Journal of Applied Social Sciences in Business and Management
(JASSBM)
Volume 4, Issue 1, 2025

Journal Homepage: https://grandmarkpublishers.com/index.php/JASSBM

SCOPE CREEP AND PERFORMANCE OF CONSTRUCTION PROJECTS IN KIAMBU COUNTY KENYA

[1] Wanjiku Kelvin Mwangi, [2] Dr. Omwenga Jane Queen, Phd

[1] Masters of Science in Project Management at the Jomo Kenyatta University of Agriculture and Technology

[2] School of Business and Entrepreneurship

ABSTRACT

The study aimed to investigate the relationship between Project scope creep and performance of construction projects in Kiambu county Kenya. The significance of this research lies in its focus on the critical elements of Project Complexity and Resource Availability and their impact on the performance of construction projects in Kiambu county Kenya. Identifying the effects of these Project scope creep is essential for policymakers, project managers, and other stakeholders involved in the implementation of construction projects in Kenya. Descriptive survey design was adopted for this study, targeting 1100 construction projects in Kiambu county. This design is suitable because it allowed the researcher to gather precise information about the phenomena under investigation, describing the characteristics, opinions, attitudes, preferences, and perceptions of individuals relevant to the study. The study used a large sample size calculated using the sample size formula for large populations, and data was collected through questionnaires administered to relevant stakeholders. Both descriptive and inferential data analyses were performed using SPSS version 29 and MS Excel to facilitate the analysis. The conceptual framework draws on the Complexity Theory and Resource Dependence Theory providing a robust theoretical background for the study. Overall, the proposed study promises to contribute to the existing literature on project management practices in Kenya and shed light on the critical factors influencing the Project scope creep and performance of construction projects in Kiambu county Kenya.

Key Words: Project scope creep, Project Complexity, Resource Availability, performance, construction projects

Background of the Study

Project scope creep is a prevalent phenomenon that involves incremental changes to the initially agreed-upon project requirements and deliverables, resulting in additional costs, extended timelines, reduced quality, and decreased stakeholder satisfaction (PMI, 2017). According to recent studies, scope creep remains a persistent challenge across various industries, including the construction sector, where uncontrolled growth in project demands can lead to suboptimal performance outcomes (Abbott, et al., 2020; Almutairi, 2016).

Project scope creep is a pervasive issue in modern project management, characterized by the slow but steady expansion of project parameters beyond their originally agreed-upon boundaries. While some degree of change may be inevitable during project implementation, excessive modifications can result in cost overruns, schedule delays, resource depletion, and diminished quality, ultimately jeopardizing project success (Jugdev & Muller, 2005). Moreover, scope creep poses unique challenges in the construction industry, given the complexities associated with multi-stakeholder coordination, regulatory compliance, and environmental sustainability considerations. Consequently, extensive research efforts have been devoted to understanding the antecedents and consequences of scope creep, focusing primarily on organizational, behavioral, technological, and external factors that contribute to its manifestation (Packendorff, 2002; Turner, 2014). Nonetheless, despite burgeoning interest in this area, several gaps remain unexplored, necessitating further examination of the underlying mechanisms through which scope creep influences construction project performance.

Scope creep continues to pose significant challenges for construction projects worldwide, irrespective of size, complexity, or geographical location. For instance, empirical findings suggest that nearly two-thirds of all construction projects encounter some form of scope creep, with approximately half experiencing moderate to severe levels of deviation from planned activities (Eken, 2017; Kerzner, 2017). Such discrepancies not only impose financial penalties on clients and contractors alike but also undermine trust, compromise relationships, and engender legal disputes among key stakeholders involved in the project lifecycle (Murphy & Ledwith, 2013). From a theoretical standpoint, numerous conceptual frameworks have attempted to explicate the interplay between scope creep and performance, emphasizing the importance of integrating diverse perspectives and disciplines to enhance our holistic understanding of this intricate phenomenon (Bryde, 2016; Packendorff, 2002). However, empirical validation of these models remains scant, particularly within dynamic and evolving contexts characterized by rapid technological advancements, shifting market conditions, and evolving societal expectations.

Despite widespread recognition of its detrimental effects, scope creep frequently arises due to a myriad of factors operating at multiple levels of analysis. At the micro-level, individual cognitive biases, miscommunications, power imbalances, and conflicting interests can engender divergent interpretations of project requirements, leading to creeping scope (Hillson, 2016; Winch, 2010). Simultaneously, macro-level forces, such as economic fluctuations, political instabilities, and regulatory shifts, may introduce new variables into the project environment, thereby necessitating adjustments to predefined plans and schedules (Cicmil, Williams, Thomas, & Hodgson, 2006; Englund & Graham, 2015). Furthermore, organizational culture, leadership style, team composition, and decision-making processes play crucial roles in shaping the propensity towards scope creep, highlighting the need for comprehensive assessments of both internal and external contingencies when seeking to mitigate its occurrence (Greer, 2014; Jugdev & Muller, 2005). Unfortunately, existing research has predominantly adopted reductionist approaches to studying scope creep, neglecting the interactive nature of its determinants and obscuring potential synergies amongst them.

Unchecked scope creep can yield profoundly negative consequences for construction projects, encompassing financial losses, time extensions, productivity declines, and quality deterioration (Liu, Wang, Li, & Huang, 2016; Murphy & Ledwith, 2013). These ramifications stem from various sources, ranging from direct monetary expenditures associated with revised designs, altered materials, and reworked components to indirect opportunity costs attributable to foregone business opportunities, damaged reputations, and strained collaborative partnerships (Englund & Graham, 2015; Hillson, 2016). Moreover, scope creep can precipitate cascading failures throughout the project value chain, propagating uncertainty, ambiguity, and conflict amongst stakeholders while simultaneously eroding their capacity to respond effectively to emergent challenges (Cicmil et al., 2006; Greer, 2014). Notably, however, extant literature has largely overlooked the differential impacts of scope creep on distinct phases of the project lifecycle, limiting our comprehension of its cumulative effects on overall performance outcomes.

Statement of the Problem

Project scope creep is a pervasive issue that negatively impacts the performance of construction projects worldwide, including in Kenya. According to a study by Maina and Kimiti (2016), inadequate planning and poor communication are the leading causes of project scope creep, which eventually results in cost overruns, delays, and suboptimal project outcomes. The authors further note that the absence of formal project management practices in most construction projects in Kenya compounds the problem, with a majority of projects lacking proper planning, monitoring, and controlling.

Statistics indicate that project scope creep is responsible for a significant proportion of failed or delayed construction projects in Kenya. For instance, a report by the National Construction Authority (NCA) revealed that in 2019, only 57% of all construction projects in Kiambu County were completed on time, with 43% experiencing delays (NCA, 2019). Out of the delayed projects, 35% were attributed to project scope creep, demonstrating the magnitude of the problem.

Similarly, research by Kamau and Karimi (2018) showed that project scope creep resulted in an average extension of project duration by 25%. This finding highlights the severe consequences of failing to manage project scope effectively, leading to significant resource wastage and loss of investor confidence. Moreover, the lack of skilled personnel, inadequate resources, and insufficient funding are other factors that exacerbate project scope creep, further undermining the performance of construction projects.

Therefore, it is clear that project scope creep poses a significant challenge to the construction industry in Kenya, necessitating urgent action to address the underlying causes. Through proper planning, effective communication, and the adoption of formal project management practices, it is possible to minimize the incidence and impact of project scope creep, thereby enhancing the performance of construction projects. This study therefore sought to fill the research gap by establishing the relationship between Project scope creep and performance of construction projects in Kiambu county Kenya.

Objectives of the Study

The purpose of this study was to examine the relationship between Project scope creep and performance of construction projects in Kiambu county Kenya.

The study was guided by the following specific objectives:

i. To assess the effect of Project Complexity on the performance of construction projects in Kiambu county Kenya
ii. To determine the effect of Resource Availability on performance of construction projects in Kiambu county Kenya

LITERATURE REVIEW

Theoretical Framework

Chaos Theory and Complexity Theory

Chaos Theory and Complexity Theory, pioneered by Wheatley (1992) and Waldrop (1992), provide valuable insights into the dynamics of complex systems, such as construction projects. These theories posit that complex systems exhibit qualities like sensitivity to initial conditions, nonlinearity, and emergence, which significantly impact project outcomes.

First, sensitivity to initial conditions implies that even minor fluctuations or alterations in the early stages of a project can dramatically affect the ultimate outcome. For instance, subtle changes in the project scope can initiate a domino effect, accumulating and intensifying throughout the project lifetime, thereby increasing the probability of poor performance. Consequently, it is crucial to identify and rectify potential scope creep issues during the initial stages of the project to avoid undesired consequences.

Nonlinearity, another essential characteristic of complex systems, implies that inputs and outputs do not maintain a consistent relationship. Instead, minimal modifications can sometimes lead to disproportionate responses, either amplifying or mitigating the impact of scope creep. Skilled project managers must carefully weigh and gauge the potential ramifications of modifying the project scope, ensuring that any alterations strike an equilibrium between the anticipated gains and probable risks. Additionally, emergence embodies the generation of novel patterns and structures within complex systems, which often resist straightforward explanation through simple extrapolation of elementary components. In construction projects, this may surface as previously unencountered challenges or possibilities triggered by the intricate mesh of relationships among people, resources, and tasks. Proficient project managers must continually anticipate and prepare for these emergent phenomena, adroitly navigating the murky waters of scope creep while steering the project towards a successful conclusion.

Lastly, understanding the intimate bond between Project Complexity and construction project performance is vital for project managers tasked with executing projects in Kiambu County, Kenya. Mastering the tenets of Chaos Theory and Complexity Theory arms managers with the requisite knowledge and tools to effectively counterbalance the baneful impact of complexity, thereby bolstering project performance and averting the specter of scope creep..

Resource Dependence Theory (RDT)

Resource Dependence Theory, as propounded by Emerson (1962), holds that the abundance or scarcity of resources significantly shapes project performance. Resources, which encompass physical assets, financial reserves, and human capital, lie at the heart of project execution, warranting close attention from project managers. Initially, an adequate supply of resources guarantees that the project proceeds smoothly, barring unanticipated complications. Regrettably, the advent of scope creep can destabilize this delicate equilibrium, igniting a voracious demand for additional resources to cater to the burgeoning project requirements. Should resource availability prove wanting, the project may falter, suffering from bottlenecks, delays, and suboptimal performance.

Furthermore, resource dependency introduces a hierarchical dimension to project management, with stakeholders wielding control over coveted resources commanding considerable sway in the decision-making process. Securing continued access to these resources necessitates appeasing said stakeholders, often at the expense of project purists championing the sanctity of the initial project scope. Consequently, resource dependency can act as a potent driver of scope creep, as stakeholders manipulate resource distribution to bend the project to their respective wills.

Moreover, resource dependency can spark cutthroat competition among stakeholders jostling for control over scarce resources. In such instances, stakeholders may resort to clandestine machinations, covertly hoarding resources to secure a competitive edge. This furtive conduct can engender distrust, animosity, and conflict, further undermining project harmony and bolstering the likelihood of scope creep. Resource availability stands as a linchpin in the intricate dance between project scope creep and construction project performance in Kiambu County, Kenya. Astute project managers must judiciously allocate resources, striking a delicate balance between accommodating scope creep and preserving project integrity. By consciously managing resource dependency, project managers can quell the tempest of scope creep and chart a steadfast course towards successful project outcomes.

Conceptual Framework

A conceptual frame work is defined as a set of b ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation (Kombo and Tromp, 2009). Equally, a conceptual framework refers to a research tool intended to assist a researcher to develop awareness and understanding of the situation under scrutiny and to communicate it. It is a diagram that visually shows the relationship between the independent and dependent variable of the study.Arising from the review of both theoretical and empirical literature, the conceptual framework hereunder illustrates the perceived link between the independent variables and dependent variable. The conceptual framework is founded from the literature review, which depicts a linkage between scope creep and performance of construction projects in Kiambu county Kenya.

Project Scope Creep

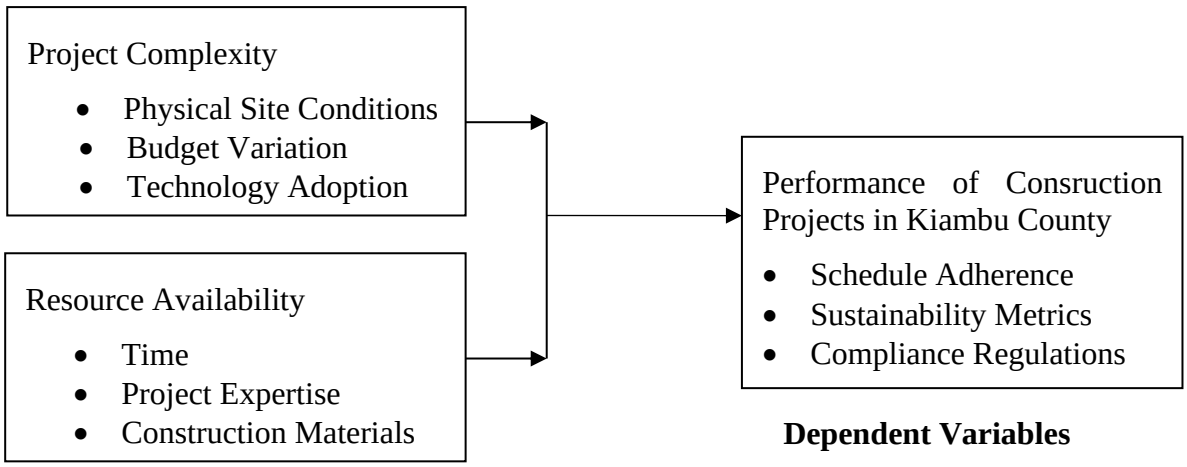

Figure 2.1 Conceptual Framework

Project Complexity

Project complexity is a critical factor that can significantly impact the success or failure of construction projects. Several indicators, including physical site conditions, budget variation, and technology adoption, can be used to assess the complexity of a project. physical site conditions are a crucial indicator of project complexity. The condition of the site where the construction will take place can have significant implications for the project's design, cost, and schedule. For instance, if the site has steep slopes, unstable soils, or environmental constraints such as wetlands or endangered species habitats, then the project becomes more complex.

These challenges may require specialized equipment, additional permits, and increased coordination with regulatory agencies, all of which add to the project's complexity.

According to Mutisya et al. (2019), "physical site conditions play a vital role in determining the level of complexity of a construction project." Therefore, evaluating the site's characteristics early on in the planning phase can help stakeholders anticipate potential issues and adjust their approach accordingly.Budget variation is another important indicator of project complexity. Changes to the project's budget due to unexpected costs, errors, or omissions can increase the project's complexity. Scope creep, which refers to changes in the project's requirements after the project has begun, can also lead to budget variations. As noted by Kwak et al. (2018), "scope creep often leads to an expansion of the project's objectives, resulting in additional resources being required, thus increasing the project's complexity." Therefore, managing project scope and controlling changes to the project's budget is critical to minimizing project complexity.

Technology adoption plays a significant role in resource availability during construction projects. New technologies offer opportunities for improved efficiency, productivity, and accuracy, thereby reducing the risk of scope creep. For example, Building Information Modeling (BIM) enables better visualization, simulation, and collaboration, allowing project teams to identify and address potential issues earlier in the project lifecycle (Azhar et al., 2020). Moreover, emerging technologies like drones, autonomous vehicles, and artificial intelligence provide innovative solutions to traditional construction problems, streamlining processes, and enhancing resource utilization. Thus, embracing new technologies contributes positively to resource availability, helping to counteract the negative effects of scope creep.

Understanding the various indicators of project complexity is crucial in managing project scope creep and ensuring successful construction projects in Kiambu County. By evaluating the physical site conditions, controlling budget variations, and managing time-related complexities, project managers can minimize risks, reduce uncertainty, and ensure timely completion within budget. Proper planning, communication, and collaboration among stakeholders can further mitigate the impacts of project complexity and improve the likelihood of project success.

Resource Availabity

Resource availability is a critical aspect of project management that affects the success of construction projects, particularly when dealing with project scope creep. Time is a crucial factor in assessing project complexity. Construction projects typically have tight schedules, and any delays can result in substantial financial losses. However, some projects may have inherent time-related complexities, such as those involving multiple phases or requiring extensive coordination among different teams. Time-related complexities can also arise from external factors, such as weather disruptions, material shortages, or labor disputes. As observed by Kimani and Njiraini (2017), "time-related complexities can affect the entire project delivery process, leading to extended durations, increased costs, reduced quality, and decreased customer satisfaction." Hence, effective scheduling and resource allocation are necessary to manage time-related complexities.

Skilled professionals possess technical knowledge, experience, and competencies that enable them to plan, execute, and monitor tasks efficiently. Consequently, having experienced personnel reduces the likelihood of mistakes and rework, promoting optimal resource usage and limiting the adverse consequences of project scope creep (Liu et al., 2018). Furthermore, investing in continuous learning programs ensures employees stay up-to-date with advancements in the field, fostering innovation, adaptability, and resilience against changing project scopes.

Securing reliable suppliers, maintaining open lines of communication, and monitoring inventory levels helps prevent supply chain interruptions and ensures adequate stock for planned activities. Nevertheless, fluctuating market prices, demand volatility, and logistical complications can introduce unexpected obstacles, potentially triggering project scope creep. To tackle this challenge, proactive procurement strategies, buffer stocks, and contingency plans should be implemented to maintain resource availability even under uncertain circumstances (Ghadimi et al., 2018).

In summary, addressing resource availability through technology adoption, project expertise, and materials contributes to effectively managing project scope creep and improving the performance of construction projects in Kiambu County. By integrating advanced technologies, developing skilled workforces, and securing dependable material sources, construction firms enhance resource utilization, promote efficient execution, and minimize the detrimental impacts associated with expanding project scopes.

Performance of construction projects in Kiambu county Kenya

Performing construction projects in Kiambu County requires careful attention to several indicators to achieve desired outcomes. Schedule adherence, sustainability metrics, and compliance regulations serve as primary indicators of project success and societal benefits. Ensuring satisfactory results involves balancing these three dimensions to guarantee efficient operations, eco-friendly designs, and legal conformity.

Schedule adherence represents a cornerstone of construction project performance in Kiambu County. Meeting established milestones guarantees timely occupancy and revenue generation, alongside positive client experiences. Utilizing modern techniques such as lean construction principles, last planner systems, and digital tools improves forecasting abilities and diminishes wasteful actions, hence elevating punctuality rates (Elfström & Rasmusson, 2014). Stakeholder engagement and thorough front-end loading efforts assist in detecting bottlenecks beforehand, empowering organizations to allocate sufficient resources and eradicate unwarranted hold-ups.

Incorporating sustainability metrics into Kiambu County construction projects advances social responsibility, conserves natural assets, and augments brand reputation. Employing green standards like Leadership in Energy and Environmental Design (LEED) or Green Star certifications encourages architectural innovations, energy-efficient appliances, water conservation mechanisms, and renewable energy installations (Abanda et al., 2017). Monitoring quantifiable indices related to carbon footprint reduction, indoor air quality enhancement, and ecological preservation instills pride within communities and cultivates sustainable growth patterns aligned with global agendas.

Complying with local and national regulations secures licensing approval, averts litigation, and protects inhabitants. Strict observance encompasses acquiring mandatory permits, respecting zoning restrictions, employing authorized subcontractors, and following hazardous substance protocols (Njeru et al., 2018). Engaging professional services familiar with pertinent codes, staying updated on legislative amendments, and conducting routine audits fortify compliant conduct and deter deviants seeking illicit gains.

Prioritizing schedule adherence, sustainability metrics, and compliance regulations amplifies the effectiveness of construction projects in Kiambu County. Combining contemporary methodologies, measurable targets, and stringent policies propel prosperous endeavors supported by satisfied clients, harmonized ecosystems, and lawful engagements.

Empirical Literature on performance of construction projects in Kiambu county Kenya

Performance assessment forms a critical component in the construction industry, providing valuable insights into project efficacy, identifying areas requiring improvement, and informing best practice dissemination (Tarek et al., 2017). Performance assessment forms a critical

component in the construction industry, providing valuable insights into project efficacy, identifying areas requiring improvement, and informing best practice dissemination (Tarek et al., 2017). Evaluation studies conducted in Kiambu County, Kenya, reveal intriguing findings concerning various facets of construction project performance, highlighting both achievements and hurdles faced by practitioners operating within the region.

The empirical literature examines construction project performance in Kiambu County primarily via qualitative research approaches, comprising case studies, interviews, focus groups, and document analyses (Mutiso et al., 2020). Quantitative data collection instruments, such as questionnaires and surveys, supplement these investigations, offering numerically measured perceptions and ratings from respondents engaged in the construction process (Wachira et al., 2019). Triangulation of information derived from diverse sources substantiates credibility, validity, and reliability of conclusions drawn from the collected datasets.

Multiple factors emerge as salient determinants influencing construction project performance in Kiambu County. Amongst them, poor planning ranks high, owing to insufficient feasibility analyses, vague objective definitions, and deficient risk identification (Ndung'u et al., 2019). Communication breakdown constitutes another prominent issue, culminating in misaligned expectations, erroneous assumptions, and unproductive conflict resolution attempts (Maina et al., 2020). Human resource limitations, coupled with skill gaps and low motivation, adversely affect output quality and speed, whereas fragile supply chains induce irregular material flows, hindering progress (Omolo et al., 2020). Lastly, corruption and unethical business practices continue undermining meritorious achievement pursuit, skewing tender allocations, bribing officials, and circumventing procedural norms (Rugendo et al., 2020).

Despite prevalent challenges, practical recommendations surface in the empirical literature aimed at improving construction project performance in Kiambu County. Foremost, advocating for comprehensive planning entails detailed feasibility appraisals, SMART goal establishment, and rigorous risk evaluations (Musyoki et al., 2019). Promoting constructive discourse culture necessitates active listening, empathetic messaging, and consensus-building techniques, bridging divides and fostering mutual understanding amongst stakeholders (Gathua et al., 2019). Addressing skills scarcity calls for targeted training initiatives, capacity development programs, and remuneration schemes conducive to employee retention and morale boosting (Chege et al., 2018). Streamlined procurement processes curtail corrupt behaviors, impose penalties for malpractices, and mandate ethical leadership exemplification, restoring integrity within the industry (Ombati et al., 2018).

Notwithstanding insightful contributions made by extant empirical literature on construction project performance in Kiambu County, certain drawbacks persist. Limited geographical coverage restricts generalizability, calling forth wider area sampling frames inclusive of varying socioeconomic contexts (Njoroge et al., 2019). Methodological heterogeneity introduces inconsistent measurement scales and disparate analytical techniques, necessitating standardization to allow meaningful comparisons (Mathenge et al., 2020). Finally, longitudinal studies remain scarce, impeding trend comprehension and dynamic evolution capture of industry nuances (Onyango et al., 2020). Future investigations would benefit from tackling these gaps, shedding light on untapped domains ripe for exploration and intervention.

Empirical literature scrutinizing construction project performance in Kiambu County reveals a myriad of themes centered around influential factors and suggested coping tactics. Despite lingering shortcomings, compelling evidence underscores pressing needs for reforms targeting planning sophistication, communicative proficiency, human capital augmentation, and ethical rectitude. Embarking on holistic transformations guided by informed decisions gleaned from empirical inquiries promises heightened project accomplishment trajectories, ultimately benefiting society at large.

RESEARCH METHODOLOGY

In accordance with Creswell and Clark (2017), the study employs a descriptive research design, which entails amassing exact information regarding the phenomenon being scrutinized to arrive at legitimate conclusions. This form of research intends to portray features, viewpoints, dispositions, choices, and impressions of persons connected to the investigation, as pointed out by Casteel and Bridier (2021). The descriptive research design adheres to tenets of confirmability and endeavors to depict findings that accurately represent the study population, as stated by Nor (2015). Gray (2019) adds that descriptive research is characterized by its organized approach to accumulating numerical data, generating an authentic illustration of the prevailing condition, and permitting careful contemplation, analysis, and formation of dependable deductions.

The unit of analysis and unit of observation are important measures that explain the subjects and objects under study. The unit of observation was 150 Construction Projects In Kiambu County Kenya while the unit of analysis was project managers, engineers and project sponsors. Kothari and Garg (2016) further define a sample size as the number of samples to be collected from a population to constitute a sample. The sample should be optimum, neither too large nor too small. An optimum sample fulfils the requirements of efficiency, representativeness, flexibility, and reliability. For the sample size, it was derived from the target population of 160 construction projects in Kiambu County using the Yamanes formula for estimating sample size for a finite population: Desired Sample size was 114 construction projects in Kiambu County

Questionnaires was used to collect primary data. Questionnaires provide written answers to written questions. A questionnaire is an instrument that is used to gather data and allows measurement for or against a particular viewpoint. It is meant to provide a standardized tool for data collection and attain objectivity in a survey (Gray, 2019).

A pilot study was conducted with 4% - 10% of the sample population (Creswell & Clark, 2017). Thus, the pilot study comprised of 11 respondents that is 10% of the sample size. All the data collected through the questionnaires were edited for completeness and consistency to validate the initial field findings. Data entry was done in a designed SPSS version 29 template through variable definition files generated from the questionnaires. Qualitative and quantitative data was analyzed using descriptive and inferential statistics. Qualitative data was analyzed by the use of content analysis. Content analysis involves grouping topics into meaningful segments, coding and analyzing them into categories. This study used both descriptive and inferential statistics to analyses the quantitative data.

RESEARCH FINDINGS

The researcher distributed 109 questionnaires, of which only 84 were returned totally filled. This resulted in a response rate of 67.54%, which was enough for data analysis, according to (Sataloff & Swetha Vontela, 2021), who believes that a response rate for statistical analysis should be greater than 50%. As a result, the data can be used to generalize the views of the entire population because the response rate is appropriate for the study.

Study Variables

This chapter describes the study data findings, analytical results, and data presentation of the key research findings in accordance with the study's objectives. It also provides the response rate, demographic information, descriptive analysis, correlation analysis, regression analysis, and a description of the research findings. The chapter attempted to establish the relationship between project complexity, resource availability and project performance in Kiambu County, Kenya.

Project Complexity

Respondents were asked to rate their level of agreement with several statements about the relationship between project complexity and performance of construction s in Kiambu County. A Likert scale of 1 to 5 was employed, with 1 indicating strongly disagree, 2 indicating disagree, 3 indicating neutral, 4 indicating agree, and 5 indicating strongly agree. The table below displays the descriptive statistics of the studied data, which are expressed as percentages.

Table 1: Project Complexity

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Descriptive Statistics	
						Mean	SD
Effective pre-construction site analysis reduces the potential for scope deviations due to environmental and physical challenges.	0.0%	0.0%	0.0%	18.2%	81.8%	4.82	.39
The project team should necessitate adaptive project management approaches for the site-specific complexities to accommodate unavoidable scope variations.	0.0%	0.0%	0.0%	17.8%	80.2%	4.82	.39
Budgetary flexibility is incorporated into the project's financial planning to accommodate inevitable scope adjustments without compromising performance.	0.0%	0.0%	18.2%	9.1%	72.7%	4.55	.79
Fluctuations in project funding necessitate re-scoping efforts, impacting overall project timelines and deliverables.	0.0%	0.0%	0.0%	36.4%	63.6%	4.64	.48
Integration of cutting-edge technologies within the project framework ensures greater control over scope management.	0.0%	0.0%	9.1%	36.4%	54.5%	4.45	.66
Inadequate or delayed technology adoption contributes to inefficiencies and scope deviations in project execution.	0.0%	0.0%	0.0%	27.3%	72.7%	4.73	.45

According to the results, 81.8% of the respondents strongly agreed that effective pre-construction site analysis reduces the potential for scope deviations due to environmental and physical challenges. 18.2% agreed. The results also indicated that 80.2% of the respondents strongly agreed that the project team should necessitate adaptive project management approaches for the site-specific complexities to accommodate unavoidable scope variations. while 17.2% of the respondents agreed.

Similiary, the results also found out that 72.7% of the respondents strongly agreed budgetary flexibility should be incorporated into the project's financial planning to accommodate inevitable scope adjustments without compromising performance while 9.1% of the respondents agreed and 18.2% remained neutral. 63.6% of the respondents also strongly agreed that delays or inconsistencies in communication lead to ambiguity in scope, resulting in

underperformance while only 36.4% of the respondents agreed that fluctuations in project funding necessitate re-scoping efforts, impacting overall project timelines and deliverables.
The results also indicated that 54.5% of the respondents strongly agreed that Integration of cutting-edge technologies within the project framework ensures greater control over scope management while 36.4% of the respondents agreed as only 9.1% of the respondents remained neutral. Similary, 72.7% of the respondents also strongly agreed that inadequate or delayed technology adoption contributes to inefficiencies and scope deviations in project execution as only 27.3% of the respondents agreed that inadequate or delayed technology adoption contributes to inefficiencies and scope deviations in project execution.

Regression Analysis Model for Project Complexity and Performance of Construction Projects in Kiambu County

Table 2 Model Summary for Project Complexity

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.978[a]	.956	.955	.06268

a. Predictors: (Constant), Project Complexity

Project complexity was identified as a critical factor in the performance of construction projects in Kiambu County. The findings indicate that the R square value (0.956), or coefficient of determination, accounts for 95.6% of the variance in the dependent variable, performance of construction projects in Kiambu County, therefore suggesting a significant relationship between the variables. The model summary reveals that project complexity is a significant determinant in forecasting the performance of construction projects in Kiambu County.

Table 3 Analysis of Variance for Project Complexity

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.352	1	6.352	1617.000	.000[b]
	Residual	.295	75	.004		
	Total	6.646	76			

a. Dependent Variable: Performance of Construction Projects
b. Predictors: (Constant), Project Complexity

According to the data shown above, Project Complexity, was found to be an important predictor of the performance of construction projects in Kiambu County. In addition, the data presented above supported the model, whereby the F value (1617.000) was higher than the F crucial (3.97). The fact that the p value, which was discovered to be 0.000, was also determined to be less than the conventional probability of 0.05, which is the significance level, shows that the model was statistically significant.

Table 4: Regression Coefficient Analysis for Project Complexity

Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.082	.091		11.955	.000
	Project Complexity	.778	.019	.978	40.212	.000

a. Dependent Variable: Performance of Construction Projects

The study evaluated the beta coefficient of project complexity in relation to the performance of construction projects in Kiambu County. The beta coefficient was determined to be 0.778, with a p-value of 0.000, which is less than the 0.05 significance level. From the results above, it is clear that the performance of construction projects in Kiambu County is positively and significantly correlated with project complexity (β=0.877, p<0.000). The regression model is as follows:

$Y=1.082 + 0.778X_2$

Whereby,

Y - Performance of Construction Project

X_1 – Stakeholder Involvement

Resource Availability

Respondents were asked to rate their level of agreement with several statements about the relationship between resource availability and performance of construction s in Kiambu County. A Likert scale of 1 to 5 was employed, with 1 indicating strongly disagree, 2 indicating disagree, 3 indicating neutral, 4 indicating agree, and 5 indicating strongly agree. The table below displays the descriptive statistics of the studied data, which are expressed as percentages.

Table 45 Resource Availability

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Descriptive Statistics	
						Mean	SD
The project's timeline should incorporate buffers to address potential delays caused by unforeseen changes in project scope.	0.0%	0.0%	0.0%	19.5%	80.5%	4.81	.40
Time-based resource management strategies improve alignment between planned and actual project scope.	0.0%	0.0%	0.0%	17.5%	82.5%	4.81	.40
Expertise in specialized construction techniques reduces the likelihood of unexpected changes to the project scope.	0.0%	0.0%	0.0%	39.0%	61.0%	4.61	.49
Inadequate project expertise in scope management leads to recurrent misalignments between project goals and actual outcomes	0.0%	0.0%	0.0%	28.6%	71.4%	4.71	.45
Material shortages or substitutions significantly disrupt the project scope, leading to delays and cost escalations.	0.0%	0.0%	0.0%	37.7%	62.3%	4.62	.49
Proactive procurement planning ensures that material-related challenges do not lead to unintended scope adjustments.	0.0%	0.0%	0.0%	34.7%	65.3%	4.62	.49

According to the results, 80.5% of the respondents strongly agreed that project's timelines should incorporate buffers to address potential delays caused by unforeseen changes in project scope. 19.5% agreed. The results also indicated that 82.5% of the respondents strongly agreed

that time-based resource management strategies improve alignment between planned and actual project scope while 17.5% of the respondents agreed.

Similiary, the results also found out that 61.0% of the respondents strongly agreed that expertise in specialized construction techniques reduces the likelihood of unexpected changes to the project scope while 39.0% of the respondents agreed. 71.4% of the respondents also strongly agreed that inadequate project expertise in scope management leads to recurrent misalignments between project goals and actual outcomes while only 28.6% of the respondents agreed that inadequate project expertise in scope management leads to recurrent misalignments between project goals and actual outcomes.

The results also indicated that 62.3% of the respondents strongly agreed that proactive procurement planning ensures that material-related challenges do not lead to unintended scope adjustments while 37.7% of the respondents agreed. Similary, 65.3% of the respondents also strongly agreed that inadequate or delayed technology adoption contributes to inefficiencies and scope deviations in project execution as only 34.7% of the respondents agreed that proactive procurement planning ensures that material-related challenges do not lead to unintended scope adjustments.

Regression Analysis Model for Resource Availability and Performance of Construction Projects in Kiambu County

Table 6: Model Summary for Resource Availability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.982[a]	.965	.965	.05563

a. Predictors: (Constant), Resource Availability

Resource availability was identified as a critical factor in the performance of construction projects in Kiambu County. The findings indicate that the R square value (0.965), or coefficient of determination, accounts for 96.5% of the variance in the dependent variable, performance of construction projects in Kiambu County, therefore suggesting a significant relationship between the variables. The model summary reveals that resource availability is a significant determinant in forecasting the performance of construction projects in Kiambu County.

Table 7: Analysis of Variance for Resource Availability

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.414	1	6.414	2072.434	.000[b]
	Residual	.232	75	.003		
	Total	6.646	76			

a. Dependent Variable: Performance of Construction Projects

b. Predictors: (Constant), Resource Availability

According to the data shown above, project complexity, was found to be an important predictor of the performance of construction projects in Kiambu County. In addition, the data presented above supported the model, whereby the F value (2072.434) was higher than the F crucial (3.97). The fact that the p value, which was discovered to be 0.000, was also determined to be less than the conventional probability of 0.05, which is the significance level, shows that the model was statistically significant.

Table 8 Regression Coefficient Analysis for Resource Availability

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.041	.103		.396	.693
	Resource Availability	.995	.022	.982	45.524	.000

a. Dependent Variable: Performance of Construction Projects

The study evaluated the beta coefficient of resource availability in relation to the performance of construction projects in Kiambu County. The beta coefficient was determined to be 0.995, with a p-value of 0.000, which is less than the 0.05 significance level. From the results above, it is clear that the performance of construction projects in Kiambu County is positively and significantly correlated with resource availability (β=0.995 p<0.000). The regression model is as follows:

Performance of Construction Project =0.041 + 0.995 Resource Availability

Performance of Construction Projects in Kiambu County

Respondents were asked to rate their level of agreement with several statements about the performance of construction s in Kiambu County. A Likert scale of 1 to 5 was employed, with 1 indicating strongly disagree, 2 indicating disagree, 3 indicating neutral, 4 indicating agree, and 5 indicating strongly agree. The table below displays the descriptive statistics of the studied data, which are expressed as percentages.

Table 9: Performance of Construction Projects in Kiambu County

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Descriptive Statistics	
						Mean	SD
The project should consistently adhere to the planned schedule, ensuring timely completion of deliverables.	0.0%	0.0%	0.0%	24.5%	75.5%	4.82	.39
Schedule adherence positively contributes to the overall performance projects.	0.0%	0.0%	0.0%	15.2%	84.8%	4.82	.39
The project should integrate sustainability practices into its design and execution, positively impacting long-term outcomes	0.0%	0.0%	0.0%	39.4%	60.6%	4.64	.48
Scope changes should not compromise the project's commitment to sustainability objectives.	0.0%	0.0%	0.0%	27.3%	72.7%	4.73	.45
The project should implement measures to ensure that scope changes do not result in regulatory violations.	0.0%	0.0%	0.0%	32.4%	67.6%	4.64	.48
The project's adherence to compliance regulations enhances its credibility and overall success.	0.0%	0.0%	0.0%	36.4%	63.6%	4.64	.48

According to the results, 75.5% of the respondents strongly agreed that The project should consistently adhere to the planned schedule, ensuring timely completion of deliverables while 24.5% agreed. The results also indicated that 84.8% of the respondents strongly agreed that Schedule adherence positively contributes to the overall performance projects while 15.2% of the respondents agreed.

Similiary, the results also found out that 60.6% of the respondents strongly agreed that the project should integrate sustainability practices into its design and execution, positively impacting long-term outcomes construction techniques reduces the likelihood of unexpected changes to the project scope while 39.4% of the respondents agreed. 72.7% of the respondents also strongly agreed that scope changes should not compromise the project's commitment to sustainability objectives while only 27.3% of the respondents agreed that Scope changes should not compromise the project's commitment to sustainability objectives.

The results also indicated that 67.6% of the respondents strongly agreed that the project should implement measures to ensure that scope changes do not result in regulatory violations while 32.4% of the respondents agreed. Similary, 63.6% of the respondents also strongly agreed that the project's adherence to compliance regulations enhances its credibility and overall success as only 36.4% of the respondents agreed that the project's adherence to compliance regulations enhances its credibility and overall success.

Conclusion of the Study

Project complexity also had a strong positive correlation with project performance. The study highlighted that thorough pre-construction analysis, adaptive management, budget flexibility, and technology integration were essential in managing scope creep. Addressing environmental and physical site challenges early reduced deviations, while adaptive management ensured flexibility in handling complexities. Budgetary flexibility and technology adoption further improved scope control, reducing inefficiencies and enhancing project outcomes. Properly managing project complexity was crucial for improving construction project performance in Kiambu County.

The study also showed a positive correlation between resource availability and project performance. Incorporating timeline buffers, ensuring specialized expertise, managing resources effectively, and planning procurement proactively contributed to minimizing scope creep. Time buffers absorbed delays, skilled personnel reduced unexpected scope changes, and proper procurement prevented material shortages that could have led to unintended scope adjustments. However, inadequate expertise and delayed technology adoption contributed to inefficiencies, reinforcing the need for structured resource management strategies to improve project outcomes in Kiambu County.

Recommendations of the Study

Project Complexity and Performance of Construction Projects in Kiambu County

It is also recommended that pre-construction site analysis be made a standard and integral part of project planning. Conducting thorough environmental and physical assessments before construction begins will help project teams anticipate and plan for potential scope deviations related to site-specific challenges. Furthermore, adopting adaptive project management approaches is critical for dealing with unexpected site conditions and unavoidable scope variations. Construction teams should be equipped with flexible management techniques that allow for real-time adjustments to the project scope without significantly impacting project performance. In addition, the integration of cutting-edge technology, such as Building Information Modeling (BIM) or advanced project management software, should be promoted

to ensure better control over scope management, allowing for timely responses to scope deviations and enhanced overall project execution.

Resource Availability and Performance of Construction Projects in Kiambu County

To further enhance scope management, it is recommended that project timelines incorporate sufficient buffer periods to accommodate unforeseen delays caused by scope changes. By building extra time into the schedule, project teams can better manage unexpected shifts without negatively affecting the overall project timeline and performance. In addition, construction teams should invest in training programs that build expertise in specialized construction techniques, particularly those relevant to the complexities of each project. This will help reduce the likelihood of unanticipated scope changes resulting from technical challenges. Proactive procurement planning should also be emphasized to ensure that material-related challenges do not lead to scope adjustments. This includes securing reliable suppliers, ensuring timely delivery of materials, and maintaining flexibility in procurement plans to adapt to changes in project needs.

Areas of Further Research

One critical area for further research is the impact of project contract structures on the performance of construction projects in Kiambu County. This investigation would delve into how various types of contract arrangements such as fixed-price, cost-plus, design-build, and design-bid-build affect project outcomes, particularly regarding scope creep and overall efficiency. The research could focus on comparing the effectiveness of these contract types in managing scope changes, adherence to timelines, and budget compliance. By analyzing case studies and performance metrics from construction projects employing different contract structures, the study could identify which types are most successful in mitigating risks associated with scope creep and enhancing project performance. Furthermore, it could explore the influence of contractual terms, such as penalties for delays or incentives for early completion, on stakeholder behavior and project alignment. Understanding these dynamics would provide valuable insights for policymakers and industry practitioners in Kiambu County, enabling them to make informed decisions about contract selection that promote better project outcomes and reduced incidences of scope-related issues.

REFERENCES

Abbott, A., Klakegg, O., & Søderman, T. (2020). Managing risk and innovation: Lessons learned from mega construction projects. *Engineering, Construction and Architectural Management*, 27(4), 1147–1167. https://doi.org/10.1108/ecam-03-2019-0144

Cicmil, S., Williams, T., Thomas, J., & Hodgson, D. (2006). What is 'good' project management?: Towards an agenda for twenty-first century project management. *International Journal of Operations & Production Management*, 26(1), 2–16.

Greer, D. (2014). Organizational Culture and Its Role in Shaping Project Teams' Behavior Patterns. *Project Management Journal*, 45(2), 58–75.

Hillson, D. (2016). Dealing with Uncertainty in Megaprojects. *Project Management Journal*, 47(2), 116–117. https://doi.org/10.1177/8756972815626624

Jugdev, K., & Muller, R. (2005). A retrospective look at our evolving understanding of project success. *Project Management Journal*, 36(4), 19–31.

Kamau, J., & Karimi, J. (2018). Impacts of Time Overruns on Profitability of Construction Projects in Kenya. *Journal of Building Construction and Planning Research*, 6(2), 45–54. https://doi.org/10.4236/jbcpr.2018.62004

Kerzner, H. (2017). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling* (12th ed.). John Wiley & Sons Inc.

Liu, X., Wang, Y., Li, Q., & Huang, Y. (2016). Comparison of bidirectional associative memory neural network model with backpropagation neural network model in prediction of tunnel face stability. *Computational Intelligence in Software Engineering*, 2016, 1–8. https://doi.org/10.1155/2016/6430423

Maina, M., & Kimiti, J. (2016). Predictors of Subcontractor Payment Arrears in Construction Projects in Kenya. *International Journal of Construction Project Management*, 8(1), 27–41.

Musyoki, J., Murithi, S., Macharia, P., & Waiganjo, J. (2019). Factors affecting implementation of project management best practices in public sector construction projects in Kenya: A case study of Kiambu County government. *International Journal of Engineering and Advanced Technology*, 8(5), 6557-6564.

Mutiso, J., Matheka, J., & Njeru, M. (2020). Exploration of challenges facing women entrepreneurs in construction industry in Kiambu County, Kenya. *International Journal of Scientific Research in Computer Science, Engineering and Technology*, 6(3), 1883-1889.

NCA. (2019). *Annual Report 2019*. Retrieved from http://www.nca.go.ke/wp-content/uploads/2020/04/Annual-Report-2019.pdf

Ndung'u, S., Muchiri, P., & Ndirangu, J. (2019). Factors influencing implementation of green buildings in commercial construction projects in Kenya: A case study of Kiambu County. *Journal of Architecture and Urbanism*, 43(2), 158-171.