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Use and Performance of the Force Account Method in Road Construction Projects: Evidence from Nairobi City County

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Abstract

This study investigated the use and performance of the force account method (FAM) in road construction projects in Nairobi City County, Kenya. The problem motivating the research was the absence of empirical evidence on the extent of FAM adoption in Kenya's urban road sector and its actual performance outcomes, despite its growing prominence in public works. A descriptive cross-sectional design was applied, using both primary data collected through semi-structured questionnaires and secondary data from the Ministry of Roads and Transport reports. The target population comprised project managers, engineers, and procurement staff, with a census approach ensuring full coverage. The findings revealed that FAM accounted for 20.63% of road projects compared to 55.56% implemented through open tender. Projects delivered through FAM were significantly more efficient, averaging KES 107.24 million and 18 months, compared to KES 797.98 million and 48 months for open tender. Respondents reported that FAM projects largely complied with technical and safety standards, but challenges persisted in the form of cost overruns (mean maximum KES 71.8 million), inadequate supervision (78.3%), and managerial inefficiencies. Notably, defect rates were lowest in FAM projects (mean = 2.616), demonstrating better quality consistency relative to other methods. The study shows that FAM delivers measurable cost and time savings but faces persistent oversight and quality challenges. Policy recommendations include enhancing supervisory capacity, strengthening financial accountability, and expanding training for technical staff. Future research should assess the long-term sustainability of FAM projects and explore cross-county comparisons to evaluate broader applicability in Kenya's infrastructure sector.

Keywords

Cost-Time Efficiency, Force Account Method, Infrastructure Delivery, Procurement Methods, Road Construction Projects, Supervision and Quality Control

1. Introduction

1.1. Background Information

Road infrastructure remains the backbone of socio-economic development in many countries, particularly in Sub-Saharan Africa where over 80% of transport activities depend on road networks [1]. In Kenya, the rapid urbanization of Nairobi City County has placed unprecedented pressure on the road sector, prompting the government to explore procurement models that promise efficiency, cost-effectiveness, and accountability. One such model is the force account method (FAM), also referred to as direct labor. Under this approach, public agencies execute projects directly using their own personnel, equipment, and resources, or through hired labor, rather than outsourcing to private contractors [2].

Globally, the force account method has been adopted to address cost escalations and inefficiencies associated with conventional contracting [3]. In countries such as the United States, this approach has been successfully applied in post-disaster reconstruction, cutting project costs by up to 30% while enhancing timeliness [4]. Similarly, in Asia, India has applied a force account to rural roads under the *Pradhan Mantri Gram Sadak Yojana* program, achieving an estimated 40% improvement in resource utilization efficiency. However, the performance of FAM remains context-dependent, with mixed outcomes in Africa, where savings on costs are often offset by quality challenges and weak oversight mechanisms [1]-[3].

In East Africa, Uganda and Tanzania have been at the forefront of adopting the force account mechanism in the public works sector. Studies indicate that the method reduces corruption and improves cost-to-quality ratios, but projects frequently suffer delays due to inadequate planning, skill shortages, and resource mismanagement [5]. For example, in Tanzania's Kilimanjaro region, 524 projects worth TZS 38.8 billion were implemented through FAM in 2021/2022, yet evaluation reports revealed persistent inefficiencies linked to limited technical capacity and weak compliance with procurement regulations [6].

The Kenyan context reflects similar tensions since the government has increasingly promoted FAM to accelerate service delivery, especially in county-level projects where road maintenance and rehabilitation require urgent interventions. According to the Kenya Roads Board (2022), allocations for road works in Nairobi have expanded significantly over the last decade, with portions of these works undertaken using direct labor [7]. Yet, data on the extent of FAM adoption and its performance in road projects in Nairobi remains scarce. Anecdotal evidence suggests that while the method saves on procurement costs, challenges such as delays,

poor workmanship, and inadequate supervision undermine the quality of outputs.

A critical concern lies in the performance of force account projects relative to conventional contracting. Studies in Tanzania and Moshi District Council revealed that although more than 80% of respondents viewed FAM as cost-saving, regression analyses confirmed significant weaknesses in financial management and timely completion of projects [6].

Similarly, in the education and housing sectors, while cost control measures were effective, quality compliance remained inconsistent, with up to 25% of projects failing to meet required standards [8]. These findings underscore the necessity of systematic evaluation of both the extent of FAM use and its performance outcomes in road construction projects [9]. The problem is particularly acute in Nairobi City County where road congestion, poor maintenance, and construction delays significantly affect economic productivity. Road transport accounts for an estimated 90% of passenger movement and 80% of cargo transport in Kenya [10]. Despite increased budgetary allocations, many projects remain incomplete or are delivered at suboptimal quality. The lack of reliable data on the adoption and performance of FAM in Nairobi hampers effective policy formulation, leaving questions about whether the approach truly delivers value for money and sustainable infrastructure.

Against this background, the proposed study will investigate the use and performance of the force account method in road construction projects in Nairobi City County. Specifically, it will assess the extent to which the method is adopted and evaluate its performance in terms of cost, time, and quality outcomes. By integrating lessons from regional evidence and contextualizing them to Nairobi's urban road challenges, the study seeks to generate timely insights that can guide policymakers, practitioners, and stakeholders in improving efficiency and accountability in infrastructure delivery.

1.2. Contribution

This study contributes to scholarship and practice by providing the first systematic evidence on the extent and performance of the force account method in Nairobi's road construction sector. Unlike earlier studies limited to Tanzanian education and housing projects, it quantifies adoption, showing that 20.63% of projects relied on FAM, and demonstrates its comparative cost-time efficiency. The findings reveal that although FAM delivers lower costs and faster completion, challenges persist in supervision, cost overruns, and managerial capacity. These insights extend regional debates, address empirical gaps in Kenyan urban contexts, and inform policy reforms aimed at strengthening accountability and infrastructure delivery.

2. Related Works

2.1. Theoretical Formulation

The force account method has attracted significant scholarly attention as an alter-

native procurement strategy in construction, particularly in Sub-Saharan Africa [1]-[3] [6] [8] Current thinking in the literature situates FAM within a broader debate on efficiency, accountability, and value for money in public infrastructure delivery. Scholars argue that by allowing government agencies to execute projects directly using in-house resources such as personnel, equipment, and finances, FAM reduces bureaucratic bottlenecks and procurement costs while potentially improving accountability [9]. For instance, research conducted in Tanzania demonstrated that the method accelerated project execution in the education sector by minimizing bureaucracies and empowering local communities to monitor public resources. Similarly, [7] reported that professionalism, defined in terms of knowledge, integrity, and experience of force account teams, was critical in achieving value for money. Their study anchored this claim in the Resource-Based View (RBV) Theory, which posits that organizational resources can be leveraged to generate superior performance outcomes when strategically deployed.

Other studies extend the theoretical grounding of FAM through Systems Theory, which emphasizes the interdependence of subsystems in determining project outcomes. [11], in a study of primary school construction in Moshi Municipal Council, showed that adequate allocation of financial resources, effective cost control, and rigorous quality monitoring function as interrelated subsystems that determine whether force account projects are delivered successfully. From this systems perspective, inefficiencies in one area, such as resource allocation, inevitably undermine performance in other areas such as quality and timeliness. Likewise, [2] applied Total Quality Management (TQM) Theory in assessing force account projects in Arusha, demonstrating that adherence to standards, continuous monitoring, and effective managerial processes are indispensable in ensuring cost-effectiveness and durability in force account projects. These studies motivate the central research issue of the present work. While there is evidence of cost savings, up to 40 percent in Tanzanian municipal projects, there are also recurrent reports of project delays, weak financial compliance, and quality shortfalls [6] [11]. This duality highlights a gap in empirical evidence, particularly within the Kenyan context, where counties such as Nairobi have embraced FAM in road construction but without adequate evaluation of its actual use and performance. As [12] observes, road infrastructure is the backbone of Kenya's competitiveness and regional integration, yet persistent inefficiencies in urban road delivery compromise both economic productivity and citizen welfare. These insights provide the impetus for the proposed study, which seeks to assess the extent of use of FAM in Nairobi City County and evaluate its performance against cost, time, and quality outcomes.

The way forward in this line of research involves integrating theoretical insights from RBV, Systems Theory, and TQM into a multi-dimensional framework for assessing FAM performance. From an RBV perspective, the focus will be on evaluating whether Nairobi County has sufficient organizational resources, skilled labor, equipment, and supervisory expertise, to sustain FAM adoption. From a systems perspective, the study will examine how resource inputs, managerial pro-

cesses, and oversight mechanisms interact to produce measurable outputs in road construction. Finally, from a TQM perspective, the emphasis will be on whether continuous improvement, quality standards, and community engagement are applied consistently to achieve durable infrastructure outcomes. This theoretical integration provides both a conceptual justification and a methodological guide for the present study, ensuring that the analysis is grounded in established theory while addressing practical concerns of efficiency, accountability, and sustainability in road construction projects.

2.2. Empirical Review and Gaps

Existing scholarship on the force account method provides valuable insights into its application in construction projects, yet the findings remain mixed. [2] examined FAM within Arusha City Council, where the central problem was poor project delivery despite the growing adoption of the method. The study assessed adherence to regulatory requirements, managerial processes, and performance outcomes using surveys and documentary reviews. Results indicated that while legal frameworks were largely followed, weak project management and execution processes led to delays and compromised quality. The study concluded that cost benefits exist, but project efficiency and quality assurance remain elusive. However, the research did not comprehensively address adoption trends or the organizational capacity constraints shaping performance, leaving a gap for more contextualized evaluations.

In Moshi District Council, [6] explored the effectiveness of FAM where inefficiencies and financial mismanagement were widespread. Through regression analysis and structured questionnaires, the study evaluated cost, time, and quality dimensions. Findings showed that the force account reduced procurement costs but was undermined by poor financial compliance and inadequate oversight, resulting in frequent delays. The study concluded that accountability mechanisms were critical but underutilized. The critique is that the research placed strong emphasis on financial controls while overlooking adoption patterns and the managerial environment influencing outcomes. This motivates further investigation into how extent of usage interacts with project performance, particularly in urban contexts like Nairobi.

Ombara [11] turned attention to school construction projects in Moshi Municipal Council, addressing inconsistent outcomes in FAM projects. Adopting a systems theory lens, the study examined resource allocation, cost control, and quality assurance using quantitative surveys analyzed in SPSS. Findings indicated cost savings of up to 40%, yet only 75% of projects met quality standards, with average delays of six months. The study concluded that effective monitoring improves outcomes, but systemic inefficiencies remain entrenched. A key limitation is its sectoral focus on education, with little attention to road infrastructure or the scale of adoption. This gap underscores the timeliness of evaluating FAM's extent and performance in Nairobi's road construction sector.

The reviewed studies highlight the current consensus that while FAM delivers

cost savings, challenges in project management, financial compliance, and quality assurance undermine its effectiveness. They motivate the present research by exposing a gap in Kenyan urban contexts, where adoption of FAM is growing but empirical evidence on extent and performance is lacking. The way forward is a context-specific analysis in Nairobi City County that links FAM usage with performance outcomes in road construction projects, offering both theoretical contribution and practical policy guidance.

3. Methodology

3.1. Research Design

This study employed a descriptive cross-sectional design, which integrates different methodological aspects to address the research problem effectively. Descriptive research is suitable for establishing the existing state of affairs by exploring "what is" in relation to the variables under investigation. In this context, it provided a platform to assess the extent of adoption and performance of force account projects in Nairobi City County. A cross-sectional approach allowed variables to be measured at a single point in time without manipulation, thereby enabling a snapshot of trends across multiple stakeholders. According to [13], such designs are cost-effective, less time-intensive, and reliable for exploring prevailing issues within a given period. By relying on this method, the study captured critical data on cost, time, and quality outcomes of road construction projects undertaken through the force account method. The design also enhanced validity since it facilitated the observation of diverse stakeholders within the same timeframe. Overall, the choice of this design was informed by the need to establish patterns and relationships among variables as they exist in practice, rather than attempting to influence or control them.

3.2. Target Population, Sampling Frame, and Sample Size

The target population comprised 66 individuals involved in force account road construction projects in Nairobi City County between 2017 and 2021. Specifically, it included 26 project managers, 26 engineers, and 14 procurement staff from the Ministry of Roads and Transport. This group represented the unit of analysis, road projects executed under the force account procurement method, and the unit of observation, namely the stakeholders directly involved in their planning, execution, and oversight. To ensure inclusivity, the sampling frame mirrored this population, thus covering all eligible participants. The study adopted a census sampling technique, which involves enumerating all members of a population. This approach was justified by the relatively small size of the population, making it feasible to include all stakeholders without resorting to sample selection. A census eliminates sampling errors, ensures comprehensive coverage, and yields highly reliable results, as every respondent contributes to the dataset. The inclusion of all 66 stakeholders allowed the study to capture perspectives across managerial, technical, and procurement dimensions, offering a holistic view of force account pro-

jects. This comprehensive sampling framework thus strengthened the validity and generalizability of the findings.

3.3. Data Collection Instruments and Procedures

The study relied on both primary and secondary data sources. Secondary data was obtained from reports and documents from the Ministry of Roads and Transport, which provided contextual insights into past and ongoing projects. Primary data was collected using a semi-structured questionnaire, chosen for its ability to balance structure with flexibility. The questionnaire contained both open-ended and closed-ended items. The closed-ended questions utilized Likert scales to capture perceptions on cost, quality, and timeliness, as well as nominal scales for demographic data. Open-ended questions allowed respondents to elaborate on challenges and contextual factors influencing project outcomes. The questionnaire was divided into six sections, beginning with general information and followed by sections addressing the four research objectives, before concluding with questions on the dependent variable, project delivery outcomes. Ethical clearance was obtained through authorization from the Department of Construction Management and a research permit from NACOSTI. Questionnaires were distributed using the drop-off/pick-up later method, ensuring respondents had sufficient time to complete them. Daily follow-ups encouraged high response rates, and the entire data collection process spanned three weeks. This combination of instruments and procedures ensured accuracy, validity, and reliability of the data collected.

3.4. Data Processing and Analysis

Data analysis combined quantitative and qualitative approaches to provide a comprehensive understanding of force account project outcomes. Qualitative data, primarily from open-ended responses, was analyzed thematically. Thematic analysis enabled the identification and interpretation of recurring patterns, such as managerial inefficiencies, resource allocation challenges, and quality control issues. These themes were then presented narratively to enrich the interpretation of quantitative results. Quantitative data analysis was conducted using SPSS version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic characteristics and respondent perceptions. Inferential statistics provided deeper insights into relationships among variables. Pearson's correlation coefficient was employed to analyze relationships between continuous variables, such as cost efficiency and project quality. Chi-square tests were used to assess associations between categorical variables, such as respondent role and perception of project delays. The integration of thematic insights with statistical outputs enhanced credibility by cross-validating findings. This mixed analytical approach ensured the study did not merely quantify responses but also contextualized them within the broader realities of project implementation, offering nuanced insights into the performance of force account road projects in Nairobi City County.

4. Results and Discussion

4.1. Respondents Background Information

4.1.1. Questionnaire Response Rate

The study sampled 26 project managers, 26 engineers, and 14 procurement staff, achieving high response rates across all groups, ensuring broad participation and reliable representation.

Table 1 indicates strong participation, with project managers responding at 92.31%, engineers at 88.46%, and procurement staff at 92.86%. The overall 90.91% response rate surpasses the 75% adequacy benchmark [14], ensuring reliable data analysis, credible conclusions, and generalizable findings through consistent engagement from all stakeholder groups. We have clarified that of the 66 targeted respondents, 60 valid responses were obtained. The 6 non-responses were due to incomplete questionnaires. While non-response bias cannot be entirely eliminated, the high response rate minimizes its effect on the representativeness of findings. The Cronbach's alpha was also computed for the Likert-scale items (covering cost, quality, and time constructs). The alpha coefficient was 0.823, exceeding the acceptable threshold of 0.70, thus confirming reliability.

Table 1. Questionnaire response rates.

Categories	Sample Size	Responses	Response Rate
Project managers	26	24	92.31
Engineers	26	23	88.46
Procurement staff at Ministry of Roads and Transport	14	13	92.86
Total	**66**	**60**	**90.91**

4.1.2. Gender Distribution

The researcher also sought to capture the gender demographic characteristics of participants.

As presented in Figure 1, 65.0% of the respondents were male while 35.0% were female. This reflects a predominance of men in technical and managerial positions, although women maintain a significant level of participation within the study context.

4.1.3. Respondents Age

The researcher also inquired the respondents age and the results were presented in Figure 2.

As shown in Figure 2, 36.7% of respondents were aged between 36 - 45 years, followed by 26.7% in the 26 - 35 years category, reflecting a strong presence of early to mid-career professionals. Respondents aged 46 - 55 years constituted 20.0%, while both the youngest group (below 25 years) and the oldest (above 55 years) each accounted for 8.3%. This distribution indicates a workforce dominated by mid-career professionals, complemented by notable representation from both younger entrants and highly experienced staff.

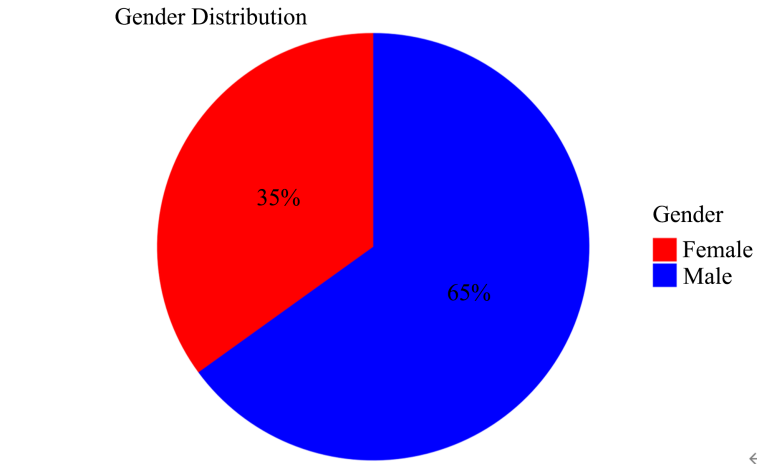

Figure 1. Gender of the respondents.

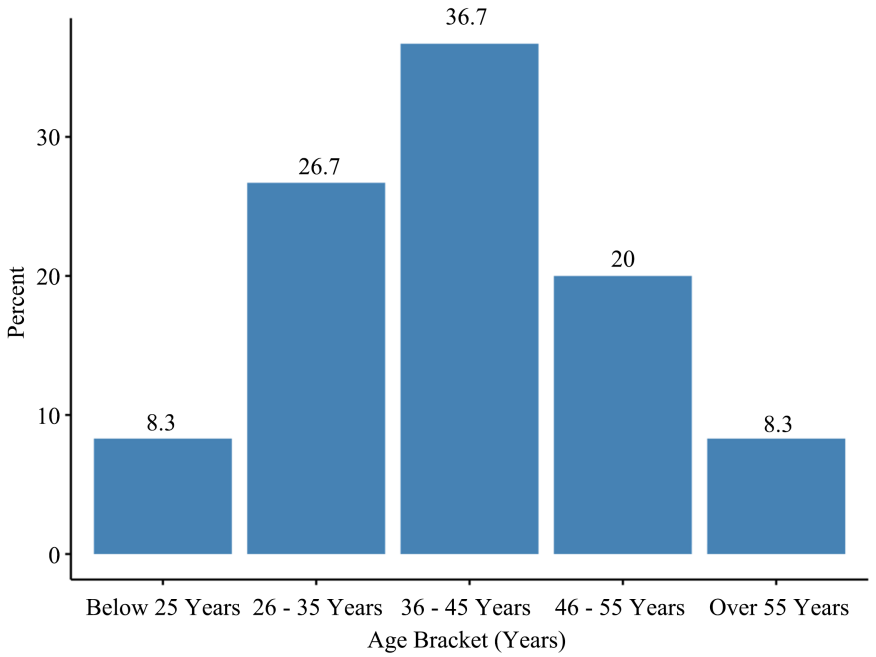

Figure 2. Respondents age.

4.1.4. Respondents Education Level

Respondents were asked to indicate their highest level of academic qualification, and the distribution of results is presented in **Figure 3**.

As shown in **Figure 3**, most respondents (58.3%) held a bachelor's degree, followed by 20.0% with a master's degree, 16.7% with a diploma, and 5.0% with a PhD. This distribution underscores a well-educated workforce dominated by bachelor's degree holders, complemented by advanced and specialized qualifications.

4.1.5. Respondents Work Experience

Respondents were asked to indicate their length of service within the organization, and the results are presented in **Figure 4**.

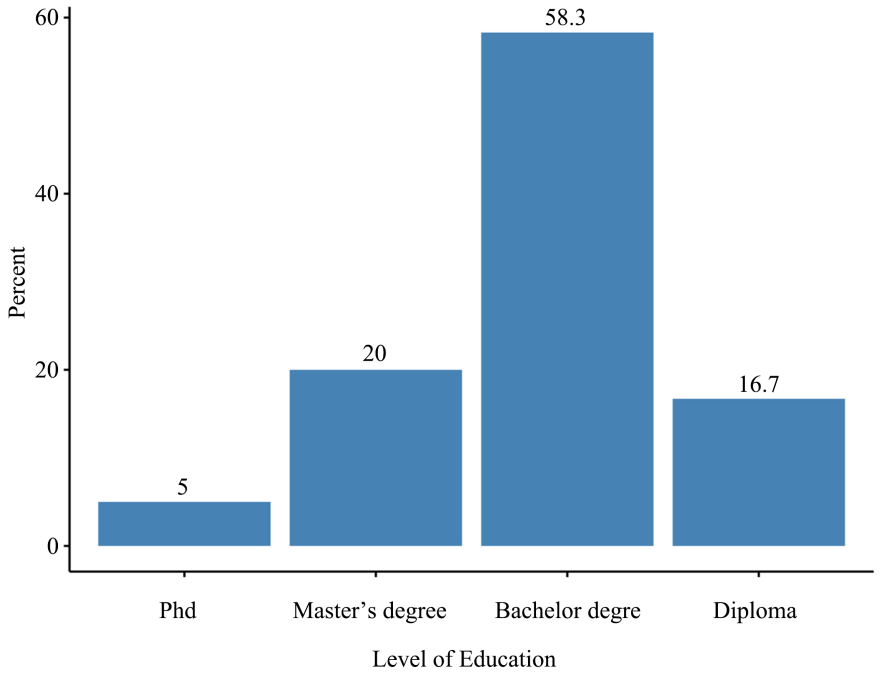

Figure 3. Respondents level of education.

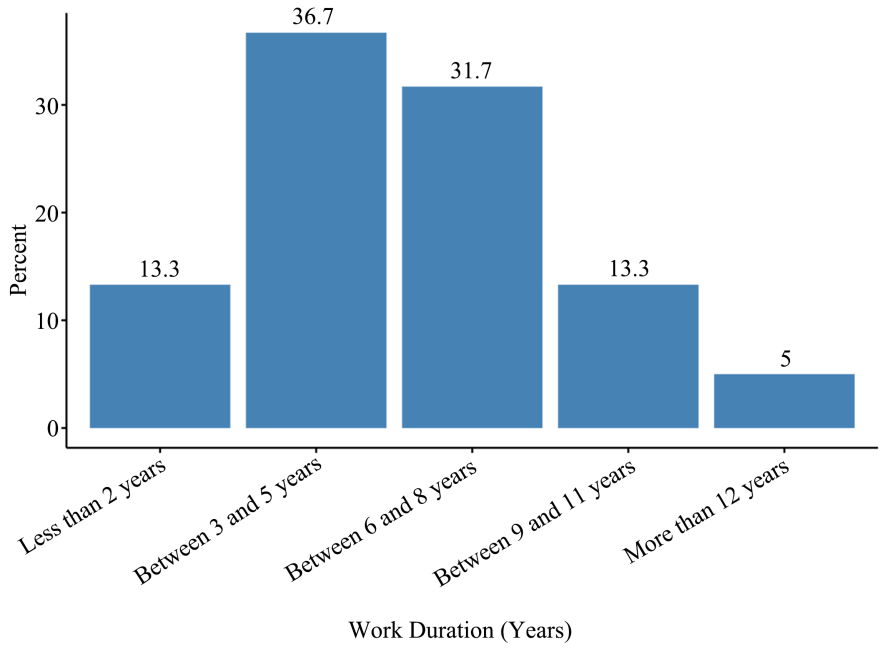

Figure 4. Respondents work experience.

As illustrated in **Figure 4**, 36.7% of respondents had served in their organizations for 3 - 5 years, while 31.7% had 6 - 8 years of experience, indicating dominance of mid-range tenures. Employees with less than 2 years and those with 9 - 11 years each accounted for 13.3%, whereas only 5.0% had served over 12 years. This reflects a workforce largely concentrated in moderate to long experience ranges, balanced by smaller groups of newer and long-term staff.

4.2. Use of Force Account Method in Road Construction Projects

The study assessed the extent of the use of force account method in road construction projects in Nairobi City County.

4.2.1. The Number of Road Construction Projects

The respondents were requested to indicate the number of road construction projects procured by Nairobi City County in the past 10 years. The results were as shown in Table 2.

Table 2. Number of road construction projects.

Number of Road Construction Projects	Frequency	Percent	Mean
62.00	13	21.7	63
63.00	26	43.3	
64.00	21	35.0	
Total	**60**	**100.0**	

As shown in Table 2, the estimates of the number of road construction projects procured by Nairobi City County over the last 10 years vary among respondents, with 43.3% estimating 63 projects as the most common figure. The mean number of projects reported is 63, suggesting this is the average estimate. Other estimates include 62 projects (21.7%) and 64 projects (16.7%). This distribution highlights that while there is some variability in the estimates, most respondents converge around the average of 63 projects.

4.2.2. Number of Projects Procured through Different Methods

The respondents were asked to indicate the number of projects procured in the last 10 years that were open tender, Public Private Partnership and Force Account. The results were as shown in Table 3.

Table 3. Number of projects procured through different methods.

Procurement Methods	Frequency	Percent
Open tender	35	55.56
Public Private partnership	15	23.81
Force account	13	20.63
Total	63	100.00

As shown in Table 3, the distribution of procurement methods for road construction projects in Nairobi City County over the last 10 years shows that the majority, 55.56%, were procured through open tender, indicating it is the most commonly used method. Public Private Partnerships accounted for 23.81% of the projects, reflecting a significant but less dominant approach. Force account was used for 20.63% of the projects, making it the least common method among the

three. Overall, open tender is the predominant procurement method, with Public Private Partnerships and Force Account being less frequently used.

4.2.3. Average Duration and Cost of Projects

The respondents were asked to provide information on the duration and cost of road project procurement using the three categories: Open Tender, Public Private Partnership, and Force Account. The results were as shown in Table 4.

Table 4. Average duration and cost of projects.

	Average Cost (in Millions)	Average Time (in Months)
Open tender	797.98	48
Public private partnership	486.33	36
Force account	107.24	18

The results indicate that road project procurement varies significantly by method. Open Tender is the most expensive at an average cost of 797.98 million and takes the longest at 48 months. Public Private Partnerships, with an average cost of 486.33 million and a procurement time of 36 months, are less costly and quicker but still more expensive and time-consuming compared to Force Account. The Force Account method is the most cost-effective at 107.24 million and the fastest at 18 months. This suggests that while Open Tender involves higher costs and longer durations, Force Account offers the greatest efficiency in terms of both cost and time. Table 5 summarizes the outcomes of the one-way ANOVA test conducted to compare project cost and project time across the different procurement methods. Table 6 provides the Tukey HSD pairwise comparisons for both cost and time, highlighting the mean differences, confidence intervals, and adjusted p-values among the procurement methods.

Table 5. One-way ANOVA results for project cost and time by procurement method.

Dependent Variable	Source	Df	Sum Sq	Mean Sq	F-Value	p-Value
Cost (KES m)	Method	2	4,850,254	2,425,127	734.7	<0.001***
	Residual	60	198,048	3301		
Time (months)	Method	2	9435	4717	488.6	<0.001***
	Residual	60	579	10		

***means statistically significant.

Table 6. Tukey HSD pairwise comparisons for project cost and time.

Comparison	Mean Diff	95% CI (Lwr, Upr)	Adj. p-Value
Cost (KES m)			
PPP—Open Tender	−334.6	−377.2, −292.0	<0.001
Force Account—Open Tender	−697.2	−742.0, −652.3	<0.001
Force Account—PPP	−362.6	−414.9, −310.3	<0.001

Continued

Time (months)			
PPP—Open Tender	−11.9	−14.2, −9.6	<0.001
Force Account—Open Tender	−31.3	−33.8, −28.9	<0.001
Force Account—PPP	−19.4	−22.3, −16.6	<0.001

To confirm whether the observed differences in cost and duration across procurement methods were statistically significant, a one-way ANOVA was conducted. Results (Table 5) revealed significant differences in both cost and time ($p < 0.001$). Post-hoc Tukey tests (Table 6) indicated that Force Account projects were significantly cheaper and faster than both PPP and Open Tender projects, while PPP projects were also significantly cheaper and faster than Open Tender.

4.3. Performance (Cost, Time and Quality) of Force Account Projects

The second objective of the study was to assess the performance (cost, time and quality) of force account projects in Nairobi City County.

4.3.1. Types of Projects Undertaken by Force Account Method

The respondents were asked to indicate the types of projects undertaken by Force Account Method. The results were as shown in Figure 5.

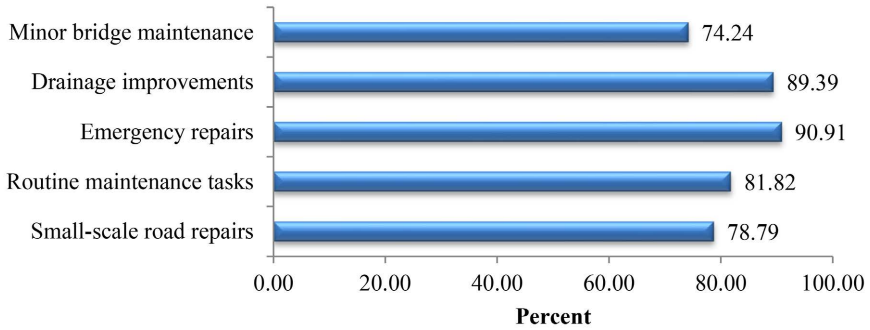

Figure 5. Types of projects undertaken by force account method.

Figure 5 shows that the Force Account method is primarily used for emergency repairs, which constitute 90.91% of projects, indicating its key role in addressing urgent issues quickly. Drainage improvements are also a major application, representing 89.39% of projects, reflecting its importance in managing drainage concerns efficiently. Routine maintenance tasks account for 81.82% of projects, highlighting the method's effectiveness for regular upkeep. Additionally, small-scale road repairs and minor bridge maintenance make up 78.79% and 74.24% of projects, respectively, demonstrating its utility in handling various smaller infrastructure needs. This implies that Force Account is most commonly utilized for urgent repairs and routine maintenance, emphasizing its role in addressing immediate and ongoing infrastructure needs.

4.3.2. Minimum and Maximum Cost Overrun of Projects

The respondents were asked to indicate the minimum and maximum cost overrun of projects undertaken by Nairobi City County. The results were as shown in Table 7.

Table 7. Minimum and maximum cost overrun of projects.

	Mean	Std. Deviation
Minimum	19.6	5.90
Maximum	71.8	4.58

As shown in Table 7, the results for the cost overrun of projects undertaken by Nairobi City County show a mean minimum cost overrun of 19.6 million with a standard deviation of 5.90 million, and a mean maximum cost overrun of 71.8 million with a standard deviation of 4.58 million. This indicates that the lowest observed cost overruns average around 19.6 million, with some variability, while the highest cost overruns average significantly higher at 71.8 million, with relatively less variability.

4.3.3. Frequency of Defects in Road Projects Using Different Procurement Methods

The respondents were asked to report the frequency of defects encountered in road projects completed through the Normal Tendering Procedure, Public Private Partnership, and Force Account methods. The results were presented in Table 8. Defect frequency" was measured using a Likert-type scale from 1 (very rare) to 5 (very frequent), where respondents rated the frequency of defects they observed in projects. The mean scores (e.g., 2.616) represent the average of respondent ratings across projects procured under each method.

Table 8. Frequency of defects in road projects.

	Mean	Std. Deviation
Normal tendering procedure	3.550	1.454
Public private partnership	3.066	1.325
Force account	2.616	1.439

As shown in Table 8, the results reveal that defects are reported most frequently with the Normal Tendering Procedure, which has the highest mean score of 3.550 and a standard deviation of 1.454, indicating both a higher average frequency and considerable variability in defect occurrences. The Public Private Partnership method has a mean score of 3.066 and a standard deviation of 1.325, suggesting a moderate frequency of defects with somewhat less variability. In contrast, the Force Account method has the lowest mean score of 2.616 and a standard deviation of 1.439, reflecting the least frequent occurrence of defects, though with no-

table variability in responses. This indicates that while defects are least common in Force Account projects, they are more prevalent in Normal Tendering Procedure projects.

4.3.4. Lack of Adequate Supervision Staff and Quality of Works

The respondents were asked to indicate whether the lack of adequate supervision staff for the project affects the quality of works and delays in the approval of completed sections. The results were as shown in Figure 6.

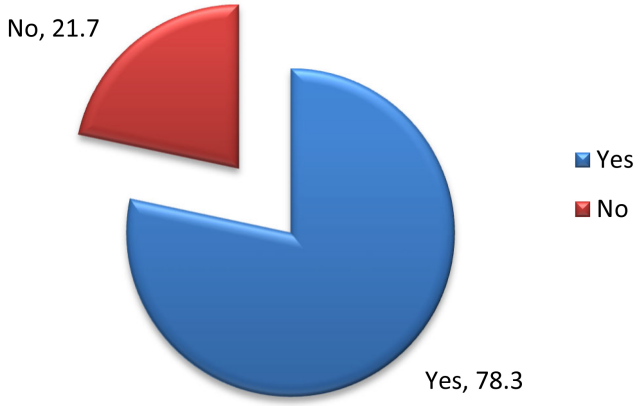

Figure 6. Lack of adequate supervision staff and quality of works.

The results indicate that a substantial majority of respondents, 78.3%, believe that a lack of adequate supervision staff for the project affects both the quality of works and delays in the approval of completed sections. Conversely, 21.7% of respondents do not think that insufficient supervision staff has an impact. This suggests that most perceive inadequate supervision as a significant factor in compromising work quality and causing delays in project approvals.

4.3.5. Performance (Cost, Time and Quality)

The respondents were asked to indicate the extent to which they agree with various statements on performance (cost, time and quality) of force account road construction projects. The results were as presented in Table 9.

Table 9. Cost of projects.

Statements	N	Mean	Std. Deviation
Force account road projects in our organization are completed within the set budget	60	4.400	0.994
Some force account road projects incur cost overrun	60	4.650	0.777
Some force account road projects in our organization have been left incomplete due to insufficient budget	60	4.383	0.958
Our organization has put proper strategies to ensure force account road projects are completed within the set budget	60	4.250	1.067

As shown in Table 9, the respondents agreed with a mean of 4.650 (Std. Deviation = 0.777) with the statement indicating that some Force Account method on road projects incur cost overruns. They also agreed with a mean of 4.400 (Std. Deviation = 0.994) with the statement that Force Account method on road projects in their organization are completed within the set budget. The findings agree with Yohana, (2020) observations that Force Account method on road projects in an organization should be completed within the set budget. Additionally, they agreed with a mean of 4.383 (Std. Deviation = 0.958) with the statement that some Force Account method on road projects have been left incomplete due to insufficient budget. Also, they agreed with a mean of 4.250 (Std. Deviation = 1.067) with the statement that their organization has implemented proper strategies to ensure Force Account method on road projects are completed within the set budget.

As shown in Table 10, the respondents agreed with a mean of 4.566 (Std. Deviation = 0.789) with the statement indicating that the project met all of the specified requirements and objectives. They also agreed with a mean of 4.416 (Std. Deviation = 0.979) with the statement that Force Account method on road projects meet the required technical specifications. Additionally, they agreed with a mean of 4.400 (Std. Deviation = 0.994) with the statement that Force Account method on road projects meet the required safety standards.

Table 10. Quality of projects.

Statements	N	Mean	Std. Deviation
Force account road projects meet the required safety standards.	60	4.400	0.994
Force account road projects meet the required quality standards	60	4.283	1.165
Force account road projects meet the required environmental standards	60	4.333	1.084
Force account road projects meet the required technical specifications.	60	4.416	0.979
The beneficiaries are satisfied with the road projects	60	4.016	1.255
The project met all of the specified requirements and objectives	60	4.566	0.789

The respondents further agreed with a mean of 4.333 (Std. Deviation = 1.084) with the statement that Force Account method on road projects meet the required environmental standards. They agreed with a mean of 4.283 (Std. Deviation = 1.165) with the statement that Force Account method on road projects meet the required quality standards. Lastly, they agreed with a mean of 4.016 (Std. Deviation = 1.255) with the statement that the beneficiaries are satisfied with the road projects.

As shown in Table 11, the respondents agreed with a mean of 4.633 (Std. Deviation = 0.822) with the statement indicating that Public Private Partnership in road projects implementation experiences disputes and conflicts. They also agreed with a mean of 4.466 (Std. Deviation = 0.891) with the statement that Force Account method on road projects in their organization are completed within schedule. The findings agree with Mayani (2019) observations that Force Account method on road projects in an organization should be completed within the schedule. Additionally, they agreed with a mean of 4.350 (Std. Deviation = 0.917) with the statement that Normal Tendering Procedure (open tendering) in road projects implementation experiences disputes and conflicts.

Table 11. Project delivery timeline.

Statements	N	Mean	Std. Deviation
Force account road projects in our organization are completed within schedule	60	4.466	0.891
I am satisfied with the time taken to complete force account road projects	60	4.200	1.005
Normal tendering procedure (open tendering) in road projects implementation experience disputes and conflicts	60	4.350	0.917
Public private partnership in road projects implementation experience disputes and conflicts	60	4.633	0.822
Force account in road projects implementation experience disputes and conflicts	60	2.067	1.132
Government officers are accused of accused of extravagance and over pricing labour and items, and wastage.	60	3.900	1.230
Lack of adequate supervision staff for the project does not affects the quality of works and delays in approval of completed sections.	60	2.450	0.891

The respondents further agreed with a mean of 4.200 (Std. Deviation = 1.005) with the statement that they are satisfied with the time taken to complete Force Account method on road projects. They agreed with a mean of 3.900 (Std. Deviation = 1.230) with the statement that government officers are accused of extravagance, overpricing labor and items, and wastage. Lastly, they agreed with a mean of 2.450 (Std. Deviation = 0.891) with the statement indicating that the lack of adequate supervision staff for the project does not affect the quality of works and delays in approval of completed sections. Robustness checks using Kruskal–Wallis test was also performed and results presented in Table 12.

Robustness checks using the Kruskal–Wallis test confirmed these results, with significant differences across procurement methods for both cost and time ($\chi^2 = 50.0$, df = 2, $p < 0.001$; Table 12).

Table 12. Robustness checks using Kruskal–Wallis test.

Dependent Variable	χ^2 (df = 2)	p-Value
Cost (KES m)	50.0	<0.001
Time (months)	50.0	<0.001

4.4. Discussion

The empirical review established that while the force account method often delivers cost savings, it is also associated with weaknesses in managerial oversight, financial compliance, and quality assurance across Tanzanian councils such as Arusha, Moshi District, and Moshi Municipal [2] [6] [11]. These studies consistently emphasized that although FAM reduces procurement costs, delays and compromised quality remain persistent challenges, particularly when organizational resources and supervision capacity are inadequate.

Findings presented in Sections 4.2 and 4.3 confirm and extend these observations within Nairobi City County. On adoption, results showed that only 20.63% of road projects were implemented using FAM compared to 55.56% through open tender, reflecting its relatively limited but significant application. Importantly, projects undertaken through FAM were the most cost-effective, averaging KES 107.24 million and requiring only 18 months, compared to open tender which averaged KES 797.98 million and 48 months. This supports prior literature that positions FAM as a time- and cost-efficient procurement strategy.

Performance results also align with regional findings. While respondents confirmed that FAM projects generally met safety, technical, and environmental standards, issues such as cost overruns (mean maximum of KES 71.8 million) and inadequate supervision (78.3% agreement) echoed the managerial weaknesses identified in Tanzanian studies. Moreover, defects were reported least frequently in FAM projects (mean = 2.616) compared to open tender and PPP, suggesting better quality consistency in Nairobi than previously reported in other contexts. The inferential tests confirmed that Force Account projects deliver statistically significant cost and time savings, strengthening earlier descriptive observations and supporting similar findings in Tanzanian studies [6] [11].

The study strengthens the empirical consensus that FAM provides efficiency advantages, yet managerial and supervisory shortcomings persist. The research gap highlighted in earlier studies, limited evidence on adoption scale and performance in urban road contexts, is addressed here, showing that while FAM is underutilized in Nairobi, it demonstrates strong potential for cost and time efficiency if quality and oversight concerns are systematically managed.

Table 13 presents a synthesis of insights from Tanzanian studies and the findings of the current research in Nairobi City County. The purpose of this comparison is to demonstrate how existing empirical evidence relates to, and is extended by, the present study, while also highlighting the gaps addressed.

Table 13. Summary of the study findings and gaps addressed.

Empirical Review (Tanzania Studies)	Key Findings	Current Study (Nairobi Findings)	Gap Addressed
Adoption of FAM is widespread in Tanzania, particularly in education and housing, but little evidence on road sector uptake [2] [11].	FAM reduces costs but remains poorly documented in road works; adoption extent unclear.	In Nairobi, 20.63% of road projects used FAM versus 55.56% open tender; average 63 projects in the past 10 years.	Provides concrete evidence on adoption scale of FAM in urban road projects.
Studies report FAM as cheaper and faster compared to conventional procurement [6].	Evidence of efficiency advantages but limited cross-sector comparisons.	FAM average cost KES 107.24 m, average time 18 months vs open tender KES 797.98 m, 48 months.	Confirms cost-time efficiency in Nairobi's road projects, quantifying scale.
Mixed quality outcomes: 40% cost savings but only 75% met quality standards; delays of six months common [11].	Managerial inefficiencies and weak supervision compromise quality.	Respondents agreed FAM projects meet technical and safety standards, but cost overruns (max mean 71.8 m) and supervision gaps (78.3%).	Shows Nairobi FAM projects meet quality benchmarks but still face supervision issues.
Defects and incomplete works are recurring issues in Tanzanian projects due to inadequate oversight [2].	Quality compliance inconsistent; defects remain significant.	Defects least frequent in FAM projects (mean 2.616) vs open tender (3.550); supervision cited as key issue.	Evidence demonstrates comparatively fewer defects in Nairobi but highlights need for oversight.

4.4.1. Adoption of FAM

Tanzanian studies emphasize adoption in education and housing but little on roads. Nairobi findings reveal 20.63% road projects used FAM, addressing this gap and providing evidence of urban uptake. Nairobi results confirm FAM adoption in 20.63% of road projects, extending Tanzanian evidence and filling the gap on uptake in urban road construction.

4.4.2. Cost and Time Efficiency

Empirical evidence shows FAM is cheaper and faster than traditional procurement [6]. Nairobi results quantified this, with FAM projects averaging KES 107.24 m and 18 months versus KES 797.98 m and 48 months. Nairobi findings strengthen efficiency claims, showing FAM delivers significant cost and time savings compared to open tender, quantifying efficiency in urban road projects.

4.4.3. Performance and Quality

Tanzanian projects achieved cost savings but struggled with quality compliance and delays. Nairobi findings mirror this: FAM met technical standards but faced

supervision challenges and cost overruns, exposing persistent managerial inefficiencies. Nairobi study confirms quality compliance yet highlights managerial inefficiencies and supervision gaps, aligning with Tanzanian evidence of persistent challenges despite cost savings.

4.4.4. Defects and Supervision

Tanzanian projects reported frequent defects due to weak oversight. Nairobi results showed comparatively fewer defects in FAM (mean 2.616) than open tender (3.550), though supervisory challenges remained significant. Nairobi findings reveal fewer defects in FAM projects, but consistent with Tanzanian studies, highlight persistent supervisory weaknesses undermining project outcomes.

5. Conclusions

This study set out to examine the use and performance of the force account method in road construction projects in Nairobi City County, addressing a significant gap in existing literature that has mainly focused on Tanzanian education and housing sectors. The problem underpinning this research was the limited evidence on the extent of FAM adoption in Kenyan urban road projects and its actual performance in terms of cost, time, and quality.

The findings revealed that while open tender remains the dominant procurement method (55.56%), 20.63% of road projects were delivered through FAM. Empirical results showed that FAM projects were more cost-effective, averaging KES 107.24 million compared to KES 797.98 million under open tender, and faster, requiring an average of 18 months versus 48 months. Respondents confirmed that FAM projects generally met safety and technical standards; however, they were also associated with cost overruns (mean maximum KES 71.8 million), inadequate supervision (78.3%), and managerial inefficiencies. Furthermore, defect rates were lower in FAM projects (mean = 2.616) compared to open tender (mean = 3.550), indicating comparatively better-quality consistency.

In conclusion, the study demonstrates that while FAM provides clear advantages in cost and time efficiency, it continues to face challenges linked to supervision, managerial oversight, and financial compliance. These findings extend the empirical literature by offering new insights from Nairobi's road sector, filling an important gap in regional evidence.

Policy and future recommendations include institutional reforms to strengthen supervisory capacity, enhance training for project managers, and establish monitoring frameworks that ensure accountability. Policymakers should also explore strategies to expand FAM in contexts where it offers efficiency gains, while addressing its weaknesses to safeguard quality and sustainability. Future research should examine longitudinal outcomes of FAM projects and compare performance across counties to assess scalability and generalizability.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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