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Project Planning and Performance of Completed Road Projects in Arid and Semi-Arid Counties in Kenya

Tiksan Abdi[1], Prof. Washington Okeyo[2], Dr. Paul Machoka[3]

[1,2&3]*School of Management & Leadership, Management University of Africa, P.O Box 29677-00100, Nairobi Kenya*
[1]tiksanabdi@gmail.com, [2]wokeyo@mua.ac.ke[3] pmachoka@mua.ac.ke
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ABSTRACT

The road construction industry has complexity in its nature because it contains a large number of parties such as the government, contractors, consultants, stakeholders and regulators. This study objective was to assess the effect of project planning on performance of completed road projects in arid and semi-arid counties in Kenya. The study was anchored on theory of constraints and supported by Stakeholder Theory, Resource Based View Theory and Regulation Theory. The study adopted positivism philosophy. The study applied a cross sectional survey design and used census sample method. The study population were the 88 completed road projects in 22 Arid and Semi-arid counties in Kenya. The study adopted convenience sampling technique where primary data was collected using a questionnaire from 198 respondents. The study respondents were the contracted company's project managers, county public works officers and the local community leaders who are most advantageously placed and in the best position to provide the information required. Quantitative data was analyzed using descriptive and inferential statistics which included correlation and multiple regressions.The study established that project planning significantly affects the performance of completed road projects in arid and semi-arid counties in Kenya. A simple regression model demonstrated a strong positive correlation ($r = 0.648$, $p < 0.001$) between project planning and performance, with project planning accounting for 41.6% of the observed performance differences. This finding led to the rejection of the null hypothesis, which suggested no significant impact of project planning. However, 58.4% of the performance variance remains unexplained, indicating other factors that may influence outcomes. The research highlights the critical role of effective project planning in enhancing road project performance in challenging environments. To improve performance, it is essential to prioritize comprehensive planning processes that integrate best practices. Stakeholders, including government agencies and construction firms, should invest in training programs for project managers to enhance their planning skills. Additionally, efforts should focus on identifying and addressing the unexplained variance related to resource allocation and stakeholder engagement. Implementing a feedback mechanism for ongoing evaluation will allow for adaptive refinements in planning strategies. Lastly, fostering collaboration between local communities and project planners is vital to ensure projects address specific regional needs and challenges.

Keywords: Road Assets Maintenance; Performance; Road agencies; Kenya

1.1 Introduction

The role of road transportation in promoting economic growth in African nations is of great Worldwide, the achievement and manageability of the task is intently attached to its planning exercise (Miringiro & Dushimimana, 2023). Projects flop because of lack of deficient planning, ordinarily on the grounds, they don't spell out the issues well or think about significant factors, for example, the necessities and perspectives on everybody associated with and influenced by the task. Successful planning gives subtleties and structure to project work plan and sets up an approach to proceed with the task after the close of financing, which means it is feasible (Flyvbjerg, 2013). Bhattacharya et al. (2021) study on schedule performance in Indian construction projects found out that factors like project stakeholder commitment, owner competence, and a variety of stakeholder perspectives in planning were thought to be critical elements in the performance of the project schedule. In addition, proactive scheduling practices, motivational initiatives, and efficient communication strategies are crucial for schedule performance (Bhattacharya et al., 2021).

In Africa, delays in the operation of government-funded projects are a typical occurrence. In Nigeria seven out of ten projects surveyed had implementation delays (Ogbeide et al., 2022). Further, 5–10% of the pre-contract cost for government projects in Nigeria is based on contingency (Ogbeide et al., 2022). This has been determined to be insufficient, which occasionally results in additional financial obligations beyond the owner's capacity. Sometimes, clients are not ready for this, thus money in the form of loans is sought to cover these extra expenses. According to Ogungbile et al. (2018), construction delays are now commonplace in Nigeria. Mohamed and Adam (2020) note that despite a large number of reported cases, cost overruns are becoming more frequent in Sudanese construction projects, ranging from straightforward to highly complicated project platforms. This is according to a study that looked at the performance of construction projects in Sudan. Amoatey and Ankrah (2017) note that studies show an increase in cost overruns, delayed completion and unsatisfactory and missed project objectives in the majority of construction projects in Ghana, where this issue is

also seen there. Pienaar (2021), research on the issue of project delays in South Africa, notes that this phenomenon can be ascribed to the project teams and the client's/his representative's incapacity to have a complete understanding of the construction project from origin to completion. They thus emphasize the necessity to raise public understanding of how much delays can harm project delivery.

Government policies and investments are a pervasive, important, and often positive influence on the business environment and economic development of any industrialized nation (U.S.A Department of Transportation, 2016). According to Maedo et al. (2018), Kenya, like many other nations, overhauled its system of county government to improve urban governance and increase the capacity of county authorities to carry out their duties. This included improving urban planning, management, and service delivery. Local authorities have not yet conducted sufficient investigations into or published the causes of project delays, cost overruns, and failure to fulfill specifications in public or government projects. According to the new constitution, the County Development Fund (CDF) in Kenya was established in 2013 following the general election (Maedo et al., 2018). The Commission for Revenue Allocation has assisted in allocating cash to counties under the new constitution's devolved form of governance. The Commission is required by Article 216 to submit recommendations for a fair method of revenue distribution among county governments. The County Government Act gives County authorities important duties but also grants them decentralized authority-based legal, administrative, and regulatory authorities. The number of construction projects in various Kenyan counties has significantly increased with the implementation of devolution in the nation. According to Kordi et al. (2021), there is increasing worry about the reasons why the required objectives are not met in accordance with the expectations of the projects' clients. There is currently no conclusive evidence that project completion delay issue is a significant result of a lack of comprehension or a misinterpretation of project planning and scheduling in actual practice. The current study will examine the influence of project planning, government regulations, community participation and performance of completed road projects in arid and semi-arid counties in Kenya.

1.1.1 Project Planning

Project planning is the process by which timetables, workforce, equipment, milestones, as well as budget estimates are specified as otherwise estimating the time, money, effort, and staff resources required in the execution of the project (Mwakajo & Kidombo, 2017). The methodical allocation of project resources is the most effective strategy for achieving the project's goal (Pellerin & Perrier, 2019). It might also be said to be one of the crucial tools used by stakeholders to guarantee the success of projects (Urbaski et al., 2019). In this study, project planning refers to the process through which project goals are established, the project framework is chosen, and then methods, tactics, targets, strategies, and deadlines are established in order to achieve the goals while informing the pertinent stakeholders of the same. This is due to the fact that project planning must be started, finished, and budgeted to suit the needs of all stakeholders.

Nowadays, Human Resource Management Practices (HRMPs) are now being updated within organizations and are constantly reaffirming their strategic relevance. The HRMP is one area that influences employee retention intentions, work satisfaction levels, and organizational commitment, which in turn influences project performance (Pellerin & Perrier, 2019). The procedures used to manage a project's human resources help it perform better, which helps it develop and establish a lasting competitive edge.

Cost budgeting and cost estimation are both included in the project's financial planning stage. The goal of cost planning is to complete the project within the allocated spending limit. (PMBOK, 2004). Project budgets are crucial because they have an impact on every aspect of planning and execution. The tracking of all expenditures, including those for the numerous work packages that make up a project, is essential (Abdi, 2021). The construction of a sound and efficient cash flow is facilitated by the professional budget development for a project, which helps to control project expenses. According to Herrera et al. (2020), insufficient cash flow caused by bad budgeting causes completion delays and significant additional expenditures, which increases the danger of a temporary halt to the entire project. The project scope, the WBS, and the project plan should all be taken into consideration when estimating costs. According to Mardiani (2018), a reserve cost may be applied to activities with a low work package level or thorough information with potential high financial risks because there are many unpredictable aspects present in a project.

1.1.2 Performance of Road Project

Evaluating project deliverables against key performance indicators (KPI) allows for the determination of road construction project performance. These key performance indicators (KPIs) assess the timeliness, cost-effectiveness, quality, efficiency, accuracy, safety, and profitability of project delivery (Vandevoorde & Vanhoucke, 2016). According to Pheng and Chuan (2006), the performance of a project may be evaluated from two perspectives: the stakeholders' viewpoint and the developer's viewpoint. Project time refers to the period starting at the beginning of a project and ending at its conclusion. According to Ngacho (2013), there are two primary time factors to consider: the project time and the actual completion time. Project time failures occur when there are excessive delays or overruns in the execution process (Lensinko, 2015).

A project is deemed successful if it is executed within the allocated budget, finished within the predetermined timescales, and adheres to the functional and technical standards. The use of Performance Measurement Systems (PMS) has received little attention in the construction sector, especially in developing nations, despite being one of the most crucial elements for determining project success. As a result, it seems like there is always a discrepancy between the actual outcomes of the implementation of significant projects and stakeholder expectations. Three fundamental criteria; time, money, and quality have typically been used in the construction industry when applying performance assessment systems to gauge the degree of project success (Cruz et al., 2018).Systems for measuring success at the organizational level are frequently dependent on financial indicators, which are nearly invariably lagging indications. The UK construction sector created particular Key Performance Indicators (KPIs) in response to the Egan Report,

including the duration and cost of construction, the capacity to anticipate expenses and completion dates, flaws, customer satisfaction with products and services, safety, profitability, and productivity (Cruz et al., 2018).

1.2 Statement of the Problem

Successful road construction is a stimulus for economic development, as stated in Kenya Vision 2030 (Kenya Vision, 2030). As a result, the government has made large investments in the construction of roads (Abdi, 2021). For example, in the 2017/2018 Financial Year, Kenya National Highways Authority (KeNHA) proposed to construct 13,238.73 kilometers of roads at an outlay of Ksh. 21,459,228,002, while Kenya Rural Roads Authority (KeRRA) planned to sustain 28,244 kilometers of roads with a spending plan of Ksh. 11,893,617,021. The Kenya Urban Roads Authority (KURA), on the other hand, supposed to maintain 2,339 kilometers of roads for a total of 5,206,382,979 people (KRB, 2016). Akali (2018) laments that, despite the government's continued investment in road building, nearly 75% of all projects (road construction) in Kenya's arid and semi-arid counties encounter a number of challenges that prevent them from being finished on schedule, incurring cost overruns, or falling short of the required quality standards. Furthermore, according to Abdi (2020), only 10% of the building projects carried out in the region by construction firms registered in Kenya using Constituency Development Funds (CDF) were successfully completed. The balance were either incompletely (30%) or never finished (60%) finished and therefore if current trend in road construction continues unaddressed, Kenya's Vision 2030 of enhancing domestic and regional trade through construction and upgrading 10,000 Kilometers of the national and county roads network won't be realized. This study aims at examining the effect of project planning on performance of completed road projects in arid and semi-arid counties in Kenya.

1.3 Research Objective

To determine the effect of project planning on performance of completed road projects in arid and semi-arid counties in Kenya

1.4 Research Hypothesis

Ho_1: There is no significant effect of project planning and performance of completed road projects in arid and semi-arid counties in Kenya

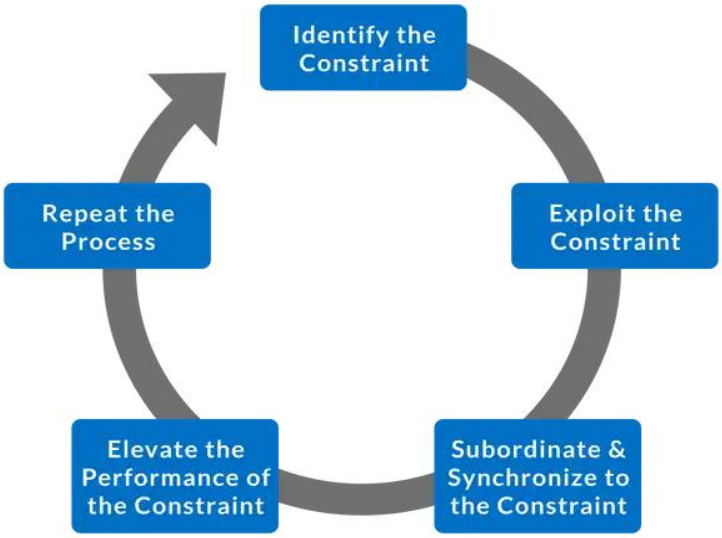
2.0 LITERATURE REVIEW

2.1 Theoretical Literature

2.1.1 The Administrative Management Theory

Dr. Eliyahu Goldratt conceived the Theory of Constraints (TOC), and introduced it to a wide audience through his bestselling 1984 novel, “The Goal”. Because of this, TOC has kept changing and growing, and now it is an important part of best practices for management. The Theory of Constraints is a way to figure out which constraint is the biggest problem that is stopping you from reaching your goal and then gradually making that constraint better until it is no longer a problem. This kind of problem is often called a bottleneck in production. The Theory of Constraints is a scientific way to find ways to make things better. It says that every complicated system, like an industrial process, is made up of several activities that are related to each other. One of these activities limits the whole system; this is called the "weakest link in the chain." One of the things that makes the Theory of Constraints appealing is that it naturally puts growth tasks at the top of the list. The present limitation is always the most important thing. For situations where change is needed right away, TOC provides a very focused way to make quick progress. A successful Theory of Constraints implementation will have the following benefits: Increased profit is the primary goal of TOC for most companies. Fast improvement is the result of focusing all attention on one critical area: the system constraint. Improved Capacity: optimizing the constraint enables more products to be manufactured. Reduced lead times by optimizing the constraint results in smoother and faster product flow. Reduced inventory: eliminating bottlenecks means there will be less work-in-process (Şimşit, Günay, & Vayvay, 2014).

The core concept of the Theory of Constraints is that every process has a single constraint and that total process throughput can only be improved when the constraint is improved. A very important corollary to this is that spending time optimizing non-constraints will not provide significant benefits; only improvements to the constraint will further the goal (achieving more profit).Thus, TOC seeks to provide precise and sustained focus on improving the current constraint until it no longer limits throughput, at which point the focus moves to the next constraint. The underlying power of TOC flows from its ability to generate a tremendously strong focus on a single goal (profit) and to remove the principal impediment (the constraint) to achieve more of that goal. The Theory of Constraints provides a specific methodology for identifying and eliminating constraints, referred to as the Five Focusing Steps. As shown in the following diagram, it is a cyclical process.



Source: Mishra (2020)

2.1.2 Resource Based View Theory (RBV)

The Resource-Based View (RBV) is a management theory that focuses on how a firm can achieve sustained competitive advantage through its resources. It argues that companies can outperform their competitors by acquiring, developing, and utilizing valuable, rare, inimitable, and non-substitutable resources. According to Freeman et al. (2021), the key assumption of the resource-based view is that the organizational resources and capabilities of different organizations might differ greatly from one another and even remain constant. An improved competitive advantage often gives stakeholders a greater sense of reassurance that their contributions, whether financial or in some other form, will be recognized and put to good use.

According to Collins (2021), the concept that underpins the resource-based outsourcing method is the notion that an organization should go to an external provider in order to address any gaps in its capabilities and resources that are substantial, uncommon, distinctive, and structured. When it comes to initiatives, stakeholders will be more interested in ones that properly manage the resources at their disposal. It is sometimes feasible to bring down the total expenses of a project by making use of resources that are contracted out. As a result, stakeholders may be convinced that the project managers are attempting to finish the project at the lowest feasible cost while still achieving the highest potential value and benefit (Collins, 2021).

2.1.3 Agency Theory

The agency theory, which was first developed by Stephen Ross and Barry Mitnick (Mitnick, 1975), places an emphasis on the significance of distinguishing between ownership and control, which results in the emergence of an inherent agency problem. According to Murtaza et al. (2021), the theory places an emphasis on how important it is for boards of directors to be independent in order to protect the best interests of shareholders. As a result, the theory supports the idea that non-executive directors should be included on boards, given that these directors are seen to be the ones who are most equipped to successfully represent the concerns of shareholders. The aforementioned concept is of considerable significance in the field of study because it relates to the complex interaction that exists between those in charge of maintaining roadways and the general populace, who use their democratic right to vote for those in charge of the government. In this scenario, the general populace is the legal owner of road assets, and they are the ones who form road agencies via the proper governmental channels in order to exercise control over the administration of such assets. It is essential that those in charge of roads do their jobs in a manner that is to the greatest advantage of the general public. Nevertheless, due to the possibility of limitations in the general public's knowledge and capability to effectively manage the activities of road agencies, the government assumes the role of a governing body, which is frequently referred to as the "Board," to exercise supervision and ensure that road agencies operate in a manner that is consistent with the public's best interests. This ensures that road agencies operate in a manner that is in line with the public's best interests. As a result, this theoretical framework will act as the basis for the dependent variable in the study, and it will also help in clarifying the phenomena of performance exaptation among road agencies, as seen by the general public and enforced by the authorities of the government.

2.2 Empirical Literature Review

2.2.1 Project Planning and Performance of completed Road Project

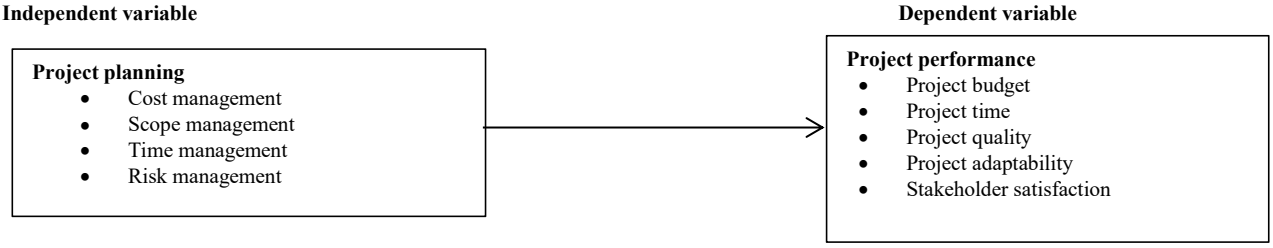
According to Pienaar (2021), the role of time planning in a project is essential in order to maintain the proper allocation of time to the overall conduct of the project throughout the subsequent phases of the project's natural life-cycle. He accomplished this by making use of the time management strategies of time planning, time estimating, time scheduling, and timetable control (concept, development, execution, and completion). The successful completion of a project does not need the signing of a contract with the expectation that it will be finished on time, within the allotted budget, and in a

manner that is consistent with the project's scope. Accurate planning of the project's time and schedule is required for the completion of all aspects of a successful project. According to Mishmish and El-Sayegh (2018), the management of project time is the first responsibility that comes within the jurisdiction of project managers. It is also considered to be one of the most important variables in determining whether or not a project is successful.

A research on project management excellence, defined as the art of excelling in project management and carried out by Heldman (2011) and mentioned in Jiang (2017), was carried out in Washington, DC, USA. He came to the conclusion that time management is an essential part of the process of carrying out a project because it requires keeping the activities of the project on track and comparing those activities to the project schedule in order to ensure that the project is completed on time. A number of processes are included in project time management. These processes include activity definition, activity sequencing, activity resource estimate, activity duration estimation, schedule formulation, and schedule control. In this research, gaps in context as well as conceptual understanding are highlighted. The United States of America played host to the research endeavor, the focus of which was on effective project management. The current research, which will be carried out in Kenya, will place a primary focus on the performance of several road construction projects.

The study by Michugu, James (2020) examined the Project factors influencing completion of Rural Roads projects in Kenya: a case of Rumuruti-Maralal Road project in Laikipia and Samburu Counties. Stakeholders' Theory was adopted. The study used a descriptive survey research approach along with interviews. The research focused on surveying 100 participants, including the personnel of KeNHA, the contractor for the Rumuruti-Maralal Road Project, and the consultant. The research used a census survey to gather data from the full target population of 100 respondents due to the limited sample size. This research used purposive sampling and stratified random sampling. The study used a semi-structured questionnaire and an interview guide as its tools. The statistical software coded the quantitative data collected from the surveys. Descriptive statistics were calculated using arithmetic means and standard deviation. The data was shown in tables showing frequencies and percentages. The qualitative data collected from the interviews was transcribed based on themes and constructs related to the study goals, highlighting similarities and contrasts seen throughout the interviews. Secondary data that matched the study goals was gathered from published books, scientific dissertations, peer-reviewed journals, and other academic publications and supplemented with primary data. Pearson's correlation was used to analyse inferential statistics. The research results for the completion of rural road projects in Kenya showed a composite mean of 3.645 and a standard deviation of 3.321. The composite mean for stakeholders' involvement was 3.550, with a standard deviation of 3.229. The composite mean and standard deviation for project funding were determined to be 3.516 and 3.195, respectively. The composite mean and standard deviation for contract management were determined to be 3.280 and 2.939, respectively. The composite mean and standard deviation for the project requirements were determined to be 3.418 and 3.069, respectively. The research revealed that stakeholders' involvement, project funding, contract administration, and project specifications impact the completion of rural road projects in Kenya. The study suggests that the government should prioritise comprehensive stakeholder participation in projects due to their significant impact on project decisions; adequate funding is essential for project success; utilising creative contracting approaches is recommended for effective construction processes and project completion; and successful management of the interface between design and pre-construction activities is crucial for projects to be completed within quality, cost, and timelines. Areas for further investigation have been identified.

2.3 Conceptual framework



3.0 RESEARCH METHODOLOGY

3.1 Research Philosophy

The term "research philosophy" was coined by Saunders (2017), who described it as "a system of assumptions and ideas underlying the creation and evolution of knowledge in a specific area of study." According to Saunders (2017), the positivist premise that objective facts provide the greatest scientific evidence is likely to result in a large choice of quantitative research methodologies. This is expected to be the case since the positivist assumption assumes that objective facts give the best scientific evidence. The present research used a positivist philosophical framework by integrating established theories to formulate hypotheses, then subjecting them to evaluation and validation via the examination of study findings. Moreover, the researcher used positivist philosophy by maintaining objectivity in relation to the study components, using quantitative data analysis procedures, and thus achieving generalizability in the targeted research outcomes.

3.2 Research Design

Cross-sectional studies are descriptive and can be used to support cause and effect conclusions. Contrary to longitudinal studies, which involve numerous observations made of the study group over time, cross-sectional surveys involve the collection of data at a specific point in time. In contrast

to longitudinal designs, which examine variables over time, the cross-sectional design is suited for studies when data is obtained from a large sample with multiple variables being evaluated at the same time (performance). Mugenda and Mugenda (2013) report's that cross-sectional survey design may be used to explain or explore the existing status of two or more variables at a specific moment in time, and is typically the most appropriate measure of characteristics of large populations, it has been regarded as optimal.

3.3 Target Population

The target population was all completed road projects in ASAL Region, Kenya from 2016 to2020 and therefore the study adopt a census research method. Most road projects in Kenya take 3-6 years to finish hence the choice of 6years (GoK, 2010). The study unit of analysis will be the 88 road projects constructed and completed by contractors during the 6 years period as per KeNHA, KURA, and KeRRA annual reports of the years 2016, 2017, 2018, 2019, and 2020 as shown in appendix V. The units of observation for the study were the contracted company's project managers, county public works officers and the local community leaders in all 88 completed road projects. Therefore the target population of the study will be 198 respondents.

Table 3: Population Distribution

Category	**Unit No.**
Contracted company's project managers	88
Local community leaders	88
County public works officers	22
Total	**198**

Source: KURA,KenHA,KeRRA, 2021

3.4 Sample Size and Sampling Design

A sample is a smaller, more representative group of individuals that is chosen from a larger population. Through the analysis of the sample, one may derive findings that can be applied to the broader population of interest (Sekaran & Bougie, 2011). This research utilized convenience sampling. Sekaran and Bougie (2011) also define convenience sampling as judgment sampling, which is suitable for selecting subjects who are strategically positioned or in the optimal position to supply the necessary information. In order to fulfill the main aim of this study, which is to examine the effect of project planning, government regulations, and community participation on the effectiveness of finished road projects in arid and semi-arid counties in Kenya, the most valuable participants are the project managers from the contracted company, the public works officers from the county, and the leaders of the local community. Therefore, convenience sampling will be employed. The research will have a sample size of 198.

3.5 Data Collection Procedures

This research utilized primary data in order to answer the study's specific aims. A questionnaire was employed for this purpose due to its ability to allow respondents to fill it out without assistance, anonymously, and being relatively cheaper and faster than other methods while reaching a bigger sample size (Creswell, 2009).

3.6 Pilot Testing

A pilot test is an investigation which is carried out on a small group of respondents to make sure the questions being asked in the questionnaire are reliable (Marczyk, DeMatteo & Festinger, 2005). Pilot testing also helps in ensuring viability before rolling out large scale and also avoids costly errors and therefore, the questionnaire will be tested for reliability and validity. The questionnaire will be pre-tested in a pilot study before actual data collection begins. For high precision and due to time, cost and practicality of the pilot study, 1% to 10% of the sample will constitute the pilot test size (Arain, Campbell, Cooper & Lancaster, 2010). This study will use 20 questionnaires for pilot study, representing 10% of study population, which will be sent to the respondents via e-mail because this is faster, cheaper and reliable.

4.0 DATA ANALYSIS AND RESEARCH RESULTS

4.1 Demographic Characteristics

The study found that a total of 88 respondents, including 65 project managers and 22 county public works officers, represented 40.3% of the total response rate. This indicates that the opinions of project managers and county public works officers were well captured and represented in the study. The sample size for the project managers category was 88 respondents, indicating a well-representation of their opinions. The results also indicate that all county public works officers in all 22 arid and semi-arid counties in Kenya were well represented. The majority of respondents (49.1%) had diploma qualifications, followed by undergraduate bachelor's degree (24.8%) and postgraduate Master's degree (14.9%). Certificate qualifications were 5%, and

Basic Education (Primary or Secondary) qualifications were 6.2%. The study found that 36.6% of respondents had 10-14 years of work experience, while 51.1% had 5-9 years of experience. The majority had more than 14 years of experience, with 25.5% of respondents having more than 14 years, and 6.8% having less than 5 years of experience.

Table 2: Demographic Characteristics

Demographic Profile		**Frequency**	**%**
Job Category	Project managers	65	40.3
	Local Community leader	74	46.0
	County public works officer	22	13.7
Level of Education	Basic Education (Primary or Secondary)	10	6.2
	Certificate	8	5.0
	Diploma	79	49.1
	Undergraduate	40	24.8
	Masters	24	14.9
Work Experience	Less than 5 years	11	6.8
	5- 9 years	50	31.1
	10- 14 years	59	36.6
	More than 14 years	41	25.5

The study findings in Table 2, findings indicate that majority of the respondents were experienced and in a good position to give credible information and feedback sought. These findings indicate that respondents who have longer working period in a given organisation, projects and areas have a greater experience of how to carry out the duties effectively.

4.2 Hypothesis Testing

4.2.1 Effect of project planning on performance of completed road projects

This part pertains to the primary research purpose of the study, which aimed to assess the effect of project planning on performance of completed road projects in arid and semi-arid counties in Kenya. The accomplishment of this objective was realised by the systematic examination of the proposed hypothesis in the following manner:

Ho_1: There is no significant effect of project planning on performance of completed road projects in arid and semi-arid counties in Kenya.

The use of basic linear regression, which produced the regression coefficients, coefficient of determination (R^2), analysis of variance (ANOVA), and model coefficients, allowed for the evaluation of the hypothesis' statistical significance. The examination included assessments of goodness of fit in terms of overall significance, individual significance, and diagnostic testing. The aforementioned results are shown in Table 3, Table 4, and Table 5.

Table 3: Model summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.648[a]	.420	.416	.47153	.420	114.931	1	159	.000

a. Predictors: (Constant), Project planning

According to the data shown in Table 3, the model demonstrated a high level of accuracy in predicting the effect of the independent variable, namely project planning, on the performance of completed road projects in arid and semi-arid counties in Kenya. The coefficient of determination the adjusted R-square (R^2) for this relationship was calculated to be 0.416. This finding suggests that the concept of project planning accounted for 41.6% of the observed differences in the performance of completed road projects in arid and semi-arid counties in Kenya. Additionally, it can be inferred that 58.4% of the observed variances in the performance of completed road projects in arid and semi-arid counties in Kenya may be attributed to unaccounted components within the current model.

Table 4: ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	25.554	1	25.554	114.931	.000[b]
Residual	35.352	159	.222		
Total	60.906	160			

a. Dependent Variable: Performance

b. Predictors: (Constant), Project planning

In order to assess the statistical performance of the regression model used in this work, an analysis of variance (ANOVA) test was conducted. The results of this test are shown in Table 4. The analysis of variance (ANOVA) findings (F = 114.931, p-value = 0.000) suggest that the regression model exhibited statistical significance and effectively captured the associations between project planning and performance of completed road projects in arid and semi-arid counties in Kenya.

Table 5: Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	.097	.345		.282	.778	-.583	.778		
Project planning	.917	.086	.648	10.721	.000	.748	1.086	1.000	1.000

a. Dependent Variable: Performance

The effect of project planning was found to be statistically significant at the individual level (β = 0.648, t = 10.721, p-value = 0.000 < 0.05), as shown in Table 5. This finding suggests that there is a positive relationship between project planning and the performance of completed road projects in arid and semi-arid counties in Kenya. Specifically, for each unit increase in project planning, there is a corresponding gain of 0.917 units in performance of completed road projects, assuming all other parameters remain the same. The relationship between the variables may be mathematically represented by the equation $Y = 0.097 + 0.917X$. The correlation between the variables is positive. In conclusion, the findings of this study offer empirical support for the notion that project planning has a significant impact on the performance of completed road projects in arid and semi-arid counties in Kenya. As a result, the null hypothesis (Ho_1), which posited that *there is no significant effect of project planning on performance of completed road projects in arid and semi-arid counties in Kenya*, was rejected. Consequently, the researcher concluded that there is indeed a significant effect of project planning on the performance of completed road projects in arid and semi-arid counties in Kenya.

Result Discussions

These results were in concurrence with results by Pienaar (2021) who defined time planning in a project as the function required maintaining the appropriate allocation of time to the overall conduct of the project through the ensuing stages of its natural life-cycle. He did this by using the techniques of time planning, time estimating, time scheduling, and schedule control (concept, development, execution, and finishing). Success in a project does not entail signing a contract and anticipating that it would be completed on schedule, within budget, and in accordance with the project's scope. Accurate project time/scheduling planning is necessary in all facets of a project's success. According to Mishmish and El-Sayegh (2018) Project time management is the first task that falls within the purview of project managers and is regarded as one of the key factors in project success. Further the study results correspond to those of Heldman (2011) cited in Jiang (2017) conducted a study on project management excellence as the art of excelling in project management in Washington DC, USA. The researcher discovered that time management is a crucial component of project execution since it involves keeping project activities on track and comparing those activities to the project schedule to guarantee that the project is finished on schedule. Activity definition, activity sequencing, activity resource estimation, activity length estimation, schedule formulation, and schedule control are some of the procedures that make up project time management.

These results are in line with Githenya and Ngugi (2014) study that focused on determinants of implementing the housing projects in Nairobi County Kenya. The study established that planning in projects had a major effect on the execution of housing projects in Kenya. This study therefore established that project planning greatly and positively impacts the performance of completed road projects in arid and semi-arid counties in Kenya in several areas namely; Project time, Project quality, Project adaptability and Stakeholder satisfaction. The study results further concur with the study by Michugu, (2020) who examined the Project factors influencing completion of Rural Roads projects in Kenya: a case of Rumuruti-Maralal Road project in Laikipia and Samburu Counties. From the findings, the study concluded that stakeholders' participation, project financing, contract management and project specifications influence completion of rural roads projects in Kenya.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The study concluded that project planning has a significant effect on the performance of completed road projects in arid and semi-arid counties in Kenya. Utilizing a simple regression model, the analysis revealed a strong positive correlation ($r = 0.648$, $p < 0.001$) between project planning and project performance. Specifically, project planning accounted for 41.6% of the observed differences in project performance, indicating its critical role in successful outcomes. This finding led to the rejection of the null hypothesis, which posited that project planning would not significantly affect performance. Furthermore, the results suggest that while project planning is influential, there remains 58.4% of performance variance that is unexplained by the current model, pointing to other factors that may also impact project outcomes. Overall, the research underscores the importance of effective project planning in enhancing the performance of road projects in these challenging environments, highlighting the need for further investigation into the unaccounted components that contribute to project success.

Based on the findings of the study, several recommendations can be made to enhance the performance of completed road projects in arid and semi-arid counties in Kenya. First, it is crucial to prioritize comprehensive project planning processes that incorporate best practices and thorough assessments to maximize the positive impact on project performance. Stakeholders, including government agencies and construction firms, should invest in training programs for project managers and planners to improve their skills in effective project planning techniques. Additionally, there should be a focus on identifying and addressing the 58.4% of performance variance attributed to unaccounted factors, which may include resource allocation, stakeholder engagement, and environmental considerations. Implementing a feedback mechanism for ongoing evaluation of project planning strategies will help adapt and refine approaches based on real-world outcomes. Furthermore, fostering collaboration between local communities and project planners can ensure that projects meet the specific needs and challenges of the regions. Policymakers should also support the development of standardized guidelines for project planning tailored to the unique conditions of arid and semi-arid areas. By enhancing project planning frameworks and actively addressing the factors influencing project performance, stakeholders can significantly improve the effectiveness and success of road projects in these challenging environments.

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