	.835	.47441	.843	115.272	4	86	.000

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	103.774	4	25.944	115.272	.000[a]
	Residual	19.356	86	.225		
	Total	123.130	90			

a. Predictors: (Constant), conflict management, Project contracting terms, Project site management, Project Coordination

b. Dependent Variable: Road construction quality

Further, ANOVA results in table 6 also showed that the F-statistical value was significant (F=115.272, *significant* at *p<.001*), thus confirming the fitness of the analytical model. That is, from the study model, the significant F value inferred that the four study independent variables (project contracting terms, project site management, project coordination, conflict management) were indeed different from each other and that they influence the dependent variable (road construction quality) in varied ways.

Lastly, from the values of unstandardized regression coefficients with standard errors in parenthesis in table 7, all the independent variables (project contracting terms; β = 0.199 (0.069) at *p<0.05*; project site management; β = 0.351 (0.067) at *p<0.05;* project coordination; β = 0.444 (0.077) at *p<0.05,* conflict management*; β = 0.132 (0.064) at p<0.05;* were significant predictors of road construction quality (dependent variable).

Table 7: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.454	.076		5.976	.000
	Project contracting terms	.199	.069	.186	2.393	.019
	Project site management	.351	.067	.345	5.212	.000
	Project Coordination	.444	.077	.413	5.745	.000
	Conflict management	.132	.064	.137	2.068	.042

a. Dependent Variable: Road construction quality

Therefore, the final multiple regression equation for overall significant multiple influence of the study's four independent variables (project contracting terms, project site management, project coordination, conflict management on road construction quality (dependent variable) is;

(v) $y = 0.454 + 0.199X_1 + 0.351X_2 + 0.444X_3 + 0.132X_4$

Where;

y= construction quality of all-weather road projects in Kisumu County

X_1= project contracting terms

X_2= project site management

X_3= project coordination

X_4= conflict management

Hypothesis Testing

The study tested a total of four null hypotheses and the decision of accepting or rejecting each null hypothesis is explained as follows; The decision was to either accept the null hypothesis ($\mathbf{H_o}$) if its corresponding unstandardized regression coefficient **β= 0** and not significant at 5% (p>0.05) from the multiple regression results; or reject the null hypothesis ($\mathbf{H_o}$) and accept the alternative hypothesis ($\mathbf{H_A}$) if its corresponding unstandardized regression coefficient **β≠ 0** and significant at 5% (p<0.05); tested as explained in the subsequent paragraphs.

Null Hypothesis one ($\mathbf{H_{01}}$): There is no significant relationship between project contracting terms and construction quality of all-weather road projects in Kisumu County, Kenya. **(Alternative Hypothesis one) $\mathbf{H_{A1}}$:** There is significant relationship between project contracting terms and construction quality of all-weather road projects in Kisumu County, Kenya.;β = 0.199 (0.069) *significant* at *p<0.05.***Verdict**; we reject the null hypothesis ($\mathbf{H_{01}}$) and accept the alternative hypothesis ($\mathbf{H_{A1}}$) that there is no significant relationship between project contracting terms and construction quality of all-weather road projects in Kisumu County, Kenya. The results implied that a single improvement in feasible project contracting terms will lead to 0.199 unit improvement in construction quality of all-weather road projects in Kisumu County.

Null Hypothesis two ($\mathbf{H_{02}}$): There is no significant relationship between project site management and construction quality of all-weather road projects in Kisumu County, Kenya. **(Alternative Hypothesis two) $\mathbf{H_{A2}}$:** There is significant relationship between project site management and construction quality of all-weather road projects in Kisumu County, Kenya.;β = 0.351 (0.067) *significant* at *p<0.05.***Verdict**; we reject the null hypothesis ($\mathbf{H_{02}}$) and accept the alternative hypothesis ($\mathbf{H_{A2}}$) that there is no significant relationship between project site management and construction quality of all-weather road projects in Kisumu County, Kenya. The results implied that a single improvement in feasible project site management will lead to 0.351 unit improvement in construction quality of all-weather road projects in Kisumu County.

Null Hypothesis three ($\mathbf{H_{03}}$): There is no significant relationship between project coordination and construction quality of all-weather road projects in Kisumu County, Kenya. **(Alternative Hypothesis three) $\mathbf{H_{A3}}$:** There is significant relationship between project coordination and construction quality of all-weather road projects in Kisumu County, Kenya.;β = 0.444 (0.077) *significant* at *p<0.05.***Verdict**; we reject the null hypothesis ($\mathbf{H_{03}}$) and accept the alternative hypothesis ($\mathbf{H_{A3}}$) that there is no significant relationship between project coordination and construction quality of all-weather road projects in Kisumu County, Kenya. The results implied that a single improvement in feasible project coordination mechanisms will lead to 0.444 unit improvement in construction quality of all-weather road projects in Kisumu County.

Null Hypothesis four ($\mathbf{H_{04}}$): There is no significant relationship between conflict management and construction quality of all-weather road projects in

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Kisumu County, Kenya. **(Alternative Hypothesis four)** **H_{A4}:** There is significant relationship between conflict management and construction quality of all-weather road projects in Kisumu County, Kenya.;β = 0.132 (0.064) *significant* at *p<0.05.***Verdict**; we reject the null hypothesis (**H_{04}**) and accept the alternative hypothesis (**H_{A4}**) that there is no significant relationship between conflict management and construction quality of all-weather road projects in Kisumu County, Kenya. The results implied that a single improvement in feasible project coordination mechanisms will lead to 0.132 unit improvement in construction quality of all-weather road projects in Kisumu County.

CONCLUSIONS AND RECOMMENDATIONS

First, the study concluded that project contracting terms significantly influence construction quality of all-weather road projects, thus well-defined project contracting terms can enhance construction quality of all-weather roads. Secondly, effective project site management to ensure availability of quality materials can boost construction quality of all-weather road projects. Thirdly, effective project coordination that ensures seamless flow of communication influences construction quality of all-weather road projects. Fourthly, timely conflict resolution management significantly enhances construction quality of all-weather road projects.

The study recommended that, first, the county government of Kisumu must ensure there are feasible project contracting terms in terms of clear estimation of contract costs, scope, time, funding sources and compensations agreement to enhance construction quality of all-weather road projects. Secondly, to boost construction quality of all-weather road projects, contractors should ensure there is secure project site management to guarantee safety and quality of construction materials. Thirdly, road construction project coordinators should ensure that there is seamless and timely communication with relevant liaison officers and supervise duty allocations so as to ensure there is timely completion of quality all-weather roads. Lastly, project managers in charge of construction of all-weather road projects should embrace viable conflict resolution mechanisms to timely address any team conflict related cases that can hamper quality of constructed roads.

Areas for further Research

First, a similar study can be done to assess the effect of procurement process on timely completion of all-weather roads. Secondly, a similar study can be done on construction quality of tarmac-bitumen roads so as to compare study results.

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