



PROJECT MANAGEMENT PRACTICES AND PERFORMANCE OF ROAD PROJECTS IN NAIROBI CITY COUNTY IN KENYA

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ABSTRACT

This study assessed the relationship between project management practices and performance of road projects in Nairobi City County in Kenya. More specifically, the study examined the influence of two key project management practices, namely, project cost management, and project team management on the performance of roads projects in Nairobi City County in Kenya. A descriptive research design was used in the study. A census research method was used to study all the fifty-one (target population) road projects under KeNHA and KURA over the eight years' period between 2008 and 2013. Questionnaires were the primary data collection instruments. A pilot study, equivalent to 10% of the target population was conducted to test the reliability and validity of the data collection instruments. Data was collected from 102 project managers and project engineers from the two government institutions, KeNHA and KURA. Qualitative and quantitative data was collected. The collected data was analyzed using the Statistical Package for Social Science (SPSS V 28.0). Spreadsheets were applied to complement the SPSS software in data analysis and presentation of results. The study concludes that Project Cost Management has a positive and significant effect on the performance of roads projects in Nairobi City County in Kenya. In addition, the study concludes that Project Team Management has a positive and significant effect on the performance of roads projects in Nairobi City County in Kenya. From the findings, this study recommends that the management of roads projects in Nairobi City County should put into consideration project budgeting & allocation, cost estimation of funds and disbursement of funds in the process of Project Cost Management and consider multi-donor approach and private sector participation in funding of roads projects. In addition, PMP certification for road engineers is recommended and upscaling of attachment to engineering consultancy firms for junior engineers.

Key Words: Project management practices, Project cost management, Project team management, Performance, Roads projects

Background of the Study

Performance of road infrastructure projects is essential for socio-economic development, as roads link people to healthcare, education, employment, markets, and resources (World Bank, 2018). The world's population continues to grow and is estimated to be 9.8 billion people in 2045 (UN, 2017). This has increased demand mobility via road (Strano, 2017). The construction industry has developed over the decades as countries have prioritized infrastructure in their budget allocation (Trifilova, 2013). According to the World Bank Infrastructure Spending Analysis (2019), developing countries like China, India, East Asia, and the Pacific allocated approximately 30 percent of their GDP to infrastructure while America and Germany allocated about 19 percent between 2010 and 2017. America is planning to repair and upgrade congested roads, unsecure bridges, and aging infrastructure at approximately \$4 trillion by 2025 (Deloitte, 2020).

In Africa, infrastructure projects represent 47.3% capital investment in South Africa, 14% in Angola and 12.9% in Mozambique (Deloitte, 2017). Nigeria, Kenya, and Egypt had the highest number of infrastructure projects and spent less than 20 per cent of their GDP and Ethiopia spent 30 percent of its GDP (Edinger & Labuschagne, 2019). In East Africa, there is a 65.1% increase in the total number of infrastructure projects; governments invest in national and regional roads and owns 90% of the projects but only funds 15.5% of them (JICA, 2019). However, literature shows that 65% of the road projects have performance failure (Deloitte, 2017).

Performance of roads projects can be assessed using project management indicators of success; cost, time, and quality (Cheung, Wong, & Wu, 2010). Other researchers includes client satisfaction, health and safety as additional indicators (Wu, et al., 2019). In addition, some studies identify user satisfaction, inbuilt safety, environmental conservation, and sustainability as performance indicators (Fewing, 2013). Other studies, emphasis on user requirement and utility as defined by the road users to meet their unique needs (Anderson , 2015).

Cost and time overruns are the biggest challenge facing construction projects and often result in the abandonment of projects (World Bank, 2014). The deviation in cost and time is common across the globe (Gbahabo & Ajuwon, 2017). Cost deviation was identified in 90% of road construction projects globally (Meijer, 2018). However, developing countries experience the greatest cost overrun accounting for 100 percent of road projects (Rjakumar, 2016).

Project management has numerous practices which can influence performance including project team management, project cost management and procurement management (PMBOK, 2013). Implementation of project management processes enhances performance of projects by providing good practices (Anderson E. , 2015). However, uniform use of all processes is not feasible and, so the project managers should determine which processes, knowledge or skills are appropriate for their project (PMBOK, 2013).

Statement of the Problem

Development of road infrastructure is crucial for achievement Vision 2030 and national economic growth. Kenya has made substantial investments in road projects, but the sector faces challenges such as delays, cost overruns and negative impact on road users which are indicators of poor performance in the road sector (Ademba, 2016). A road project is considered successful if it is completed within budget, in time, as per quality standards and is accepted by users (Ochenge, 2018). The performance of roads projects in Kenya has declined over the years and time and cost overruns are most common problems (Gituro & Mwawasi, 2016).

A study by Deloitte (2018) on infrastructure projects trends in Kenya showed 48% cost overruns and 87%-time overruns. Literature shows that 79.2 percent of road projects had negative performance (Hussein, 2019). A recent study by Mongina (2021) estimated that on average 48%

of road projects in the initiation phase had cost overruns and 54% projects had delays. The complexity of the project also influences performance; research estimates overrun of 14% more in roads projects with bridges (Deloitte, 2017). The completion rate of projects is also quite low with abandonment of projects (Mongina, 2021). Vulnerable road users account for 46% of fatalities on roads in Kenya, an indication that roads still do not cater for the needs of pedestrians, cyclist and boda boda users (WHO, 2019).

Roads in Nairobi City County are characterized by heavy traffic, which is controlled manually, unpredictable public transport and inadequate facilities (JICA, 2019). Moreover, roads in Nairobi City County are unsafe as evident in the number of speed-related deaths, lack of facilities and failure to protect boda boda passengers, school children, pedestrians, and cyclists (WHO, 2019). An analysis by Kamau & Waweru (2020) on road safety shows that injuries and deaths resulted from road accidents which increased from 26% to 46.5% between 2015 and 2020. Further, previous research identifies delays in road projects in Nairobi City County. For instance, based on KNBS data, 47.5 percent of road projects in Nairobi City County were not completed within schedule between 2008 and 2013 (Kimemia, 2015).

Previous studies indicate that deviation in cost and time is a common characteristic in road projects regardless of region or complexity of the project and the trend has worsened (Mongina, 2021). A study by Adan (2017) on performance of roads projects in arid and semi-arid regions in Kenya showed an average of 35.6% of projects had a 82.7% variance in performance. Poor performance was also evident in the Lake basin based on a study of 41 roads in the regions by Ochengi (2018). The study found that most road projects had delays, cost overruns, inadequate funding and inadequate resources.

It is notable from the foregoing literature that a majority of the studies conducted focused on other counties in Kenya while studies in Nairobi City County focused mainly on other project management areas. Road construction performance measurement systems and review mechanisms are neither effective nor sufficient. Performance of roads projects is significant as about 95% of the Kenyan population rely on roads as a main mode of transport (Ondieki, 2016). This study sought to close that research gap by providing more insights into good project management practices and the performance of roads in Nairobi City County, and at the same time add to the body of knowledge on the subject.

Objectives of the Study

The general objective of the study is to explore the relationship between project management practices and performance of road projects in Nairobi City County, Kenya. The Specific objectives of the study include:

- i. To establish the influence of Project Cost Management on the performance of roads projects in Nairobi City County, Kenya.
- ii. To examine the extent to which Project Team Management influences the performance of roads projects in Nairobi City County, Kenya.

LITERATURE REVIEW

Theoretical Framework

Game Theory

Game theory was developed as a mathematical concept in 1944 by Von Neuman and Morgenstem (Chatterjee & Samuelson, 2002). It uses mathematics and logic to determine which actions players should take to achieve the most optimum outcome (Dixit & Nalebuff, 2019; Hayes, 2019). Interdependence is a common characteristic of all games since outcomes are dependent on

strategies used by other participants resulting in conflict or cooperation (Brams & Davis, 2019). Games can either result in mutual gain, mutual harm, or gain for one participant and loss for the rest, which in game theory is known as positive-sum, negative-sum, and zero-sum, respectively (Dixit & Nalebuff, 2019).

In a *sequential game*, players anticipate the moves of other players without imposing their views on them and use the information to make decisions (Myserson, 2013). However, a *linear chain of reasoning* can also be applied in sequential games with a player making concurrent moves using *logical circles* (Brams & Davis, 2019; Dixit & Nalebuff, 2019). This implies that players make decisions while considering moves that other player anticipate them to make. Nash's *equilibrium* is achieved when all players are playing their best strategy, and each player makes the best personal choice; thus, change in strategy cannot result in a better payoff (Camerer, 2008; Stanford University, 2019). Elimination of a strategy is necessary when players consistently make the same lousy choice called a *dominant strategy* (Stanford University, 2019). In-game theory *prisoners' dilemma*, an individual player's best choice can result in a collective lousy outcome for all players (Dixit & Nalebuff, 2019). Although game theory is still evolving, researchers have discussed strategies such as mixing moves, use of incentives and information to influence decision-making. (Chatterjee & Samuelson, 2002; Rapoport, 2013; Davis, 2012).

Game theory can also be applied across various project functions including bidding by suppliers, negotiation, management of contracts, resolving disputes, innovation, legal and economic policy creation (Carayannis, 2013; Chatterjee & Samuelson, 2014; Davis, 2012; Hayes, 2019). According to Meaklim (2013), collaboration in the public sector can be explained using the theory to conceptualize relations between stakeholders and explain self-interest tendencies. Success can be achieved by capturing value and developing strategies that provide positive outcomes for different stakeholders (Meaklim, 2013). Osman & Nikbakht (2014) used game theory to assess user satisfaction and provide a framework evaluation of road performance by key decision-makers.

According to Chatterjee & Samuelson (2014), game theory can be applied to project cost management; consequently, explaining decisions on budgets, allocation, and control of funds by implementing agencies, and funders. The equilibrium concept of game theory is used to formulate policies at government and institution level as well as incentives (Levine, 2019). For instance, innovation can also be analyzed using Game Theory since research and development are costly and risky. Without protection like patents or licenses, organizations lack incentives to engage in innovation activities (Chatterjee & Samuelson, 2014).

Agency Theory

The Agency theory model developed by Jensen and Meckling in 1976 provides an analogy for governance in the corporate sector (Laiho, 2011). According to McColgan (2001), modern organizations are managed by appointed persons or agents who are not actual owners or principals. The tenant of the theory is that conflict of interest arises between the parties of a contract (McColgan, 2001). Heath (2009) points out that Agency theory illustrates relationships between agents such as managers or government officials and owners like shareholders or citizens. It provides a rationale for evaluating trade-off decisions made by management (Dutta, Raef, & David, 2012). Inspirational leadership with a clear vision and strategy is needed to achieve a successful performance of road construction projects by developing policies, implementing procedures, and enforcing best practice (Opoku, Cruickshank, & Ahmed, 2015).

The theory focuses on reducing problems that occur when owners delegate responsibility to agents, and questions arise as to whether agents perform for their self-interest or that of owners (Laiho, 2011; Panda, 2017). An example of such problems is the Moral hazards problems that occur in an

organization when funds are misappropriated, or business ethics violated in decision making (Heath, 2009). According to Laiho (2011), risk-sharing is a problem source since agents are risk-averse, yet they seek maximum gains while owners take risks. Using the Agency Theory analogy, agents and owners have different attitudes towards risk management and impact (Kulik, 2005). For instance, in many countries, road construction waste management attracts additional tax disposal in landfills, providing more revenue for the government and increasing costs for construction companies (Dawson, 2017).

Research by Athapaththu and Karunasena (2018) revealed that gaps in legislation and poor enforcement of existing laws are significant challenges facing construction projects in Sri Lanka and the Persian Gulf. Kulik (2005) further notes that solutions need to be developed at the national and organizational level, and agency theory can interpret gaps in expectations. The approach can also be applied to project teams' management in road projects responsible for day-to-day project decisions.

Conceptual Framework

A conceptual framework provides a mental sketch of the study by linking the independent variables and the dependent variable (Quinlan & Babin, 2019). This connection between the independent and dependent variables is illustrated in fig 2.2. The conceptual framework for the study shows the relationship between select project management practices and the performance of road projects in Nairobi City County.

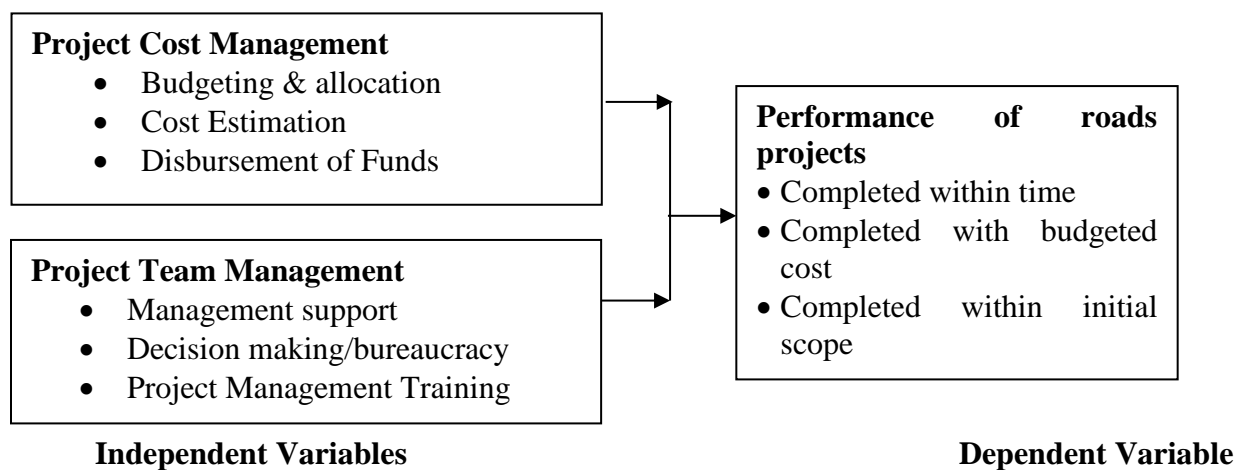


Figure 1: Conceptual Framework

Project Cost Management

Cost management in a project involves resource planning, cost estimation, budgeting, and cost control. Resource planning is a process which involves identifying quantities and duration that equipment, materials and people will be required in a project through use of expert judgement, alternatives examination or PM software's (PMBOK, 2013). According to Payne (2017), cost estimation in project management is the process of forecasting the cost of resources for the entire project including any additional work. Cost estimates can be generated from work breakdown structure activities, resource schedule, activity duration, industry rates or from historical data (PMBOK, 2013). In most projects, the cost is determined from cost of previous projects or use of mathematical models to estimate cost (Westland, 2017). Budgeting entails allocation of the cost estimates generated to project activities while control of cost involves monitoring, managing change in cost and managing the stakeholders (Harrison & Lock, 2014)

Project cost management processes are not done in isolation but in conjunction with other processes and the project management knowledge areas. Planning for resources, budgeting, estimation, and control of cost are either an individual or teams' responsibility throughout the project phases (Alam, 2016). Project cost management is concerned with the financial implication of inputs required in projects and the impact of decisions by management on the overall cost of the project (Anderson E. , 2015). For instance, design review in roads projects results in increased cost for taxpayers (Gbahabo & Ajuwon, 2017). Project management presents project cost management as life cycle costing which uses value engineering techniques to improve performance by managing time, cost, quality and optimizing decisions (PMBOK, 2013). Further, PMBOK (2013) recommends that projects should also rely on general financial management techniques such as calculating return on investment, payback and discounted cash flow in cost management.

Project cost estimates usually become the project budget and form the basis for monitoring and controlling cost (Anderson E. , 2015). Hence, cost estimates are the baseline for assessing performance of projects and control is measured by the extent to which cost is within the estimate (KPMG-PMI, 2016). Project funding allocation is paramount to all management decisions. It typically refers to an investment decision concerning what portion of the total budget to allocate in each project and how to meet funding requirements throughout the projects' development while maximizing the full reward (Bacon, 2012). Green (2017) defines availability of funds as the pool of financial resources available for near-term use in projects. The project manager is responsible for cost control to ensure that funds are used as per the project budget allocation (Koller, Goedhart & Wessels, 2015). Nonetheless road projects are characterized by financial challenges including adequacy, allocation of funds and overestimation which result in cost overruns (Akali, 2018; Gaba, 2013). Project Cost Management practices can significantly impact the success of a project (Donaldson, 2016).

Project Team Management

Projects achieve their objectives through individuals who offer diverse skills including the technical staff, project management team, support staff, other key experts, suppliers, contractor, and business partners (PMBOK, 2013). In a road project for instance, specialized skills are required during resource planning, project planning, scheduling, budget creation, communication, monitoring and control, reporting, management of risk and project administration (Bueno, Vassallo, & K, 2015). A project manager with civil engineering training is preferred, however, literature shows a gap when technical staff adopt managerial roles such as project management (Walker, 2015).

Project teams can have full time staff or part time staff who work when their skills are needed (Akali, 2018). The team composition also varies based on the nature of the organizational structure for instance a joint venture or consortiums formed for strategic purposes to synergize resources by partners may require stronger coordination, communication and monitoring by the project manager (PMBOK, 2013). Selecting a competent team is essential for the success of the project; Project Team Management, training, motivation, communication, and retention (Cohen, 2017). Road projects required expert staff like engineers, topo-graphical surveyors, quantity surveyors, economists, environmentalists, inspectors, and technicians (Gällstedt, 20013). Wu (2019) recommends training project teams to reduce delays and enhance optimal use of resources, such as assigning complex tasks like traffic management to trained workers with the assistance of novice workers

Performance of Roads Projects

The unique circumstances of a project require project teams to balance various project constraints, including budget, schedule, quality, scope, resources, and risks (Akali, 2018). A change in any of the constraints will affect the other factors; for instance, to reduce the project schedule, the budget needs to increase to provide more resources to achieve the same deliverables in less time or the scope or quality may be reduced (PMBOK, 2013). Daneshpour (2015) recommends evaluating performance using the project management iron triangle, to compare completion and project plan in terms of, cost, time, quality, and scope. Other researchers include project impact on people, the environment, and profits in evaluation of performance or a matrix approach (Hosein & Takala, 2017). Cheung, Wong, and Wu (2010) include communication and satisfaction by user to assessment of project success.

Zulu and Chileshe (2015) argue that to enhance project performance, the project implementers, project sponsors, and other stakeholders should agree on the project goals. Clear guidelines should guide them to ensure that projects cater to the needs of the end-users and implementation is executed on time (Bhattacharya, Romani, & Stern, 2012). The project implementers should have a clearly defined plan having assigned responsibilities on how the deliverables ought to be defined, including the required tasks that should be carried out and the risks involved (Branum, et al, 2013). Project implementers should effectively manage the project's scope by defining goal setting and planning project stages. The project implementer must be prepared for any changes to the scope and find ways to cope with the changes effectively (Lines, et al, 2015).

Samson and Lema (2017) argue that this can be achieved by cultivating a communication culture between the project's stakeholders. This assists in improving efficiency since the project facilitators are aware of what they are expected to do. The management and project sponsors should know the project's status; many projects fail due to inadequate communication approaches (Attarzadeh & Ow, 2008). Lack of management support is for a project is a significant reason for failure of many development projects (Payne, 2018). Samson and Lema (2016) posit that efficient project implementation contributes to a reduction of costs. Most road construction projects are well implemented in developed economies for several reasons: top management support, availability of funds, and effective communication and coordination of activities by all the stakeholders involved in road construction projects (Cheung, Wong, & Wu, 2010).

Wayne (2013) contends that different kinds of people measure project performance differently at different times. Zulu and Chileshe (2018) explain that time, cost, quality, and stakeholder satisfaction are key indicators of project performance. According to Lewis (2017), key performance indicators (KPI) are performance measures that depict progress towards the expected outcome. Strategic Key performance indicators monitor the strengths and determine the gap between the actual and targeted outcome and hence determine the firm's effectiveness and operational efficiency (Oyewobi, 2013). In an organizational setting, performance measurement is the link between decisions and set goals. It is essential to realize that before the project improves on something, it should measure and qualify it; this implies that what needs to be improved should be quantifiable (Kaplan & Norton, 2016).

Empirical Literature Review

Project Cost Management

Roads are capital intensive projects and require huge financial investment (Kimemia, 2015). The funding of such projects is justified as roads are drivers of economic development, promoting trade, industries, and mobility (Bundi, 2011). Significant budget allocations by nations are allocated to development of infrastructure (Edinger & Labuschagne, 2019). Road projects require funding for design, construction, supervision, maintenance and upgrading and thus legal

regulations are necessary to manage project procurement and cost management (Haule, 2015). Project funding is identified consistently in research as a major impediment to project success in Kenya, the region and globally (Deloitte, 2020).

Adequacy of funds is a major challenge that developing countries grapple with. Research by Edinger and Labuschagne (2019) shows that even the two largest economies in Africa; Nigeria and South Africa, have funding challenges, evident in the underspending on infrastructure. Availability of funding is also a constraint as African nations depend on donors and foreigners to invest in road projects (Wafula, 2017). The Republic of China is the leading foreign investor of road projects in the East African region with significant funding in projects in Ethiopia, Tanzania, Djibouti, and Kenya (Edinger & Labuschagne, 2019). A study by African Development Fund (2013) showed that World Bank funded 39 percent, AfDB 21 percent, China 13 percent, and EU, AFD, JICA, and KfW funded 10 percent of road projects in Kenya. A study on the Thika superhighway highlighted funding by AfDB and the governments of China and Kenya and showed a correlation between successful performance of a project and multiple funders (Maina, 2015).

Despite the challenges in acquiring funding, cost overruns are still prevalent in roads projects. Literatures shows that delays contribute to poor performance of road construction projects and escalated costs which is a project cost management challenge (Mesah, Knight, & Coffey, 2012). In Sydney, Australia, literature showed that delays in disbursement of funds negatively influences completion of road projects (Karia, 2011). Poor performance in 70 percent of roads projects in Malaysia is attributed to financial constraints (Hussin & Omran, 2011). In addition, delays in road projects in Malaysia are attributed to skill deficiency by contractors, poor planning, and Project Cost Management (Sambasivan 2011). In Singapore, financial challenges like cost overruns are also identified in road projects (Ling, 2011).

The World Bank, Infrastructure Assessment (2014) shows that financial challenges in the road projects that link the East African countries. Gaba (2013) attributes delays in road projects in Ghana to late disbursement of funds by government. Research on roads projects in Coastal Kenya points to inadequate finances as a determinant of delay (Kimemia, 2015). Isiolo County has similar challenges; delays by government to disburse funds contributes to delays in road projects and bureaucracy & malpractices in the tendering pose additional limitations (Adan, 2017). Projects performance is improved when funding is available as the project can acquire better staff, adopt technology, mobilize stakeholders, and use quality materials (Adek, 2016).

Countries increasingly motivate the private sector to participate in funding infrastructure due to limited public funds and the global economic crisis (Trifilova, 2013; Thillian, 2010; Yuan, 2011). Infrastructure projects in Kenya also have financial constraints and PPP is preferred as an alternative source of funding due to increased public debt (ICPAK, 2018). PPP is popularized as a visible funding model for the private sector in infrastructure (Akintoye, Beck, & Kumaraswamy, 2015). However, research on PPP adoption in road maintenance projects, in India, revealed challenges in accountability, knowledge, bidding and transaction (Nilesh & Laishram, 2017). Studies in China identify financial strength, profit, governance, and control as key drivers for private sector participation in PPP to fund infrastructure (Zhang, Gu, Shan, & Darko, 2018). Reduced investment on infrastructure necessitates prudent project cost management of the limited funds in road projects (Trifilova, Bessant, Jia, & Gosling, 2013).

Project Team Management

Projects often require the project team with diverse skills, experience, and qualifications (Turner, Ledwith, & Kelly, 2012). Research on project management in software engineering projects in Malaysia identifies training and communication as significant factors to performance (Attarzadeh & Ow, 2008). The project team's knowledges, skills and learning ability influence performance in

the automotive sector in Thailand based on findings of research on 198 projects (Sujinda & Sununta, 2014). Adopting of project management practices gives firms competitive advantage especially during tendering process due to adoption of flexible methodology that promotes the business interest (Kerzner, 2018).

Training and management of change are a key HR function in the management of project teams (Rangaro & Raju, 2014). Literature shows improved productivity by employees when organizations invest in capacity development and employees' wellbeing (Cohen & King, 2017). In addition, employees are motivated and creative in problem solving when organizations invest in training (Rangaro & Raju, 2014). Literature shows that project cost is reduced when project teams are empowered through training, coaching or mentorship (Meng, Xue, Liu, & Fang, 2015). Leadership and effective communication by project managers also play a key role in management of teams (Akali, 2018).

Based on a study by Adan (2017), Isiolo County government staff in roads projects are well trained but skill gaps and adequacy of personnel was identified in various phases of the project cycle. Countries like Australia have introduced penalties for non-performance such as unavailability of project teams for works tendered through competitive bidding (Dobes, 2016). Communication with project teams is essential to manage the project constraints of time, cost, quality and scope (Moleli, 2012). Literature shows project managers have a significantly impact project performance through policy, decisions, and culture (Galpin, Whittington, & Bell, 2015).

Management of project teams also includes developing strategies for management of change and processes (Cohen, Taylor, & Camen, 2012). The project manager plays a pivotal role in shaping the culture of the organization, stakeholder engagement and project performance audit (Cohen & King, 2017). A study by Ogwen, Muturi, & Rambo (2016) on road projects in Kisumu County, argued that prioritization, decision making and attendance in meetings are pointers of support by management for a project. Further, the study identifies training of employees, good work conditions, quality control and communication as determinates of timely completion of road projects (Ogwen et al., 2016). Management of project team was also identified as a driver of project performance in Mombasa County (Adek, 2016). From the foregoing literature, project team management influences performance in developed and developing nations.

RESEARCH METHODOLOGY

The proposed study's research design was a descriptive survey, which involves the collection of data, organize, tabulate, depict, and describe it (Kabir, 2016). The proposed study focused on all the 51 road projects in Nairobi City County in Kenya implemented in the last eight years. The World Bank (2018) states that five years is a short duration to access the performance of road projects; thus, the focus on projects carried out in the last eight years. Data was collected from the 37 road projects by KURA and 14 roads projects by KeNHA. The implementing agencies are responsible for project management services, including investigations, detailed design, construction supervision, and contract management (FIDIC, 2019). Data was collected from Project Managers and Roads Engineers in each of the 51 identified road projects in Nairobi City County in Kenya. Given the size of the sample population, a census is the most appropriate method rather than a sampling method. Daniel (2011) recommends census over sampling when the population is small to enhance credibility. The study collected and analyzed data from the 51 road projects identified in Nairobi City County in Kenya carried out in the last eight years.

This study collected and analyzed both primary and secondary data. Questionnaires were the primary data collection instrument. Secondary data was collected from institutional records, reports, journals, and past research. Secondary data is advantageous as it less expensive to collect, fast and reliable when sources used are valid or published (Syed, 2016). A pilot study was conducted to test the reliability and validity of the questionnaire. A sample size of 10% the sample

size was considered for the pilot study (Creswell, 2014). In this study, the pretest group comprised of 10 respondents who include road engineers and project managers. According to Saunders (2012), a pilot study is necessary for testing the reliability and validity of data collection instruments. Qualitative and quantitative analysis of data is to be applied. The Statistical Package for Social Science (SPSS V 28.0) was used for quantitative analysis. Descriptive statistics, including means, standard deviation, and frequency distribution. Inferential statistics such as regression and correlation analysis showed the relationship between project management practices and performance in road projects in Nairobi City County in Kenya. The study used regression analysis to explain the relationship between independent and dependent variables.

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

The study collected data from all 51 roads identified in Nairobi City County and with respondents comprising of project manager and Roads Engineer. The researcher sampled ten percent of the target population and had a response rate of 90% with a consideration of 46 road projects in Nairobi City County based on questionnaires completed and returned. The response rate was considered as suitable for making inferences from the data collected (Bryman and Bell, 2015).

Descriptive Statistics Analysis

Descriptive statistics was applied to summarized data collected from the population in the census study of 51 roads in Nairobi City County in Kenya on project management practices and performance of road projects. Central tendency was measured using mean and variability main through standard deviation and data is presented in the form of summary tables.

Project Cost Management

The first specific objective of the study was to establish the influence of Project Cost Management on the performance of roads projects in Nairobi City County in Kenya. A 5-point Likert scale was used where 1 symbolized strongly disagree, 2 symbolized disagree, 3 symbolized neutral, 4 symbolized agree and 5 symbolized strongly agree. From the results, resource mobilization for the project is done adequately ($m=3.74$, $std. dv = 0.869$), road construction projects have a revised budget ($m=3.23$, $std. dv = 1.087$, and Project Cost Management efficiency is satisfactory ($m=3.57$, $std. dv = 1.106$).

Further, financial estimates for the project are relatively accurate was disagreeable ($m=2.48$, $std. dv = 0.824$) and so was that finances are disbursed on time against project invoices ($m=2.41$, $std. dv = 1.034$). Findings imply that, although, budgets exist for these roads, estimates are often inaccurate, and disbursement of funds is also delayed resulting in delays in initiation and implementation of the roads projects. Findings agree with Adan, (2017) that the government delay to distribute funds for road projects contributing to delays in road projects in Isiolo County. The results were as presented in Table 4.3.

Table 1: Project Cost Management

	Mean	Std. Deviation
Resource mobilization for the project is done adequately	3.74	0.869
The financial estimates for the project are relatively accurate	2.48	0.824
Finances are disbursed on time against project invoices	2.41	1.034
The road construction projects have a revised budget	3.23	1.087
Am satisfied with the effectiveness of Project Cost Management	3.57	1.106
Aggregate	3.08	0.984

Project Team Management

The second specific objective of the study was to examine the extent to which Project Team Management influences the performance of roads projects in Nairobi City County in Kenya. A 5-point Likert scale was used where 1 symbolized strongly disagree, 2 symbolized disagree, 3 symbolized neutral, 4 symbolized agree and 5 symbolized strongly agree. Based on the analysis of findings; in many cases management supports project's activities ($m=3.57$, $std. dv = 1.106$), hence project decisions are made quickly without bureaucracy ($m=4.07$, $std. dv = 0.938$), and to some extent project management professional qualifications are a prerequisite in recruitment of key project personnel ($m=3.62$, $std. dv = 0.955$).

However, data show training gaps as respondents disagree that the project teams are frequently trained on project management skills ($m=2.41$, $std. dv = 1.247$). Findings show that management support and decisions making without bureaucracy is crucial for the success of a project. Project management skills are relevant for personnel working on roads projects and deliberate initiatives by management is needed to build capacity through project management trainings. Findings concur with Ogwen, Muturi, and Rambo (2016) that prioritization, decision making and attendance in meetings are pointers of support by management for a project. The results were as presented in Table 2.

Table 2: Project Team Management

	Mean	Std. Deviation
Management supports project's activities	3.57	1.106
Project decisions are made quickly without bureaucracy	4.07	0.938
Project management professional qualifications are a prerequisite in recruitment of key project personnel	3.62	0.955
Project teams is frequently trained on project management skills	2.45	1.247
Aggregate	3.43	1.062

The Performance of Roads Projects in Nairobi City County, Kenya

The researcher further scrutinized secondary data to examine the performance of 51 road projects by KENHA and KURA in Nairobi and its environs implemented within the last eight years. The researcher was formally introduced to the road agencies through a letter from the university. Secondary data was collected from records in the institutions, reports, research by other scholars and journal articles. However, there was limited availability of detailed data and information presented in this study is based on information available during the time of the study.

The research findings show good management systems within the two road agencies and adopt some of the project management practices but gaps are still evident in performance of road projects. Weaknesses relating to project planning were identified in road projects due to the delays in payment of invoices, scope increases due to additional work not foreseen initially and delays in relocation of facilities. Design review was identified in 50% of the projects indicating inadequacy in design and cost escalation by 10% during implementation phase.

The project had approved budgets but inadequacies in budget estimates were evident due to delayed payment of invoices raised by contractors and consultants. Some of the projects required more land, in addition, to the allocated road reserves, necessitating compensation of the landowners. This is a significant cost as land in Nairobi and its environs is expensive. For instance, Langata -Bomas Road required KES 1,037,813,089 and Northern bypass needed KES4 billion, for relocation which was not included in the initial budget. This gap identified in budget allocation to land acquisition in the initial project planning resulted in delays.

The cost implications and insufficient budget allocations also contributes to delayed relocation of utilities. Out of the 51 projects, 51.3% had delays and extension of time. 57% of the delays were due to delayed payments or inadequate budget allocation and 36% due changes in scope. Findings of the study indicate that although the projects achieved its objectives and users were satisfied, the projects experienced time overruns and budget overruns.

The road projects exceeded the initial budgets and were delivered late. Results concur with Deloitte (2018) that road projects in Kenya experience cost and time overruns. Findings are also in agreement with Mongina (2021) that road projects had cost overruns, and experienced delays; an estimated 48% average of roads in the initiation phase. In addition, Ochenga (2018) found that most road projects in Kenya had delays, cost overruns, inadequate funding and inadequate resources. Findings were analyzed through content analysis and are presented in Table 4.7

Table 3: Performance of Roads Projects in Nairobi City County, Kenya

Theme	Sub-theme
Variation in cost	<ul style="list-style-type: none"> • Some roads (53.8%) experience cost variations while others (43.6%) did not experience cost variations
Reasons for cost variations	<ul style="list-style-type: none"> • Unforeseen topographical factors leading to increase in earthworks quantities. • Changes in the scope of works, bad weather condition with some works having to be redone, • Accidental damage to work by users. • Some quantities were underestimated at design stage. • Extension of time • Inflation
Extension of time	<ul style="list-style-type: none"> • 51.3% of the road projects were not completed on time and 46.2% were completed on time
Reasons for project time extension	<ul style="list-style-type: none"> • Change in scope • Delayed payments • Hostility from surrounding communities • Delays in relocation of Services • Underestimation of time • Inadequate budgetary allocation • Unfavorable working condition or weather that impeded the progress of work • Delays in payment for certified works by employer, delays associated with services relocation, delay in removal of encroachments on road corridor
Deviation from project plan	<ul style="list-style-type: none"> • 53.8% of the road projects had additional work from initial project plans and 43.6% did not have additional work from initial project plans
Reasons for deviation from project plan	<ul style="list-style-type: none"> • The client increased the project scope to cater for other facilities not included in the original work such as access roads to institutions, connecting cross culverts. • Miscellaneous works that came up during project implementation like tree planting, lane widening. • Change of scope of works such as relocation of proposed footbridges from Mombasa Road to Langata road due to construction of Nairobi Expressway • Due to further engagement with stakeholders • Scope variations due to Politics
Litigations	<ul style="list-style-type: none"> • 66.7% of the road projects did not have litigations and 5.1% had litigations

Theme	Sub-theme
Reasons for litigations	<ul style="list-style-type: none"> • Road corridor encroachments – the affected filed cases in court • Disagreement with landowners along the road
Road users (pedestrians and boda boda users) considerations	<ul style="list-style-type: none"> • 59% of contractors considered road users and 12.8% did not consider road users
Reasons why road users were not considered	<ul style="list-style-type: none"> • Isolated facilities for non-motorized transports are put in place (walkway and cycle tracks) • Non-motorized infrastructure is not captured in the project plan

Correlation Analysis

This research adopted Pearson correlation analysis determine how the dependent variable (the performance of roads projects in Nairobi City County in Kenya) relates with the independent variables (Project Cost Management, Project Team Management). From the results, there was a very strong relationship between Project Cost Management and the performance of roads projects in Nairobi City County in Kenya ($r = 0.811$, $p \text{ value} = 0.000$). The relationship was significant since the $p \text{ value}$ 0.000 was less than 0.05 (significant level). The findings are in line with the findings of Alam (2016) who indicated that there is a very strong relationship between project cost management and project performance.

Moreover, there was a very strong relationship between Project Team Management and the performance of roads projects in Nairobi City County in Kenya ($r = 0.830$, $p \text{ value} = 0.001$). The relationship was significant since the $p \text{ value}$ 0.001 was less than 0.05 (significant level). The findings are in line with the findings of Akali, (2018) who indicated that there is a very strong relationship between Project Team Management and project performance in road construction projects in Kakamega County.

Table 4: Correlation Coefficients

		Project Performance	Project Cost Management	Project Team Management
Project Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
Project Cost Management	Pearson Correlation	.811**	1	
	Sig. (2-tailed)	.000		
Project Team Management	Pearson Correlation	.830**	.297	1
	Sig. (2-tailed)	.001	.060	

Regression Analysis

Multiple-regression analysis was used to assess the relationship between independent variables (Project Cost Management, Project Team Management) and the dependent variable (performance of roads projects in Nairobi City County in Kenya). Regression analysis is ideal for analyzing the relationship between dependent and independent variable (Babbie, 2001).

Model Summary

The r-squared for the relationship between the independent variables and the dependent variable was 0.851. This implied that 85.1% of the variation in the dependent variable (performance of roads projects in Nairobi City County in Kenya) could be explained by independent variables (Project Cost Management, Project Team Management)

The model summary in table 5 was used to explain the variation in the dependent variable that could be explained by the independent variables.

ANOVA Results

The ANOVA was used to determine whether the model was a good fit for the data. F calculated was 632.9 while the F critical was 2.471. The p value was 0.002. Since the F-calculated was greater than the F-critical and the p value 0.002 was less than 0.05, the model was considered as a good fit for the data. Therefore, the model can be used to predict the influence of Project Cost Management, Project Team Management on performance of roads projects in Nairobi City County in Kenya.

Regression Coefficient

The study used regression analysis to explain the relationship between independent and dependent variables. Regression analysis also helped determine the strength, level of association between the independent and dependent variables. Multiple-regression model used for the study is: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$. Where: $Y = 0.342 + 0.397X_1 + 0.387X_2 + \varepsilon$. The study Y is the dependent variable; Performance of Roads Projects, X_1 = Project Cost Management, X_2 = Project Team Management

According to the results, Project Cost Management has a significant influence on the performance of roads projects in Nairobi City County in Kenya ($\beta_1 = 0.397$, p value = 0.000). The relationship was considered significant since the p value 0.000 was less than the significant level of 0.05. The findings are in line with the findings of Alam, D. (2016) who indicated that there is a very strong relationship between Project Cost Management and project performance.

The results also revealed that Project Team Management has a significant influence on the performance of roads projects in Nairobi City County in Kenya ($\beta_1 = 0.387$, p value = 0.001). The relationship was considered significant since the p value 0.001 was less than the significant level of 0.05. The findings are in line with the findings of Akali, (2018) who indicated that there is a very strong relationship between Project Team Management and project performance.

Table 5: Regression Analysis

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.923 ^a	.851	.853	.10482

Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	102.028	4	25.507	632.9	.002 ^b
Residual	3.668	91	.0403		
Total	105.695	95			

a. Dependent Variable: Performance of road projects

b. Predictors: (Constant), Project Cost Management, Project Team Management

Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.342	0.089		3.843	0.002
Project Cost Management	0.397	0.097	0.398	4.093	0.000
Project Team Management	0.387	0.097	0.389	3.990	0.001

P < 0.05

The regression model was as follows:

$$Y = 0.342 + 0.397X_1 + 0.387X_2 + \varepsilon$$

Conclusions

The study concludes that Project Cost Management has a positive and significant influence on the performance of roads projects in Nairobi City County in Kenya. Findings revealed that budgets exist for these roads but financial estimates for the project are relatively inaccurate, and finances are not disbursed on time against project invoices, influencing the performance of roads projects in Nairobi City County in Kenya. Delayed disbursement of funds against project invoices contributed to delays in 57% of the projects in the study. This points to a constraint in the availability of funds for road projects and challenges in accuracy of cost estimates. Despite the challenges in acquiring funding, cost overruns are still prevalent in roads projects. 53.8% percent of the road projects in this study had cost overruns. Findings also showed bureaucracy and slow approval process for invoices raised to KeNHA and KURA by contractors.

Project Team Management has a positive and significant effect on the performance of roads projects in Nairobi City County in Kenya. Findings revealed that management support, decision making/bureaucracy and project management training affect the performance of roads projects in Nairobi City County in Kenya. The road agencies invest in employee capacity development; in this study 80% of the employees had training or benchmarking in the technical skills in the last year. Junior engineers were also attached to consultancy firms implementing roads projects. While 60% of the research participants had no project management training. These skills gap negatively influences the performance of project; adoption of project management practices influences the success of road projects. The study also found that road projects in Nairobi City County had adequate support from management based on attendance and input in meetings and site visits.

Recommendations

The study acknowledges that road agencies have a role to play in adequate mobilization of funding for road projects and allocation for all project phases. This study concluded that delays in 57% of projects showed constraints in availability of funds, inaccuracy of cost estimates and bureaucracy. Therefore, the study recommends use of multi-donors to fund road projects, which had positively influences performances of the Thika Superhighway . Further, exploration on multi-donor funding of road projects is recommended to mitigate the challenges of inadequacy. Involvement of the private sector in funding of road projects, through models like PPP, is also a viable option which needs further development of a framework for successful adaptability in Kenya. Mobilization of financial resources is paramount due to current economic constraints and reduced funding for roads.

The study also commended capacity development in the road agencies as 80% of the employees had training in technical skills. However, the study findings point to skills gaps in project management, as 60% of the employees had no project management training. Thus, the study recommends training on project management to enhance performance of road projects. Literature also shows reduced project costs when employees have project management training. The road agencies should also consider PMP certification for roads engineers responsible for project management. Further, the study recommends that the attachment of junior engineers in KeNHA and KURA to consultancy firms implementing roads projects should be upscaled to increase participation due to its positive results.

Suggestions for Further Studies

This study focused on exploring the relationship between project management practices and performance of road projects in Nairobi City County in Kenya. This study was limited to road

projects in Nairobi City County in Kenya. The study therefore suggests further studies on the relationship between project management practices and performance of projects in other sectors in Kenya. Further, the study found that the independent variables (Project Cost Management, Project Team Management

could only explain 85.1% of performance of roads projects in Nairobi City County in Kenya. Hence, this study suggests research on other factors affecting the performance of roads projects in Nairobi City County in Kenya.

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