**CONTRACTOR CAPACITY AND INFFRASTRUCTURE PROJECT PERFORMANCE: EVIDENCE FROM ROAD CONSTRUCTION PROJECTS IN NAIROBI CITY COUNTY, KENYA**

# ABSTRACT

Research on project performance underscores the importance of meeting cost and schedule targets to ensure successful and quality outcomes. In Kenya, a significant 56% of road construction projects suffer from cost overruns, delays, and subpar results. This study focuses on Nairobi City County and examines how contractor capacity—specifically financial, technical, managerial, and regulatory compliance—affects road construction project performance. The primary objective was to investigate the relationship between contractor competence and the execution of specific road projects. The study aimed to benefit government agencies, private contractors, and public stakeholders involved in road development. It employed a descriptive research design targeting five major road projects in the county. Respondents included engineers from the Ministry of Roads, Kenya Urban Roads Authority (KURA), technical auditors, and contractor consultants, totaling 75 professionals. Data collection was done via questionnaires, and the analysis utilized both descriptive statistics and inferential methods, such as correlation and multiple linear regression. The analysis revealed an R-square value of 0.727, indicating that 72.7% of variations in project performance could be explained by contractors' financial, technical, organizational, and regulatory capacities. The remaining 27.3% were influenced by other factors. Key recommendations include enhancing technical capacity through modern training and technology, strengthening financial and organizational structures, and ensuring full regulatory compliance. The study suggests future research should explore the impact of technological advancements, financial models, leadership dynamics, regulatory frameworks, and conduct broader geographic comparisons to improve the understanding and outcomes of road construction projects.

**Key Words:** *Contractor capacity, Road construction, Project performance, financial capacity, technical expertise, Regulatory compliance, Organizational capability*.

**1.0 INTRODUCTION**

Infrastructure, particularly the road sector, plays a critical role in supporting national economies and societal development. A well-developed road network is essential for meeting a country's production needs, promoting economic growth, and enhancing sustainability and global competitiveness. Contractors are central to the success of road construction projects, as they are responsible for acquiring finances, sourcing materials and technology, applying technical expertise, and managing resources efficiently. Research by Shehu & Wang (2020), Taofeeq et al. (2019), and others emphasizes that the effectiveness and capabilities of contractors are vital to the success of road development initiatives.

The construction industry has a rich historical legacy, from the engineering feats of ancient empires to the monumental infrastructure of the 18th and 19th centuries spurred by industrial revolutions. Modern developments have built on this foundation, with global construction accounting for about 13% of the world’s GDP and projected to exceed 13.5% by 2030, with annual spending reaching \$10 trillion. In Africa, road infrastructure investments are substantial, averaging 1.8% of regional GDP. For Nigeria, the construction sector contributes 16% to the GDP and employs a quarter of the labor force. Similarly, Kenya has prioritized infrastructure through initiatives like Vision 2030, dedicating considerable resources to improve its road networks, safety, and efficiency. Despite these investments, many projects in Africa fail to meet expectations due to cost overruns, delays, and substandard quality, signaling the need for a deeper evaluation of success factors in road construction projects.

Project performance in road construction is assessed through metrics like quality, timeliness, cost adherence, and client satisfaction. While government regulations often ensure timelines and cost controls, quality and stakeholder satisfaction are emerging as primary indicators of success. Effective operational control and efficient risk management are also crucial. Research by Kerzner (2019) and Befrouei & Taghipour (2018) underlines the importance of integrating quality, time, and budget into the performance framework, alongside environmental sustainability. Organizational risks, such as communication breakdowns and internal conflicts, can significantly hinder performance. Wu et al. (2017) emphasize the importance of harmonious collaboration among all stakeholders to ensure project success.

The contractor’s capacity is a determining factor in achieving project goals. According to Transparency Market Research (2020), contractor capacity refers to the ability to identify and manage project risks effectively. This capacity is multifaceted, encompassing financial, technical, management, organizational, and compliance aspects. Financial capacity involves accurate forecasting of funding needs and securing the necessary resources. Technical capacity requires creativity and specialized skills for project design and execution. Management capacity reflects the leadership and oversight needed throughout the project lifecycle, while organizational capacity ensures smooth interdepartmental communication and coordination. Compliance capacity involves adherence to regulatory frameworks and contractual obligations. As the United Nations Development Programme (2019) notes, a blend of these capacities is critical to delivering projects that are timely, cost-effective, and of high quality.

In Nairobi City County, the capital and economic hub of Kenya, road infrastructure development has been a key priority. The county contributes 13% to the national GDP, is home to over 4.3 million people, numerous industries, and serves as a major tourist destination. Road construction in the county is managed by government agencies like KeNHA, KURA, KeRRA, and the state department of roads. Significant projects include the Nairobi Expressway and the Eastern Bypass, as well as ongoing projects like the rehabilitation of Kasarani-Mwiki Road and Ngong Road. These initiatives are aimed at easing traffic congestion and boosting economic activity. Despite these efforts, many road projects in Nairobi have been plagued by delays and budget overruns. For example, the Nairobi Expressway, a 27.4-kilometer toll road, cost Kes 88 billion against an original budget of Kes 81 billion and was completed several months later than planned. Such discrepancies underscore the importance of contractor capacity in determining the success or failure of infrastructure projects. Assessing the contractors’ capabilities can provide insights into improving current projects and planning more effectively for future developments. This comprehensive understanding will be crucial not only for Nairobi City County but for infrastructure planning across Kenya.

**1.1 Research Problem**

The problem addressed in this study centers on the persistent challenges in aligning road construction project outcomes with their initial cost and schedule baselines, especially in Kenya. Despite the critical role that cost, schedule, and scope play in determining project success and quality, existing literature reveals significant gaps in understanding how to effectively manage these aspects. In Kenya, about 56% of road construction projects suffer from issues such as delays, cost overruns, and substandard outputs. Vision 2030, which aimed to improve road infrastructure between 2008 and 2016, failed to meet its objectives due to widespread project delays and abandonment. A common reason identified was inadequate contractor performance, with billions of Kenyan shillings lost to stalled projects. This highlights a pressing need to strengthen the capacity of construction firms. While studies in other countries like the UK and India have examined factors such as financial stability, contractor reputation, design changes, and labor and material availability, research specific to Kenya has pointed to financial capacity, managerial frameworks, and regulatory compliance as key success factors. Nevertheless, there is still a significant lack of recent and comprehensive studies that evaluate contractor capacity in terms of financial, technical, managerial, and organizational dimensions within the Kenyan context—particularly in Nairobi. This study seeks to fill that gap by exploring how these contractor capacities impact the successful completion of road construction projects in the region.

**1.2 Research Objective**

This study was guided by the following general objective to: determine how the capacity of contractors influenced the performance of road construction projects in Nairobi City County, Kenya.

Specific Objectives were to; examine the effect of contractor’s technical capacity on the performance of selected road construction projects, establish the effect of contractor’s financial capacity on the performance of selected road construction projects, establish the relationship between organizational capacity and performance of selected road construction projects, and to determine how regulatory compliance capacity relates to the performance of road construction projects in Nairobi City County, Kenya.

**1.3 Research Questions**

The ensuing research questions outlined this investigation:

What is the influence of contractor’s technical capacity on the performance of selected road construction projects in Nairobi County, Kenya?

To what extent does contractor’s financial capacity affect the performance of selected road construction projects in Nairobi City County, Kenya.?

What is the relationship between contractors’ organization capacity and the performance of selected road construction projects in Nairobi County, Kenya?

How does contractor’s regulatory compliance capacity relate to the performance of selected road construction projects in Nairobi City County, Kenya.?

**1.4 Justification of the Study**

This study provides valuable insights for researchers and professionals in project finance, management, administration, and road engineering by examining how contractor capacity affects highway development in Nairobi County. It enriches existing literature, especially for developing nations, and supports ongoing research. The findings benefit project managers and contractors in Kenya by helping them evaluate their financial, technical, managerial, and compliance capacities to enhance project success. Regulatory bodies such as KURA, KeNHA, and KeRRA also gain critical understanding of how contractor capabilities impact road project outcomes, allowing for improved assessment, selection, and monitoring of contractors in infrastructure development.

**2.0 LITERATURE REVIEW**

The theoretical literature review explores four key frameworks underpinning the analysis of contractor capacity and performance in road infrastructure projects: the Cost-Benefit Analysis (CBA) model, Stakeholder Theory, Theory of Constraints (TOC), and the Resource-Based View (RBV) theory. Each of these models provides a different lens through which the effectiveness and efficiency of contractors in construction, especially in Nairobi County, can be evaluated.

The Cost-Benefit Analysis (CBA) model has its origins in the work of Jules Dupuit, a French civil servant who developed it to assess the social profitability of bridge construction. Alfred Marshall later formalized the model, while Otto Eckstein adapted it in the 1950s as a welfare economics tool for water resource development. CBA integrates theories, models, and empirical data to weigh benefits against costs, enabling informed decision-making by selecting options with the greatest net positive outcome. In construction, this model is highly relevant as it helps risk and project managers to compare alternative investments and strategies using a common metric—cost-effectiveness. Financial design, as an independent variable in this context, influences project performance, while maintaining financial capacity at optimal levels is critical. The CBA framework thus offers a structured approach to justify project decisions, ensuring benefits outweigh costs and that essential factors like time and scope are not compromised. It is also beneficial in comparing different project organizational structures, each with varying impacts on remuneration, productivity, team coordination, and communication. As highlighted by Shehu & Wang (2020) and Hong et al. (2018), using CBA ensures that the chosen strategy aligns with project goals and resource constraints.

Stakeholder Theory, advanced by scholars such as Donaldson and Preston (2020), Evans and Freeman (2017), and Freeman (2018), emphasizes the need to manage and consider the interests of all stakeholders within a project. This includes anyone affected by or capable of affecting the project’s outcome, such as government agencies, community members, contractors, and regulators. The theory underscores that neglecting stakeholder interests can lead to project failure. Project managers must therefore facilitate planning, scheduling, and integration of stakeholder expectations to ensure smooth execution. Nguyen et al. (2018) support this view by pointing out that failing to attend to stakeholder concerns can disrupt resource flow, making the project unfeasible. The theory plays a crucial role in guiding how stakeholder relationships are managed in road infrastructure projects, particularly regarding compliance with regulations from bodies like KRA, NEMA, and NCA. However, Stakeholder Theory has been criticized for focusing predominantly on external stakeholders who can obstruct project success while underrepresenting internal stakeholders such as project managers and staff who are equally crucial in achieving technical and performance goals.

The Theory of Constraints (TOC), introduced by Eliyahu M. Goldratt in his 1984 book ***The Goal***, offers a systems-based approach to identifying and addressing bottlenecks in organizational performance. The theory maintains that every organization has at least one constraint that limits its ability to achieve higher performance. TOC involves three steps: identifying what to change, determining how to change it, and implementing necessary adjustments under enabling conditions. Goldratt (2019) argued that most constraints arise from budget limitations, system inefficiencies, or lack of managerial capacity. In project management, these constraints may manifest as conflicts, ineffective cost control, or scheduling challenges. Rothwell, Hohne, and King (2018) highlight that failing to consider the entire organizational structure in cost estimations is itself a constraint. In the context of road construction in Nairobi, TOC informs how constraints—especially those affecting contractor capacity and financial efficiency—can be systematically identified and addressed. Despite its utility, TOC has faced criticism for not adequately recognizing intangible constraints such as potential and efficiency, which are especially relevant in managing complex infrastructure projects.

The Resource-Based View (RBV) theory, developed by Barney (2019), provides a strategic framework emphasizing the importance of a firm’s internal resources in achieving competitive advantage and superior performance. RBV asserts that resources must be valuable, rare, inimitable, and non-substitutable for a firm to sustain its advantage. In the construction industry, this translates to the contractor’s access to critical inputs such as skilled labor, machinery, and financial resources. Olawale & Sun (2018) argue that contractors who can mobilize these resources effectively are more likely to complete projects on time and within budget, avoiding delays and cost overruns. Financial capacity is especially vital for ensuring timely procurement and labor payments, contributing to smooth project execution. Furthermore, firms that consistently perform well due to superior internal capacities tend to build reputations that enhance their chances of winning future contracts. This is particularly significant in urban areas like Nairobi, where infrastructure plays a central role in economic development. The RBV theory, therefore, offers a compelling explanation of how contractor effectiveness and performance are shaped by internal capabilities.

Collectively, these four theories offer a multidimensional framework for evaluating contractor performance in road construction. The CBA model emphasizes financial efficiency and informed decision-making, Stakeholder Theory focuses on managing stakeholder interests and regulatory compliance, TOC addresses operational bottlenecks and system inefficiencies, and RBV highlights the strategic importance of internal resources and capabilities. While each model has its limitations, their integration provides a robust theoretical foundation for assessing how well contractors can deliver infrastructure projects in challenging and dynamic environments like Nairobi County. Understanding and applying these theoretical perspectives ensures a more holistic evaluation of contractor capacity and performance, ultimately supporting better project outcomes and sustainable development.

**2.1 Empirical Review**

The empirical review of literature explores four key dimensions of contractor capacity and how they influence the performance of construction projects: technical capacity, financial capacity, organizational capacity, and regulatory compliance capacity. Each of these areas is supported by a number of recent studies conducted in various countries, revealing a global perspective on contractor performance issues and potential solutions.

The first dimension, contractor ***technical capacity,*** has been explored through multiple studies over the past five years. Fukuda (2018), in Nigeria, identified that limited exposure to technical know-how in personnel management led to substandard project quality, unfit contractors, and overall organizational inefficiency. The study found that poor technical management resulted in considerable negative outcomes across the construction sector. Similarly, Worsley (2019) conducted a study in Kenya, pinpointing execution issues in construction projects caused by ill-qualified and inexperienced managers. He concluded that many project delays and difficulties were linked to the technical incompetence of leadership teams. In Jordan, Al-Momani (2020) examined how managerial decision-making influenced project deliverables. His findings stressed that decision-making capabilities significantly affect project outcomes in construction. Jackson (2020) investigated project managers’ (PMs) mindsets in China, showing that their personal traits—such as positivity, flexibility, and risk sensitivity—play crucial roles in project success. Additionally, Medugu et al. (2021) in Nigeria found that a technically skilled labor force facilitated quicker project completion and improved results. Collectively, these studies underscore that technical and managerial competence—including expertise, decision-making ability, and labor proficiency—are central to improving contractor performance and ensuring the successful delivery of projects.

The second theme, ***financial capacity***, is also critical for project success. Olusanya (2018) highlighted undercapitalization as a major hurdle facing domestic contractors in Nigeria. His findings suggested that without adequate capital, contractors struggle to function effectively. Erdogan, Saparauskas, and Turskis (2019), through their London-based study, emphasized that insufficient working capital severely limits contractors' operational capacities. Ondara (2019) reinforced this perspective by advising contractors in China to adopt careful financial planning and budgeting to mitigate government payment delays that could affect project continuity. Scarpetta, Fally, and Aghion (2018) stressed that small businesses, including contractors, require better financial access to compete fairly with larger entities, suggesting that financial institutions must play a role in supporting growth. In Nigeria, Nwude (2020) pointed out that financial mismanagement leads to reduced output and profitability, urging effective control of working capital to ensure adherence to budget and schedule. These studies collectively make it clear that financial readiness, strategic planning, and the availability of funding are indispensable for effective and uninterrupted project execution.

***Organizational capacity*** is another key determinant of project performance. Armstrong and Taylor (2019) defined organizational capacity as the ability of individuals within an organization to work effectively together toward a common goal, implying that teamwork and collaboration are foundational. Wolf (2018) found that a sound organizational structure promotes a productive implementation culture, which in turn supports project success. Clemmer (2017), in Kenya, highlighted the importance of having structured frameworks incorporating planning, directing, and control mechanisms to enhance project delivery. Javed et al. (2018) reinforced this by emphasizing interdepartmental coordination as essential for seamless project execution. Larsen et al. (2019) in India noted that supervision and management were vital to structured contractor activities. Steyn (2017) addressed workload management, pointing out that over- or underloading personnel compromises performance. According to Bredin and Söderlund (2021), human-related factors such as team composition, experience, and commitment significantly influence outcomes, highlighting the need for good team management. Mbiti (2019) called for inclusive monitoring and evaluation in Kenya, stressing that participatory approaches improve goal setting and accountability. Maaty, Akal, and El-Hamrawy (2018) studied road projects in Egypt, where organizational aspects were identified as dominant influences on effectiveness. Collectively, these works argue for the importance of robust organizational structures, teamwork, management systems, and monitoring processes in enhancing contractor effectiveness and project outcomes.

The final area, ***regulatory compliance capacity,*** examines how legal frameworks and oversight influence construction project success. Stern and Cubin (2018) asserted that regulation is vital for institutional success, suggesting that compliance promotes efficiency, capacity development, and better utilization of resources. Gelderman et al. (2017) warned that weak regulatory environments, like that in Kenya, require exhaustive compliance mechanisms to function effectively. Mukulu (2020) and Puddephatt & March (2019) observed that procurement challenges in Malindi, Kenya, often arose due to weak enforcement, impacting project execution. Mitchell and Ambrose (2017) emphasized that a strong regulatory framework improves quality, protects stakeholders, and manages costs, making it indispensable for successful projects. In Nigeria, Famakin and Fawehinmi (2020) called for stricter safety regulations in construction, citing them as essential to reducing risks. Nmadu (2018) also stressed the need for adherence to procurement laws and expertise in sustainable practices. Umeokafor, Umeadi, and Jones (2019) found that client pressure, weak enforcement, and regulatory inadequacies were primary barriers to compliance in Nigeria. Minjire and Waiganjo (2019) underlined the importance of good governance in enforcing regulations, arguing that bureaucratic delays and ambiguity undermine legal adherence. Jeptepkeny (2018) advocated for clearly communicated bidding requirements to foster compliance, while Gacheru and Diang’a (2019) pointed out challenges such as corruption, lack of training, and limited reach by regulatory bodies in Kenya. Finally, Ndumia (2019) emphasized that effective regulatory frameworks must engage stakeholders, adapt to emerging challenges, and empower legal entities to enforce compliance. These studies collectively reinforce that clear, enforceable, and well-communicated regulations are essential to guiding contractor behavior and ensuring project success.

**3.0 METHODOLOGY**

The research adopted a ***descriptive design,*** which is ideal for providing an accurate, unbiased depiction of events or phenomena as they occur naturally. According to Mugenda and Mugenda (1999), this method answers the fundamental questions of who, what, when, and where, enabling a systematic and objective understanding of the subject under study. Kothari (2017) further elaborates that descriptive research is well-suited for aligning research objectives and offers a cost-effective approach to gathering, measuring, and analyzing data. This design enabled the researcher to focus effectively on participant selection, data collection, and interpretation processes, providing a reliable framework for exploring the performance of road construction projects.

The ***target population*** for the study included personnel involved in five active road projects within Nairobi County. These were the Waiyaki Way-Redhill Link Road, the Upgrading of Mombasa Road, Upper Hill Road Phase II, Ngong Road-Kibera-Kungu Karumba-Lang’ata Road, and Ngong Road from Dagoretti Corner to Karen Roundabout. According to Cooper and Schindler (2018), a population encompasses all elements or individuals considered for deriving statistical inferences. For this study, the population comprised senior staff engaged in the supervision of these road projects, including 20 engineers from the Ministry of Roads, 15 technical auditors, 30 contractor consultants, and 10 engineers from the Kenya Urban Roads Authority (KURA), amounting to a total of 75 individuals. These participants were instrumental in ensuring that the sample accurately reflected the broader context of road construction supervision in the county.

Regarding ***sampling procedures***, the study employed a stratified random sampling technique to ensure adequate representation from each subgroup involved in the construction projects. The population was divided into four strata based on their roles: Ministry of Roads Engineers, Technical Auditors, Contractor Consultants, and Engineers from KURA. This approach enabled the researcher to consider the diversity of perspectives and experiences relevant to road construction. Using Slovin’s formula (2012), the appropriate ***sample size*** was calculated to be 63 respondents. As observed by Pavan and Kulkarni (2019, 2021), a well-determined sample size is critical in reducing the margin of error and ensuring the accuracy and generalizability of research findings.

***Data collection*** was conducted using semi-structured questionnaires designed to elicit both quantitative and qualitative data. These instruments were carefully crafted with straightforward language to accommodate the respondents’ levels of education and ensure clarity. The questionnaire was divided into sections: Part A gathered demographic details; Part B explored the influence of financial resources on road project efficiency; Part C examined how technical expertise affects project outcomes; Part D investigated the role of regulatory compliance; and Part E addressed contractor compliance with regulations. This structured design facilitated the analysis process by aligning responses directly with the study’s variables and objectives, thereby enhancing the relevance and usability of the data collected.

To ensure the reliability and clarity of the questionnaire, a ***pilot study*** was carried out involving ten participants from the Kasarani-Mwiki Road project. These included representatives from each of the four key categories: Ministry of Roads Engineers, Technical Auditors, Contractor Consultants, and Engineers from KURA. The pilot phase helped identify and revise any ambiguous or irrelevant questions, thereby enhancing the overall quality of the data collection tool. Importantly, individuals involved in the pilot study were excluded from the main research to avoid bias.

The study also emphasized ***validity and reliability*** in its methodology. ***Validity*** refers to the accuracy with which a data collection instrument measures the intended variables (Kothari, 2019). To ensure content validity, the questionnaire underwent thorough evaluation by the research supervisor and other subject-matter experts. They reviewed the questionnaire for ambiguity and consistency, ensuring that it aligned with the research variables and objectives. This process was essential to minimize misinterpretation and enhance the instrument’s accuracy in capturing relevant data. ***Reliability***, on the other hand, relates to the consistency of the instrument in producing similar results under consistent conditions. As per Mugenda and Mugenda (2003), and Rogers et al. (2016), reliability was assessed using the Cronbach Alpha Coefficient, with a threshold of 0.70 considered acceptable, as recommended by McNeish (2017). Internal consistency was evaluated based on responses from the pilot study, and any components falling below the threshold were adjusted to improve the instrument's dependability.

Data collection procedures involved obtaining formal approval from various authorities, including a research authorization letter and clearance from the National Commission for Science, Technology, and Innovation (NACOSTI), as well as from the respective road construction firms. Upon receiving the necessary permissions, the researcher utilized the drop-and-pick method for administering the questionnaires. This method allowed participants ample time to respond thoughtfully before the questionnaires were collected for analysis.

For ***data analysis and presentation***, the information gathered was first edited, coded, and tabulated. Preliminary analysis was conducted using Microsoft Excel, after which the data was imported into SPSS version 21 for detailed analysis. The study employed both descriptive and inferential statistical methods. Descriptive statistics, including means, standard deviations, and percentages, were used to summarize the data. Inferential statistics included correlation and multiple regression analyses to investigate relationships between variables. Statistical significance was determined using the correlation coefficient (r) and a p-value threshold of 0.05. The application of these techniques provided a rigorous foundation for interpreting the impact of financial resources, expertise, and regulatory compliance on the effectiveness and performance of road construction projects in Nairobi County.

**4.0 RESULTS AND DISCUSSION**

**4.1 Response Rate**

The study involved 75 participants, including engineers from KURA, contractors’ consultants, technical auditors, and Ministry of Roads engineers. Local contractors were selected based on active involvement in Nairobi City County Road projects. Of these, 66 participants completed and returned the surveys, yielding an exceptional 88% response rate. This high participation was sufficient for drawing meaningful conclusions and accurately reflected the study population. According to Mugenda and Mugenda (2003), a response rate above 70% is considered outstanding.

***Table 1: Response Rate***

|  |  |  |
| --- | --- | --- |
|  | **Frequency** | **Percent (%)** |
| Completed Questionnaires | 66 | 88% |
| Non-Response | 9 | 12% |
| **Total Sample** | **75** | **100** |

**Source: Survey Data (2025)**

**4.2 Descriptive Statistics**

The study investigated the financial, technical, organizational, and regulatory capacities of contracting firms involved in road construction, particularly in Nairobi, and how these capacities influence their overall project performance. In terms of **financial capacity**, findings revealed that many firms struggled to secure loans due to lack of sufficient collateral (mean = 2.213), and faced frequent cash flow shortages (mean = 3.871). Government payment delays were also a common challenge (mean = 2.414), contributing to late salary payments (mean = 3.469), and denial of bank overdrafts (mean = 4.042). Delays in paying suppliers (mean = 3.012) and subcontractors (mean = 3.571) were also prevalent. The overall financial capability average was 3.227, indicating inadequate financial strength to support both current and future obligations. A low standard deviation of 0.099 across financial indicators suggested a high level of agreement among respondents regarding these financial constraints.

Regarding ***technical capacity***, the study found a widespread perception of technological inadequacy (mean = 1.431) and poor managerial proficiency (mean = 2.602). These challenges were consistent with earlier studies in Kenya and elsewhere, highlighting the limited skillsets among contractors’ management. Conversely, work planning quality received a relatively favorable rating (mean = 3.728), and safety standards were generally well-managed (mean = 4.221). However, the adoption of modern construction techniques (mean = 1.790) and the ability to manage changes during ongoing projects (mean = 2.052) were both rated poorly. The overall technical capacity average was 2.637, below the neutral benchmark of 3.0, indicating inadequacy. A standard deviation average of 0.1737 reflected consistent views among participants about the technical shortcomings.

The study also assessed ***organizational capacity***, focusing on aspects like project monitoring, task allocation, cost control, coordination, and planning. Oversight of road projects was rated moderate (mean = 3.342), while task distribution was seen as weak (mean = 2.280), a finding consistent with research indicating that poor task allocation leads to workforce overburdening. Cost management (mean = 3.346), coordination (mean = 2.682), and supervision (mean = 3.014) were rated as average. However, work planning was viewed positively (mean = 4.048). The average organizational capability was 3.135, suggesting that firms possess only marginally sufficient operational effectiveness. The consistency in responses was demonstrated by an average standard deviation of 0.132.

In evaluating ***regulatory compliance***, the study looked into fines, complaints, court cases, and adherence to industry standards. A significant number of respondents reported frequent fines by the National Construction Authority (NCA) (mean = 2.943), which have been attributed to limited awareness and training. There were also frequent complaints from the National Environment Management Authority (NEMA) (mean = 3.579), and regular involvement in legal disputes (mean = 3.322). On a more positive note, respondents reported moderate consistency in complying with construction industry standards (mean = 3.155). The standard deviation for these regulatory indicators ranged between 0.601 and 0.941, reflecting relatively uniform perceptions among contractors about the challenges they face in regulatory compliance.

Finally, the study examined ***performance in new road projects,*** focusing on cost, time, and quality. Respondents reported that staying within budget was a recurring issue (mean = 2.724), and that completed projects were frequently subjected to modifications (mean = 3.031). Moreover, failure to meet project deadlines was common (mean = 3.048). The overall project performance average was 2.934, suggesting that road projects often fall short in terms of expected cost, time, and quality standards. A standard deviation of 0.660 indicated a shared perception among respondents regarding these challenges.

**4.3 Multicollinearity Test**

The research conducted a multicollinearity analysis to assess correlations among independent variables, as high correlations can distort regression results. Table 4.9 shows that all variables—Financial Capacity (VIF=3.934), Technical Capacity (VIF=4.535), Organizational Capacity (VIF=3.247), and Regulatory Compliance (VIF=4.375)—had VIF values below 5. This indicates low multicollinearity, ensuring the regression model’s parameters remain reliable and free from distortion caused by variable interdependence**.**

***Table 2: Multicollinearity Test Using Tolerance and VIF***

|  |  |
| --- | --- |
|  | **Multicollinearity Statistics** |
| **Tolerance** | **VIF** |
| Financial Capacity | .254 | 3.934 |
| Technical Capacity | .220 | 4.535 |
| Organizational Capacity | .308 | 3.247 |
| Regulatory Compliance | .229 | 4.375 |

**Source: Researcher 2024**

**4.4 Normality test**

A normality assessment of all study variables showed significance values around 0.300, exceeding the 0.05 threshold. This indicates that both the variables and performance measures are normally distributed, aligning with Norusis's (2007) guidelines. The detailed results are presented in Table 3.

***Table 3: Tests of Normality***

|  |  |
| --- | --- |
| Variables | Kolmogrov-Smirnov |
|  | statistic | Df. | Sig. |
| Financial Capacity  | 0.094 | 72 | 0.300 |
| Technical Capacity  | 0.093 | 72 | 0.291 |
| Organizational Capacity  | 0.097 | 72 | 0.299 |
| Regulatory Compliance  | 0.094 | 72 | 0.301 |
| Performance | 0.090 | 72 | 0.300 |

**Source: Researcher 2024**

**4.5 Model Summary**

This research used inferential analysis to examine the relationship between a treatment and its outcome, focusing on how predictor variables impact the output of highway building companies. The study analyzed factors affecting productivity by measuring changes in these variables. Results showed that 72.7% of the variation in road construction performance in Nairobi city county, Kenya, is explained by contractors’ capacities, including technical, financial, organizational, and regulatory compliance. The remaining 27.3% is attributed to other factors

***Table 4: Model Summary***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error** |
| 1 | .853a | .727 | .713 | .116 |

**Source: Researcher 2024**

**4.6 Correlation Analysis**

The study assessed the correlation between contractors' capabilities and the success of highway development projects, with results shown in Table 5. Findings indicated strong, significant positive relationships between various contractor capacities and project performance: builders' capacity (r=0.672), financial capability (r=0.735), organizational capacity (r=0.838), and regulatory compliance capacity (r=0.607), all with p=0.000. These results confirm that all dimensions of contractor capacity significantly influence highway project success. Supporting this, Kolapo et al. (2021) found that contractor capacity notably improves project performance by enhancing service quality, customer satisfaction, and innovation**.**

***Table 5 Correlation Analysis Results***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Technical Capacity | Financial Capacity | Organizational Capacity | Regulatory Compliance Capacity | Performances of road construction |
| Technical Capacity | Correlation(r) | 1 |  |  |  |  |
| p-value |  |  |  |  |  |
| Financial Capacity | Correlation(r) | .795\*\* | 1 |  |  |  |
| p-value | .000 |  |  |  |  |
| Organizational Capacity | Correlation(r) | .744\*\* | .815\*\* | 1 |  |  |
| p-value | .000 | .000 |  |  |  |
| Regulatory Compliance Capacity | Correlation(r) | .838\*\* | .823\*\* | .744\*\* | 1 |  |
| p-value | .000 | .000 | .000 |  |  |
| Performances of road construction | Correlation(r) | .672\*\* | .735\*\* | .838\*\* | .607\*\* | 1 |
| p-value | .000 | .000 | .000 | .000 |  |
| \*\*. Correlation is significant at the 0.01 level (2-tailed). |

**Source: Researcher 2024**

**4.7 Multiple Linear Regression Analysis**

The regression analysis reveals that monetary, technical, organizational, and regulatory capacities all have significant positive impacts on the performance of road projects in Nairobi city. Specifically, a one-unit increase in monetary capacity corresponds to a 0.797-unit performance gain, highlighting the critical role of financial resources such as funding availability and budgeting effectiveness in ensuring timely project completion and quality outcomes. Technical capacity, characterized by skilled labor and modern construction techniques, also strongly influences performance, with a coefficient of 0.772, supporting the view that technical expertise reduces cost overruns and improves standards adherence. Organizational capacity exhibits the highest impact on performance (β = 0.807), emphasizing the importance of effective leadership, structured management systems, and efficient resource allocation in achieving project success. Regulatory capacity, relating to compliance with legal, environmental, and safety regulations, significantly contributes to performance as well (β = 0.638), reducing risks and enhancing project credibility. Respondents noted that financial shortfalls, lack of technical skills, poor management, and bureaucratic delays are key challenges that undermine project success. To improve outcomes, the study recommends increasing funding, providing training, adopting better project management practices, strengthening regulatory oversight, and integrating technologies such as Building Information Modeling (BIM) and GIS. Future research could explore the effects of emerging technologies and sustainability practices on infrastructure project performance**.**

***Table 6 Regression Coefficients***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model** | **Un-standardized Co-efficients** | **Standardized Co-efficients** | **t** | **Sig.** |
| **B** | **Std. Error** | **Beta** |
| 1 | (Constants) | .485 | .151 |  | 9.510 | .001 |
| Financial capacity | .797 | .073 | .672 | 10.918 | .002 |
| Technical capacity | .772 | .069 | .735 | 11.188 | .003 |
| Organizational capacity | .807 | .119 | .719 | 6.789 | .001 |
| Regulatory capacity | .638 | .092 | .607 | 6.922 | .000 |

**Source: Researcher 2024**

**5.0 CONCLUSIONS**

Contractors with skilled staff, advanced equipment, and ample experience are more likely to complete projects on time, within budget, and with high quality. Technical incompetence often causes delays, cost overruns, and poor workmanship, highlighting the importance of capacity development and firm qualification standards. Financial capacity is also critical; contractors with adequate resources can procure quality materials, hire skilled labor, and manage risks effectively, while those with limited finances frequently face cash flow problems, causing delays or abandoned projects. Strengthening financial planning and exploring funding alternatives like public-private partnerships is advised. Organizational capacity impacts performance as well, with well-organized firms exhibiting strong leadership, decision-making, and project management, resulting in timely and quality project delivery. The study urges contractors to adopt strategic planning and employee development for greater efficiency. Lastly, compliance with engineering, environmental, safety, and contractual laws is vital to avoid penalties and ensure project success, with regulatory agencies playing a key role in enforcement and support.

**6.0 RECOMMENDATIONS**

The study recommends that construction firms invest significantly in enhancing their technical capacity through ongoing training, adopting advanced technologies, and hiring skilled professionals. This improvement in technical expertise is crucial for better project execution, timely completion, and quality assurance. Financial capacity should also be optimized by implementing effective planning, managing cash flow efficiently, and diversifying funding sources to avoid over-reliance on a single source. Access to credit and strategic financial management are vital to ensure smooth operations, procurement of quality materials, and prevention of project delays due to funding shortages. Organizational capacity requires firms to refine their internal management systems, streamline decision-making, and foster teamwork among stakeholders. Efficient project management and clear communication are essential to improving coordination and execution. Furthermore, capacity building in regulatory compliance is critical; firms must adhere strictly to legal and policy requirements, obtain necessary certifications, and establish mechanisms to monitor compliance, thereby avoiding penalties and project disruptions. Implementing these recommendations is expected to enhance cost-effectiveness and overall project performance.

For future research, the study suggests comparative analyses between public and private contractors to better understand variations in technical capacity and project outcomes. Investigations into financing modes such as public-private partnerships and alternative funding sources could provide insights into their effects on project sustainability and completion. Research on leadership styles, project management, human resource competencies, and knowledge transfer within firms would also be valuable for improving efficiency. Additionally, exploring the impact of regulatory frameworks and enforcement on contractor compliance could offer lessons for enhancing governance in road construction. Expanding studies beyond Nairobi to rural and metropolitan areas would provide a broader perspective on contractor abilities, infrastructure sustainability, and long-term maintenance.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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Details of the AI usage are given below:

1.

2.

3.

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