






Financial resource scheduling and road construction projects performance in Nairobi Metropolitan, Kenya

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ABSTRACT

Kenya has seen a boom in road building during the last couple of years as a result of the government's significant investments in the construction industry to upgrade infrastructure, such as road networks. Road network construction is one of the key pillars of the country long term vision 2030. However, the performance of the road projects has experienced various challenges leaving some roads uncompleted, others poorly done after huge investment of public resources. This study sought to evaluate the influence of financial resources scheduling on the performance of road construction projects in Nairobi Metropolitan, Kenya. The research was based on resource dependence theory. A descriptive design as well as the cross-sectional survey was used. The population of interest for this study consisted of 39 road construction projects being implemented by Kenya Urban Roads Authority and Kenya National Highway Authority within the Nairobi metropolitan area. A semi structured questionnaire was utilized to collect primary data. The quantitative data was analyzed using descriptive and inferential statistics. The study results revealed projects resource scheduling had a positive and significant effect on project performance of road construction projects in Nairobi Metropolitan, Kenya. The study concludes that effective financial resource scheduling enables that organization to manage risk that may occur from changes in the project's outcome. Financial resource scheduling starts from developing the project budget which is a process for allocating administered and departmental funds necessary to build a financial foundation for producing stated project deliverables

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Introduction

World over, projects performance is important in both the public and private sector. This is often outlined in the mission statement of each organization, and is pre-meditated in the statement of vision. Contemporary project scheduling practices for projects have been around for nearly half a century. The initial development work on the critical path method (CPM) and in the mid-1950s the performance assessment and review method (PERT) apparently started (Bokor, Kocsis, & Szenik, (2011). Even though fundamental principles underneath CPM and PERT have not changed, major developments in project scheduling have taken effect in the years after initial adoption of these methods. Currently, there are a wide collection of project scheduling skills, theories, and methods.

The construction business in Kenya has been the subject of studies by Gituro and Mwawasi (2017) and Kwatsima, (2017) although there hasn't been nearly enough attention paid to road building in the Nairobi City County Metropolitan region. In a dense urban area, it is especially important to know how resource scheduling impacts the time, money, and quality of a road construction project. Since the existing research has largely focused on various project management strategies including planning, communication, monitoring, and evaluation, resource scheduling needs to be evaluated independently

The success of a project is measured by how well it meets all of the project's objectives, including those related to cost, schedule, quality, and functionality, fitness for purpose, safety, and environmental protection (Khisaa & Mutuku, 2023). Throughout the building process, developers are always worried about project delays and cost overruns. World Bank (2014) notes that the intended completion date of the Thika Superhighway was July 2011, however this was pushed back to July 2013 due to cost overruns and delays. This

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indicates that certain road construction projects failed to meet expectations due to cost and time overruns. In this study, earned value analysis, the cost performance index, and the schedule performance index were used to assess the success of currently underway projects

According to Project Management Institute (2013) resource scheduling is a project management technique that comprises a description of the objectives, activities, and outputs of a project, often with anticipated start and end dates. These factors—resource allocation, spending plan, and duration were all calculated and connected by dependencies and planned occasions. Project initiation, execution, control, and termination are all parts of the second phase of project management, known as project preparation. According to Abramov, Poznakhirko and Sergeev (2016) new tools, methods, and software for project scheduling have been created throughout time

Many public construction and road building projects continue to underperform in regard to project management practices, as shown by a review of the literature (Khisra & Mutuku, 2023). Ocheng, (2018) acknowledged that the success of road infrastructure projects is greatly influenced by project management practices. According to Densford, James and Ngugi (2018) project resource scheduling involves identifying technical, physical, human, and most importantly, financial resources, and then organizing the resources in a manner that allows for the efficient completion of the project. Lessard, and Miller (2013) state that construction projects have unique financial requirements, such as meeting wage and salary demands and covering other ancillary costs, which necessitate the availability of sufficient financial resources. In addition to material and monetary means, projects rely on the skillfully planned and executed use of their people (Makori & Mundia, 2019).

The overall cost of construction is estimated to be the sum of the following items under normal circumstances: materials, labor, site overheads, equipment, plant, head office costs, and profile. A company's budget is a management tool for carrying out strategic plans for realizing the company's mission and vision. It's crucial for figuring out where to take the project and making any necessary corrections based on clarity (Hall, 2012). According to Perks (2023) budgeting is the process through which project managers allocate funds to activities that must be completed in order to meet policy criteria. The process also includes a constant comparison of actual and planned outcomes to identify and implement the precise measures that provided the expected outcomes or form the basis for rethought planned outcomes. That's why it's crucial to set financial targets before beginning road construction. Goals for a project's success and standing often factor in forecasted revenue and costs

In the financial year 2017/18 Road maintenance at KeRRA cost KSh. 10,893,617,021, while road construction at KeNHA was estimated to cost KSh. 20,459,228,001 annually (Kabiti & Kikwatha, 2022). On the other side, KURA in the same period estimated that it would cost \$5,106,382,979 to maintain 2,338KM of roads (Kabiti & Kikwatha, 2022). Further, road building projects in Kenya were finished beyond their scheduled completion dates between 2013 and 2018. Between 2013 and 2018, there was an average 6.7-month delay in the completion of road construction projects. Road construction projects had an average cost overrun of KES 14.2 million in 2018. In Kenya, 2,334 road building projects were completely abandoned between 2013 and 2018 compared to Ghana where a report by GhanaWeb (2020) revealed there was 200 abandoned road projects between 2016-2020. Between 2013 and 2018, the average cost of abandoned road building projects in Kenya was USD 7.3 million compared to South Africa where an average road construction cost per kilometer was estimated at around USD 1.2 million, significantly higher than Kenya's average project cost. These statistics demonstrates that road projects in Kenya are facing serious performance challenges that necessitate further interrogation.

Literature Review

Theoretical Review

This study was founded on Resource Dependency Theory. According to the Resource Dependence Theory put forth by Salancik and Pfeffer, (1978) an organization's capacity to obtain and keep resources is essential to its survival. The idea contends that because organizations cannot provide all of the resources or services needed to maintain themselves on an internal basis, they must establish partnerships with components of the external environment. Therefore, it is necessary to implement internal systems that meet the requirements of both internal and external resource suppliers. Resources provide companies power, which transforms interactions by giving shareholders' interests first priority, working to increase their value, and changing remuneration policies to enhance performance and share price. Resources that are more easily accessible, improves an organization's effectiveness and ability to survive.

The funds provided as a result of the project's budget determines the ability to obtain equipment and supplies when they are required (Kerzner, 2017). Second, a budget is the bedrock of cost management, which is why it's so important to the project's success. By comparing the actual expenses of the project to the agreed budget, it is possible to evaluate whether it is on track or if adjustments need to be made. Therefore, resource dependence theory is used to back up monetary resource scheduling for project outfitting operations, with the goal of boosting the efficiency of road construction projects.

Empirical Literature Review

Mrongo, Iravo and Nyagechi, (2016) Investigated capital budgeting as a tool for improving the success of projects for a study that they were commissioned to do. This research was driven by the following particular aims: to assess the influence that governance has on the success of a project; to discover the role that technical talent plays when assessing the performance of a project; and to investigate the role that money plays in determining the success of a project. The study finding showed no causal link was found between budgeting and performance, despite the fact that accountability and retraining were included as intervening variables in the study. In addition to budgeting with regulatory framework as a moderator, this research included various resource scheduling approaches.

Sibururema, Shukla and Mbera, (2015) Looked at the building of Bukomane-Gikoma Road in Rwanda's Gatsibo District as a case study. The study took into account project funding aspects like cost estimation, technical design, and Rwanda's project funding policy, all of which affect project budgeting. We measured success by how quickly projects were put into action. Data was gathered through the use of questionnaires, reviews of secondary sources, and in-person interviews. According to the findings, the projects' funding policy and the timetabled implementation of the projects are severely impacted by cost estimation and technical design. In addition to the traditional budgeting metrics of estimated project costs, technical design, and funding policy, this analysis also included in (activity-based budgeting), the source of budget estimates, the project timeline, the scope baseline, and periodic budget monitoring.

Kisavi (2019) has out study in the county of Kiambu in Kenya to find out which factors were most essential in influencing the performance of road construction projects. The study discovered that the success of road construction projects is affected by a variety of factors, including funding, contractor capability, project design, as well as project monitoring and evaluation. Nevertheless, the financial planning justification for the successful completion of the project was not established in this research. In addition to contractor availability, project planning, and monitoring and assessment all played a role in the project's end result. This was conceptually different from the current study, which would look at how budgeting, project revisions, and equipment all play into how well road construction projects turn out. The study that was carried out by Mutungi, (2017) on other hand found that County government has problems implementing their budgets, such as failing to meet budget deadlines as required by the Public Financial Management Act of 2012. Financial results and the provision of public services were found to be influenced by budget legislation and budget planning.

Aigbavboa and Thwala (2019) remark that good project management remains a hurdle for road development projects in South Africa and Botswana. Mukuka, Aigbavboa and Thwala (2015) emphasize that the performance of road building projects is negatively impacted by poor project management methods. According to Chin Foo (2021) who noted that road building projects contribute significantly to the Nigerian economy despite performance difficulties, poor project management practices such as inadequate budgeting and staffing are also encountered in Nigeria.

Project management techniques have a significant impact on the success of road infrastructure projects. Project resource scheduling, according to Densford, James and Ngugi (2018) entails first determining the technical, material, human, and most importantly financial resources, and then allocating them in a way that enables the project to be completed effectively. Miller, Lessard, and Sakhrani, (2017) state that construction projects have unique financial requirements, such as meeting wage and salary demands and covering other ancillary costs, which necessitate the availability of sufficient financial resources. In addition to material and monetary means, projects rely on the skillfully planned and executed use of their people resources (Makori & Mundia, 2019)

A company's budget is a management tool for carrying out strategic plans for realizing the company's mission and vision. It's crucial for figuring out where to take the project and making any necessary corrections based on clarity (Hall, 2012). According to Perks (2023) budgeting is the process through which project managers allocate funds to activities that must be completed in order to meet policy criteria. The process also includes a constant comparison of actual and planned outcomes to identify and implement the precise measures that provided the expected outcomes or form the basis for rethought planned outcomes. That's why it's crucial to set financial targets before beginning road construction. Goals for a project's success and standing often factor in forecasted revenue and costs.

Research Methodology

The study adopted positivism research philosophy to empirically quantify facts through statistical analysis. A descriptive design as well as a cross-sectional survey were used. The population of interest for this study consisted of 39 road construction projects being implemented by Kenya Urban Roads Authority and Kenya National Highway Authority within the Nairobi metropolitan area. The study focused on county and national government roads. As a result, 195 participants were selected for this study. A semi structured questionnaire was utilized to collect primary data. The quantitative data was analyzed using descriptive and inferential statistics. Correlation and multivariate regression analysis were employed for inferential statistics.

Study Findings

The result of response rate based on a sample size of 195 respondents is presented in Table 1. The results in Table 1 indicate that out of 195 questionnaires administered to the respondents, 189 questionnaires were returned resulting to a 96.9% response rate. However, the study had a non-response rate of 3.1% because of 6 questionnaires which were not returned. This agrees with Kiende (2019) Mugendi (2018) who claimed research having a 70% or more response rate is appropriate for investigation and conclusion drawing.

Table 1: Response Rate

Questionnaires	Frequencies	Percentage
Returned	189	96.9%
Not returned	6	3.1%
Total	195	100

Source: Survey Data (2024)

Descriptive Results for Entrepreneurial Innovation Competence

The study sought to analyze how planning for the allocation of financial resources affects the efficiency of certain road building projects in the Nairobi Metropolitan area of Kenya. The respondents were asked to indicate the adequacy of financial resources scheduling during road project you have implemented and the results are presented in Figure 1.

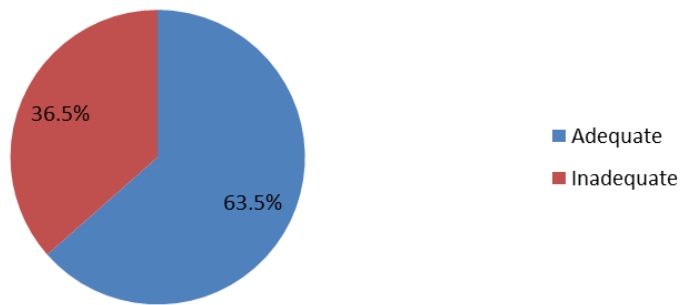


Figure 1: Adequacy of Resources; Source: Survey Data (2024)

According to the results presented in Figure 1, majority (63.5%) of the respondents indicated that financial resources scheduling was adequate. However, 36.5% indicated inadequate. Mchelule (2023) Study on the effects of financial planning on project performance found that the financial status is the background factors affecting methods and approaches in the management of projects. The study also agrees with Mutungi (2017) study findings on the investigation of the influence of cost planning on project performance. The study found that project cost planning practices, which includes the cost budgeting as well as cost estimating process, positively affects project performance.

The respondents were further given a list of statements describing financial resource scheduling in selected road construction projects in Nairobi Metropolitan, Kenya. The descriptive statistics results of financial resource scheduling are presented in Table 2.

Table 2: Financial Resource Scheduling

Statements	M	SD
Budgeting is based on project activity cost estimates	4.11	0.89
Budgeting is based on the expected total/final cost of the project	4.45	0.54
Budgeting is guided by project schedules	4.31	0.69
Budgeting is guided by project scope baselines	3.61	1.39
Project activity schedules provide basis for budget estimates	4.56	0.44
There is periodic budget monitoring	4.60	0.40
Adequate estimation of costs of project activities	4.53	0.47
Adequate budgetary planning	3.84	1.16
Budgeting process takes into consideration schedule delays	3.21	1.79
Budgeting process takes into consideration changes in project scope	3.96	1.04
Budgeting process takes into consideration project contingencies	4.58	0.42
Sufficient cost planning, monitoring, and control are essential during both pre- and post-contract stages	4.61	0.39
Adequate contingency allowance and assessment of risks.	4.13	0.87
Aggregate score	4.19	0.81

Source: Survey Data (2024)

The results in Table 2 indicates that the respondents agreed that financial resource scheduling influences the performance selected road construction projects in Nairobi Metropolitan, Kenya as shown by mean score of 4.19 and standard deviation of 0.81. The finding concurs with Siborurema, Shukla and Mbera, (2015) who conducted research into the connection between financial planning and productivity in businesses and the budgetary control types and budgeting processes were used to predict the relationships between the dependent variables sales volume, pretax profit, posttax profit, and earnings per share and the independent variables.

The respondents strongly agreed on the statements that; sufficient cost planning, monitoring, and control are essential during both pre- and post-contract stages (M=4.61, SD=0.39), there is periodic budget monitoring (M=4.60, SD=0.40), budgeting process takes into consideration project contingencies (M=4.58, SD=0.42), project activity schedules provide basis for budget estimates (M=4.56, SD=0.44) and that adequate estimation of costs of project activities (M=4.53, SD=0.47). The finding concurs with Hall (2012) who observe that a company's budget is a management tool for carrying out strategic plans for realizing the company's mission and vision.

The respondents agreed on the statements that; Budgeting is based on the expected total/final cost of the project (M=4.45, SD=0.55), budgeting is guided by project schedules (M=4.31, SD=0.69), budgeting is based on project activity cost estimates (M=4.11, SD=0.89), budgeting process takes into consideration changes in project scope (M=3.96, SD=1.04), adequate budgetary planning (M=3.84, SD=1.16), budgeting is guided by project scope baselines (M=3.61, SD=1.39) and that adequate contingency allowance and assessment of risks (M=4.13, SD=0.87). The results concur with Lessard and Miller (2013) who state that construction projects have unique financial requirements, such as meeting wage and salary demands and covering other ancillary costs, which necessitate the availability of sufficient financial resources. In addition to material and monetary means, projects rely on the skillfully planned and executed use of their people resources.

The respondents indicated neutral that budgeting process takes into consideration schedule delays (M=3.21, SD=1.79). The finding is in contrary with Khisa and Mutuku (2023) observation that project resource scheduling involves identifying technical, physical, human, and most importantly, financial resources, and then organizing the resources in a manner that allows for the efficient completion of the project.

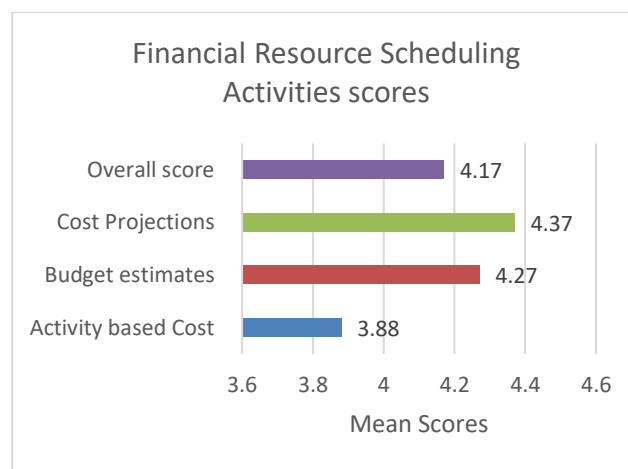


Figure 2: Financial Resource Scheduling Activities scores; *Source:* Survey Data (2024)

The results in Figure 2 shows that the project managers in road construction projects in Nairobi undertook financial resources scheduling include budgeting, cost projections and activity-based costing.

Regression Analysis Results

The financial resource scheduling had a $\beta=0.753$ and significance value of 0.000 which is less than the significance level (0.05). Therefore, the study rejected the null hypothesis (H01). This means there is statistically significant evidence to suggest that there is a relationship between financial resource scheduling and project performance in Nairobi Metropolitan. Specifically, the positive coefficient (0.753) for financial resource scheduling indicated that an increase in financial resource scheduling is associated with an estimated increase in project performance, holding other variables constant.

Based on the provided data, we can conclude that there is a statistically significant positive relationship between financial resource scheduling and project performance in road construction projects in Nairobi Metropolitan. This suggests that effective financial resource scheduling can contribute to improved project outcomes.

Practically, the findings implied that road construction project where the project manager undertook financial resources scheduling for instance effective budgeting, proper costing and cost projections perform between in terms of reduced cost overruns, reduce time overruns and were also completed within the expected standards of quality.

The finding concurs with Nafisatu (2018) who conducted research into the connection between financial planning and productivity in businesses and the budgetary control types and budgeting processes were used to predict the relationships between the dependent variables sales volume, pre-tax profit, post-tax profit, and earnings per share and the independent variables.

The findings are line with Densford, James and Ngugi (2018) who argued that project resource scheduling, entails first determining the technical, material, human, and most importantly financial resources, and then allocating them in a way that enables the project to be completed effectively. Further, Makori and Mundia (2019) stated that construction projects have unique financial requirements, such as meeting wage and salary demands and covering other ancillary costs, which necessitate the availability of sufficient financial

resources. In addition to material and monetary means, projects rely on the skillfully planned and executed use of their people resources.

Table 3: Univariate Regression for Financial Resources Scheduling and Road Project performance

	B	Std. Error	Beta	t	Sig.
(Constant)	0.611	0.152		4.019	0.000
Financial resource scheduling	0.753	0.352	0.268	2.139	0.000
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	101.125	4	25.281	66.442	0.001
Residual	70.012	184	0.381		
Total	171.137	188			
Model Summary	R	R Square	Adjusted R Square	Std. Error of the Estimate	
	.559a	0.312	0.31	0.5882	

Source: Survey Data (2024)

The study revealed that there is a statistically significant relationship between financial resource scheduling and performance of road construction projects in Nairobi Metropolitan, Kenya. The financial resources scheduling was adequate. Sufficient cost planning, monitoring, and control are essential during both pre- and post-contract stages, there is periodic budget monitoring, budgeting process takes into consideration project contingencies, project activity schedules provide basis for budget estimates and that adequate estimation of costs of project activities.

Conclusions

The study concludes that effective financial resource scheduling enables that organization to manage risk that may occur from changes in the project’s outcome. Financial resource scheduling starts from developing the project budget which is a process for allocating administered and departmental funds necessary to build a financial foundation for producing stated project deliverables. Financial resources scheduling enables the project managers in estimating the necessary number of financial resources for the project, controlling project costs within the approved budget and delivering the expected project goals. The study recommends that for successful delivery of the project, the project manager should effectively estimate costs, track expenditure over time and adequately react to situations when the financial resources are over-spent or under-spent, or there are opportunities for savings in the project budget. A project budget template should be designed and managed under supervision and control of the project manager. Also the customer and sponsor should be involved in allocating and managing financial resources.

Future studies could explore longitudinal data to assess the impact of financial scheduling over the complete lifecycle of road construction projects. Investigating the role of other variables, such as technological innovations in project management or the impact of training programs for project managers, could provide deeper insights into improving project outcomes.

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Author Contributions: Conceptualization, Methodology, Data Collection, Formal Analysis, Writing—Original Draft Preparation, Writing—Review And Editing by authors with equal participatino. All authors have read and agreed to the published the final version of the manuscript.

Institutional Review Board Statement: Ethical review and approval were waived for this study, due to that the research does not deal with vulnerable groups or sensitive issues.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

Conflicts of Interest: The authors declare no conflict of interest.

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