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How Does Project Schedule Management Dimension Influence Building Construction Project Performance? Evidence from County Governments in Kenya

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Abstract

Purpose: Effective project schedule management is widely recognized as a critical determinant of construction project success. However, the performance of county government building construction projects in Kenya has traditionally been assessed using the "iron triangle" of time, cost, and scope, with limited attention given to post-completion outcomes such as stakeholder satisfaction, benefits realization, and strategic performance. Consequently, many completed public infrastructure projects have failed to deliver their intended socio-economic benefits despite being completed within planned project constraints. This study examined the effect of project schedule management on the performance of county government building construction projects in Kenya, while also assessing the moderating influence of the project regulatory framework.

Materials and Methods: The study was anchored on complexity theory, theory of constraints, and project management competency theory. The study adopted a mixed-methods research design integrating quantitative and qualitative approaches. A census of 200 respondents drawn from selected county government building construction projects was conducted, yielding 189 valid responses (94.5% response rate). Data were collected using structured questionnaires and analyzed using descriptive statistics, Pearson correlation analysis, and regression analysis.

Findings: The findings revealed that project schedule management has a positive and statistically significant effect on the performance of county government building construction projects ($\beta = 0.323$, $p < 0.001$), explaining 12.6% of the variation in project performance ($R^2 = 0.126$). Effective activity sequencing, duration estimation, schedule development, and schedule monitoring enhanced stakeholder satisfaction, benefits realization, and strategic performance. The estimated regression model was $Y =$

$3.702 + 0.323X_1$. The findings provide evidence that improvements in schedule management are associated with improved performance of county government building construction projects. Furthermore, the project regulatory framework significantly moderated the relationship between project schedule management and project performance ($\beta = 0.292$, $p = 0.044$), demonstrating that compliance with regulatory requirements strengthens the effectiveness of schedule management practices.

Implications to Theory, Practice, and Policy: The study extends the Kenyan public-construction literature by examining schedule management against a broader conception of project performance that incorporates stakeholder satisfaction, benefits realization and strategic performance rather than relying exclusively on the traditional time-cost-scope measures. The findings emphasize the importance of treating scheduling as an integrated project-management capability involving realistic activity sequencing, duration estimation, schedule development and continuous monitoring. The implications of the study are threefold: theoretically, it strengthens the application of Systems Theory to project scheduling; practically, it provides project managers with specific scheduling practices for improving implementation; and from a policy perspective, it supports stronger institutionalization of schedule planning, monitoring, coordination and accountability within county-government construction governance

Keywords: *Project Schedule Management, Project Performance, County Government, Building Construction Projects, Project Regulatory Framework, Stakeholder Satisfaction, Benefits Realization, Strategic Performance*

Codes of Classification: *L74 and H83*

INTRODUCTION

The construction industry is a major contributor to economic growth, employment creation, urban development and infrastructure modernization globally. Governments and private organizations continue to invest substantially in transport systems, healthcare facilities, educational institutions, commercial buildings, energy infrastructure and affordable housing. However, construction projects continue to experience schedule delays, cost escalation, scope changes, inadequate stakeholder engagement and failure to realize intended socio-economic benefits. These challenges underscore the importance of effective project management throughout the project life cycle.

Contemporary project management has evolved beyond the traditional “iron triangle” of time, cost and scope. The Project Management Institute (PMI, 2021, 2024) emphasizes value creation, stakeholder satisfaction, benefits realization and alignment with organizational strategy as important measures of project success. Similarly, the International Project Management Association (IPMA, 2023) emphasizes the integration of technical competence, leadership, behavioural competence and contextual understanding. Effective project management therefore requires appropriate schedule management, supported by effective governance, stakeholder engagement and continuous monitoring.

Globally, construction productivity continues to be affected by fragmented project delivery, inadequate planning and coordination, rework and inefficient resource utilization. Emerging technologies, including Building Information Modelling (BIM), Artificial Intelligence, digital twins, cloud-based collaboration platforms and data analytics, provide opportunities to improve planning, progress monitoring, decision-making, communication and risk management. Nevertheless, persistent performance challenges demonstrate the need for integrated project management approaches that focus not only on completing projects within time, cost and scope but also on achieving sustainable benefits and stakeholder value.

Across African public construction projects, performance challenges tend to arise from interconnected institutional, financial, technical and administrative constraints rather than from isolated project-management deficiencies. Common problems include delays in public procurement, late release of project funds, inadequate project-management capacity, weak monitoring and reporting systems, limited access to reliable project information, and coordination difficulties among government agencies, contractors and other stakeholders. Although the severity of these constraints varies across countries, their cumulative effect is often manifested in schedule slippage, cost escalation, scope changes, incomplete facilities and reduced realization of intended project benefits.

In the Kenyan county-government context, these regional challenges are particularly relevant because county building projects operate within decentralized public-finance, procurement and regulatory systems in which timely planning, budgeting, procurement, implementation and monitoring must function as an integrated process. Consequently, weaknesses in any of these interconnected processes can undermine project performance and provide a strong rationale for examining specific project-management dimensions, particularly schedule management, within county government building construction projects. The Bungoma County Milk Processing Plant in Webuye provides an illustration of this challenge. Although the facility was completed at an estimated cost of approximately KSh 141 million and complementary investments were undertaken, the plant has remained non-operational for several years. Consequently, anticipated benefits such as value addition, employment creation, increased farmer incomes, expansion of dairy markets and local economic development have not been fully realized. This demonstrates that physical completion of a construction project does not necessarily translate into stakeholder satisfaction, benefits realization or strategic performance.

Recent Kenyan studies indicate that effective project management dimensions can improve construction project performance. Consequently, project performance in county governments should be assessed more broadly than compliance with time, cost and scope. Successful county construction projects should demonstrate stakeholder satisfaction, realization of intended socio-economic benefits, improved service delivery and strategic performance, aligned with County Integrated development plans (CIDPs), contribution to the Bottom-up economic transformation agenda (BETA), public confidence and sustainable value creation.

Although previous studies have examined factors influencing construction project performance in Kenya, many have focused on individual project management practices or relied primarily on the traditional iron triangle. Limited empirical evidence exists on the influence of project schedule management, on the broader performance of county government building construction projects, particularly when performance is measured through stakeholder satisfaction, benefits realization and strategic performance. Furthermore, the moderating influence of the project regulatory framework remains inadequately explored. This study therefore seeks to address this knowledge gap by examining the effect of project schedule management dimension on the performance of county government building construction projects in Kenya.

Statement of the Problem

Despite substantial public investment in infrastructure since the introduction of devolution in 2013, the performance of many county government building construction projects in Kenya remains a major concern. The problem is that many projects are completed within the constraints of time, cost and scope and are abandoned, underutilized or remain non-operational after completion, thereby failing to deliver the intended benefits and value to citizens.

The problem affects several groups. Citizens and local communities are affected because they fail to receive the services, employment opportunities and socio-economic benefits promised through public infrastructure projects. Taxpayers are affected through inefficient utilization of public resources and poor value for money. County governments experience reduced revenue, increased costs, stalled development programmes and diminished public confidence. Farmers, traders and other intended beneficiaries may also lose anticipated economic opportunities when completed projects fail to become operational. For example, the Bungoma County Milk Processing Plant, constructed at an estimated cost of approximately KSh 141 million, remained non-operational years after completion, denying farmers and the local community the anticipated benefits of value addition, employment creation, improved incomes and economic growth. Similarly, evidence from Mombasa and Kiambu counties demonstrates that poorly performing construction projects can result in failure to achieve intended outcomes, reduced returns, insecurity, congestion, poor sanitation and reduced functionality of public facilities.

It is therefore important to conduct this study because there is limited empirical evidence on the effect of project schedule management, on the long-term performance of county government building construction projects in Kenya. There is also limited understanding of whether the project regulatory framework moderates this relationship. Without such evidence, county governments and policymakers may continue implementing projects without adequate knowledge required to improve stakeholder satisfaction, business value and project efficiency after completion. Ultimately, the study seeks to contribute to the delivery of functional, sustainable and value-generating county infrastructure projects that achieve their intended socio-economic and strategic development objectives.

Objectives

This study was guided by the following objectives:

- i. To determine the effect of project schedule management dimension on performance of county government building construction projects in Kenya.
- ii. To determine the moderating effect of Project regulatory framework as a moderator on the relationship between project management dimensions and the performance of county government building construction projects in Kenya

Research Hypotheses

This study was guided by the following null hypothesis:

H0₁ Project schedule management dimension does not have a significant effect on

H0₂ Project regulatory frameworks don't have a significant moderating effect on the relationship between project management dimensions and the performance of county government building construction projects in Kenya

LITERATURE REVIEW

Theoretical framework

This study is anchored on three complementary theories that explain how project schedule management dimension influence the performance of county government building construction projects in Kenya. The theories include complexity theory, theory of constraints, and project management maturity theory. Together, these theories provide a comprehensive understanding of how project schedule management affect project performance measured through stakeholder satisfaction, benefits realization, and strategic performance.

Complexity Theory

Complexity theory originated from the works of scholars such as Warren Weaver and later evolved through contributions by researchers including Stacey (1996), Morris (1987), and Baccarini (1996). The theory argues that projects operate within complex and dynamic environments characterized by uncertainty, interdependence, emergence, and continuous change. According to the theory, project outcomes cannot always be predicted because numerous interacting variables influence project implementation.

Recent project management literature recognizes construction projects as complex adaptive systems where stakeholders, technologies, regulations, resources, and environmental factors interact continuously (Florice et al., 2023). Building construction projects undertaken by county governments involve multiple actors including contractors, consultants, county officials, community members, regulators, and financiers. The interactions among these actors often create uncertainty that influences project schedule performance. The Project Management Institute (PMI, 2021) acknowledges that modern projects operate in environments characterized by volatility, uncertainty, complexity, and ambiguity (VUCA). Complexity Theory therefore supports the need for flexible schedule management.

In Kenya, county government projects are frequently affected by changing political priorities, procurement delays, stakeholder conflicts, budget reallocations, and regulatory requirements. These factors create complexity that may significantly affect project performance. Despite its usefulness, complexity theory has been criticized for providing limited practical guidance regarding specific management interventions. The theory explains why complexity exists but does not prescribe precise

mechanisms for controlling it. Nevertheless, it remains relevant because county government building projects operate in highly dynamic environments where uncertainty is unavoidable.

Effective management of project schedule dimensions enables project teams to navigate complexity and enhance stakeholder satisfaction, benefits realization, and strategic performance.

The theory is applicable to this study because it explains how effective management of schedule dimension can improve project performance despite environmental uncertainties.

Theory of Constraints

The Theory of Constraints was developed by Eliyahu M. Goldratt in 1984. The theory argues that every system contains at least one constraint that limits its overall performance. Organizational performance can therefore be improved by identifying and managing the most critical constraint. The theory proposes five improvement steps: Identify the constraint, Exploit the constraint, Subordinate other activities to the constraint, Elevate the constraint and Repeat the process continuously.

Recent project management studies demonstrate that constraints in construction projects frequently arise from inadequate funding, procurement delays, shortage of skilled personnel, regulatory bottlenecks, and stakeholder conflicts (Mabin & Balderstone, 2023).

Within schedule management, TOC is operationalized through Critical Chain Project Management (CCPM), which focuses on managing resource constraints and reducing schedule delays.

County government construction projects often face constraints related to funding disbursement, procurement approvals, contractor performance, and regulatory compliance. Effective identification and management of these constraints can significantly improve stakeholder satisfaction, benefits realization, and strategic performance.

The theory is particularly relevant because it provides a practical framework for improving project performance through systematic identification and management of bottlenecks.

Maturity theory

Maturity theory is a multi-author concept developed through contributions by scholars such as Greiner, Crosby, Humphrey, and later institutional models like PMI's OPM3.

Maturity theory posits that organizations evolve through identifiable and sequential stages of development characterized by increasing levels of structure, control, integration, and optimization. Typical maturity levels include: Initial (Ad hoc), repeatable, defined, managed, and level five of optimizing

These levels reflect a transition from informal and reactive management to systematic, data-driven, and continuously improving practices. At early maturity stages, performance is measured by time and budget adherence. At advanced stages, measurement includes value creation, return on investment (ROI), stakeholder satisfaction, and benefits realization. Empirical studies consistently demonstrate a positive correlation between maturity theory and project performance rates, and schedule predictability

While maturity theory provides a structured developmental model, it has been critiqued for: Assuming linear progression, overemphasizing formalization. limited adaptability in agile or highly dynamic environments.

However, maturity theory is applicable to project schedule management dimension as a diagnostic and developmental framework. It enables organizations to: assess current capability levels, identify gaps across governance, processes, people, tools, risk, and performance, implement structured improvement roadmaps, and enhance strategic value delivery.

Conceptual Framework

A Conceptual framework is a diagrammatical research tool that assists the researcher to develop awareness and understanding of the situation under scrutiny (Kandampully & Tingting, 2019).

Independent Variable **Moderating Variable**

Dependent Variable

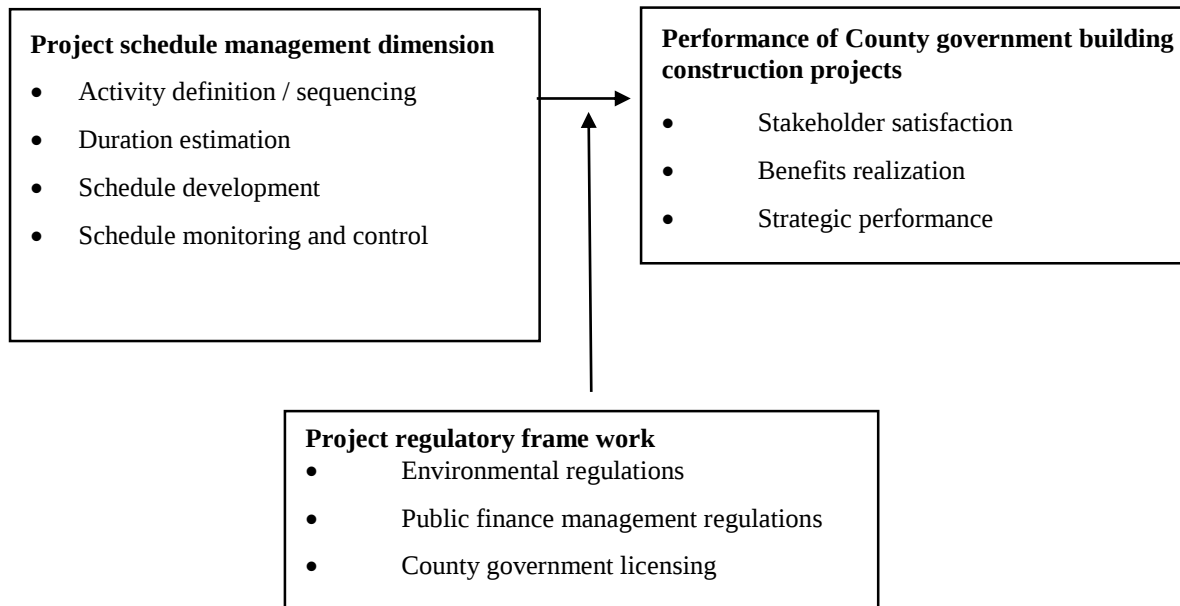


Figure 1: Conceptual Framework

In the above conceptual framework, project schedule management dimension is independent variables. On the other hand, performance of county government building construction project is the dependent variable measured on the basis of impact on customer, benefits realization and strategic performance. The moderating variable that influences the relationships is the Project regulatory framework narrowed down to environmental regulations, public finance management regulations and county government licensing.

Project Schedule Management Dimension

Project schedule management refers to the processes required to ensure that project activities are planned, sequenced, scheduled, monitored, and controlled to facilitate timely completion of a project. According to the Project Management Institute, project schedule management comprises activity definition, activity sequencing, duration estimation, schedule development, and schedule control. The PMBOK Guide (7th Edition) emphasizes that schedule management should not merely focus on meeting deadlines but also on delivering value through effective planning, resource coordination, and continuous monitoring throughout the project life cycle. Effective schedule management enables project managers to optimize resource utilization, minimize delays, manage dependencies among project activities, and respond proactively to emerging risks.

In public sector construction projects, schedule management is particularly important because implementation delays often trigger cost overruns, contractual disputes, disruption of public services, and reduced stakeholder confidence. County government building construction projects are especially vulnerable to delays arising from procurement bottlenecks, funding interruptions, political interference,

lengthy approval processes, land acquisition challenges, and contractor performance. Consequently, robust scheduling practices are essential for ensuring efficient delivery of public infrastructure.

The present study operationalizes the project schedule management dimension using four indicators: activity sequencing, duration estimation, schedule development, and schedule monitoring and control.

Activity sequencing involves establishing logical relationships among project activities to facilitate efficient workflow. Duration estimation entails determining the time required to complete individual project activities based on available resources and anticipated constraints. Schedule development integrates project activities, resource availability, milestones, and dependencies into an achievable implementation timetable. Schedule monitoring and control involve tracking project progress, identifying schedule variances, implementing corrective actions, and updating schedules to reflect changing project conditions.

Recent empirical evidence from Kenya demonstrates the significant influence of schedule management on construction project performance. Mogoa and Muchelule (2023), in a study of construction projects in Mombasa County, found that effective task sequencing, dependency mapping, use of Gantt charts, critical path analysis, and continuous communication of project schedules significantly improved project performance. The study concluded that systematic scheduling of project resources before project commencement enhanced timely completion, efficient resource utilization, and project quality. It further recommended strengthening project scheduling competencies and adopting modern scheduling tools across construction projects.

Similarly, Gangla et al, (2025) examined project management practices and the performance of building projects in Migori, Homabay, and Kisii counties. Their findings established that project schedule management had a statistically significant positive influence on project performance ($\beta = 0.298$, $p = 0.001$), indicating that projects with realistic schedules, continuous monitoring, and well-coordinated implementation achieved better outcomes in terms of timeliness, budget compliance, and quality. The study further observed that schedule management, together with planning and monitoring, contributed substantially to improved performance of county government building projects.

The importance of schedule management is further reinforced by Kenya's regulatory framework governing public investment. The Public Finance Management (Public Investment Management) Regulations, 2022 require accounting officers and project implementation teams to ensure that public investment projects are delivered according to approved implementation plans, monitored against milestones, and reported regularly through the Public Investment Management Information System. The Regulations also require project implementation teams to identify implementation delays, assess emerging risks, and recommend corrective actions, thereby institutionalizing schedule monitoring and control within public sector projects. Despite these regulatory requirements, delays remain common in county government construction projects due to weak planning, inadequate coordination, delayed disbursement of funds, procurement inefficiencies, contractor capacity limitations, and political interference. These challenges negatively affect project completion, increase implementation costs, and delay realization of intended public benefits. Although existing Kenyan studies consistently demonstrate that project schedule management improves project implementation, most have measured project performance using traditional indicators such as time, cost, and quality. Limited attention has been given to examining how schedule management influences broader performance dimensions, including stakeholder satisfaction, benefits realization, and strategic performance, particularly within county government building construction projects. This represents an important empirical gap that the present study seeks to address by examining the effect of project schedule management on the long-term performance of county government building construction projects in Kenya.

Performance of County Government Building Construction Projects in Kenya

Project performance refers to the extent to which a project achieves its intended objectives and delivers sustainable value to stakeholders. Contemporary project management literature recognizes that project performance extends beyond the traditional measures of completing projects within time, cost, and scope constraints to include the realization of intended benefits, stakeholder satisfaction, and contribution to organizational strategic objectives. According to the Project Management Institute (PMI, 2021), project success should be evaluated based on the value delivered to stakeholders and the achievement of expected project outcomes throughout the project life cycle. Similarly, ISO 21502:2020 emphasizes that successful projects should create sustainable organizational and societal value by delivering the intended outputs, outcomes, and long-term benefits.

Historically, project performance was measured using the "iron triangle" comprising schedule adherence, cost compliance, and scope or quality achievement. While these indicators remain important measures of project implementation efficiency, they are insufficient for evaluating the effectiveness of public sector construction projects whose primary objective is to improve public service delivery and socio-economic development. Modern project management therefore advocates multidimensional performance measures that capture both implementation efficiency and post-completion value creation (PMI, 2021).

County government building construction projects in Kenya are undertaken to improve access to devolved public services through the construction of hospitals, administrative offices, markets, vocational training centres, stadiums, and other public infrastructure. Consequently, project performance should be assessed not only by whether the projects are completed efficiently but also by whether they satisfy stakeholders, realize anticipated development benefits, and contribute to county development priorities as articulated in County Integrated Development Plans (CIDPs), the Bottom-Up Economic Transformation Agenda (BETA), and Kenya Vision 2030.

The present study operationalizes the performance of county government building construction projects using three indicators: stakeholder satisfaction, benefits realization, and strategic performance.

Stakeholder satisfaction refers to the extent to which completed projects meet the expectations and requirements of key stakeholders, including project beneficiaries, county governments, contractors, consultants, regulatory agencies, and local communities. Stakeholder satisfaction reflects perceptions regarding project quality, usability, accessibility, transparency, accountability, and responsiveness to community needs. Effective stakeholder engagement throughout the project life cycle enhances project acceptance, ownership, and sustainability. Recent evidence from Kenya indicates that stakeholder management significantly improves the performance of county government-funded construction projects by strengthening communication, participation, trust, and alignment between project objectives and community expectations.

Benefits realization refers to the extent to which completed projects achieve their intended economic, social, institutional, and service delivery outcomes after completion. Unlike traditional project success measures that focus on implementation efficiency, benefits realization evaluates whether projects generate measurable improvements in public service delivery, operational efficiency, socio-economic development, and citizens' well-being. The PMBOK® Guide (7th Edition) identifies benefits realization as a critical component of project governance because projects are undertaken primarily to create value rather than merely produce deliverables. In county governments, benefits realization includes improved healthcare access, enhanced administrative efficiency, increased educational opportunities, expanded market infrastructure, and improved public service delivery resulting from completed building projects.

Strategic performance refers to the extent to which completed projects contribute to the long-term strategic objectives of county governments and national development priorities. Strategic performance evaluates the alignment between completed projects and broader development agendas, including County Integrated Development Plans (CIDPs), sector strategic plans, Kenya Vision 2030, and the Bottom-Up Economic Transformation Agenda (BETA).

Recent empirical evidence from Kenya supports the adoption of broader measures of project performance. Keseko and Tumuti (2025) established that effective project integration management significantly improved the performance of building construction projects in Nairobi City County. Their study found that projects characterized by effective stakeholder management, communication, change management, and resource coordination recorded higher stakeholder satisfaction and improved overall project outcomes, although time performance remained challenging.

Similarly, Muinde, Simon, and Okaka (2025) found that stakeholder management practices significantly enhanced stakeholder management performance in county government-funded construction projects in Machakos County. The study concluded that effective communication, stakeholder participation, and structured engagement mechanisms improved project acceptance, reduced conflicts, and increased the likelihood of successful project implementation and sustainability.

Despite continuous reforms in public investment management, county government construction projects in Kenya continue to experience implementation challenges. Reports by the Office of the Auditor-General (2024) and the Controller of Budget (2024) identify persistent project delays, stalled projects, cost overruns, poor contract management, underutilized completed facilities, and failure to realize intended development outcomes. These challenges demonstrate that successful completion of construction works does not necessarily translate into stakeholder satisfaction, realization of anticipated benefits, or achievement of strategic development objectives.

Although numerous studies have examined construction project performance in Kenya, the majority continue to measure performance using traditional indicators such as completion within time, cost, and quality constraints. Limited empirical evidence has examined project performance using stakeholder satisfaction, benefits realization, and strategic performance, particularly within county government building construction projects. Furthermore, few studies have investigated how project schedule management, and the project regulatory framework collectively influence these broader dimensions of project performance. This constitutes the empirical gap that the present study seeks to address

Project Regulatory Framework

In public sector construction projects, regulatory frameworks provide the standards, procedures, and accountability mechanisms that ensure projects comply with national laws, professional standards, environmental safeguards, and financial management requirements. According to the Project Management Institute (PMI, 2021), project governance and regulatory compliance are integral to successful project delivery because they promote accountability, transparency, ethical conduct, and effective risk management throughout the project life cycle.

County government building construction projects in Kenya operate within a comprehensive regulatory environment established by the Constitution of Kenya (2010), the Public Finance Management Act (2012), the Public Procurement and Asset Disposal Act (2015), the Public Finance Management (Public Investment Management) Regulations (2022), the Environmental Management and Coordination Act (EMCA, 1999, Revised 2015), the National Construction Authority Act (2011), the Occupational Safety and Health Act (2007), and relevant county legislation. Collectively, these laws regulate project identification, feasibility studies, budgeting, procurement, environmental impact assessment, contractor

registration, project supervision, occupational safety, financial reporting, monitoring, and post-project evaluation. The present study operationalizes the project regulatory framework using four indicators: Compliance with public investment and financial management regulations; , Environmental and occupational safety compliance; and Construction licensing and statutory approvals.

Compliance with public investment and financial management regulations ensures projects undergo proper appraisal, budgeting, implementation, monitoring, and evaluation. The Public Finance Management (Public Investment Management) Regulations (2022) require all public investment projects to undergo feasibility studies, economic appraisal, risk assessment, implementation planning, and continuous monitoring before receiving funding. These regulations seek to improve value for money while minimizing stalled or abandoned projects.

Environmental and occupational safety compliance ensures that construction activities protect the environment, workers, and surrounding communities. The Environmental Management and Coordination Act requires projects likely to have significant environmental impacts to undertake Environmental Impact Assessment (EIA) before implementation, while the Occupational Safety and Health Act (2007) establishes minimum safety standards for construction sites.

Construction licensing and statutory approvals are administered by institutions such as the National Construction Authority (NCA), county governments, and other sector regulators. Contractors undertaking public construction projects must be appropriately registered and licensed by the NCA, while projects must obtain the necessary planning approvals, building permits, and inspection certificates before implementation and occupation.

Recent empirical evidence from Kenya demonstrates that regulatory compliance significantly influences project performance. Kariuki and Mwangangi (2023) found that adherence to procurement regulations significantly improved project accountability, reduced procurement disputes, and enhanced timely completion of county government infrastructure projects. Likewise, Omondi, Wanyonyi, and Kibet (2024) established that compliance with public investment management regulations significantly improved project implementation efficiency and benefits realization in devolved government projects.

The Office of the Auditor-General (2024) continues to report that many county government construction projects experience delays, cost overruns, abandoned works, and poor value for money due to weak compliance with procurement procedures, inadequate project appraisal, poor contract administration, weak financial controls, and ineffective monitoring. Similarly, the Controller of Budget (2024) observed that delayed project approvals, inadequate regulatory oversight, and non-compliance with public investment regulations continue to undermine the implementation of county development projects.

Although previous studies have examined procurement compliance, environmental regulations, or financial management independently, limited empirical research has investigated the moderating influence of the broader project regulatory framework on the relationship between project schedule management dimension and the performance of county government building construction projects. This study addresses this gap by examining how compliance with Kenya's project regulatory framework moderates the effect of project schedule management, on stakeholder satisfaction, benefits realization, and strategic performance.

Research Gaps

Although substantial literature exists on project management and construction project performance, several conceptual, contextual, methodological and empirical gaps remain, particularly regarding county government building construction projects in Kenya.

The existing empirical studies have consistently established positive relationships between project schedule management and project performance. Studies by Mogoa and Muchelule (2023), Gangla et al, (2025), and Oyier and Tumuti (2025) reported that effective scheduling, activity sequencing, schedule monitoring and critical path analysis significantly improve project implementation. However, these studies largely measured performance using the traditional iron triangle of time, cost and quality. Consequently, little empirical evidence exists regarding how project schedule management influences stakeholder satisfaction, benefits realization and strategic performance within county government building construction projects.

Another important gap relates to the moderating role of the project regulatory framework. Previous studies have examined moderating variables such as stakeholder involvement, organizational culture and leadership support. However, very few studies have investigated how Kenya's project regulatory framework including the Constitution of Kenya (2010), the Public Procurement and Asset Disposal Act (2015), the Public Finance Management Act (2012), the Public Finance Management (Public Investment Management) Regulations (2022), and National Construction Authority regulations—influences the relationship between project schedule management dimension and project performance. Recent Kenyan evidence suggests that institutional and regulatory factors significantly shape project outcomes, but these relationships remain underexplored in county government construction projects.

Methodologically, most previous studies have employed descriptive or correlational research designs with limited integration of moderation analysis. Many studies have also focused on a single county or one category of infrastructure projects, thereby limiting the generalizability of findings. Furthermore, few studies have incorporated senior county government officers, consultants, contractors and project management professionals simultaneously as respondents.

Conceptually, many previous studies continue to operationalize project performance using the traditional iron triangle of cost, time and quality despite the evolution of project management theory toward value creation and benefits realization. The PMBOK® Guide (7th Edition) emphasizes value delivery, stakeholder satisfaction and strategic alignment as measures of project success. Therefore, there remains a need for studies adopting broader performance dimensions that better reflect the objectives of public investment projects.

At the macro level, weaknesses in public-sector investment and infrastructure delivery can constrain economic and social development by limiting the timely provision of productive facilities and public services. At the sector level, challenges such as fluctuations in construction and manufacturing activity, rising implementation costs, procurement inefficiencies and constraints in public investment can affect the capacity of government institutions to deliver infrastructure projects effectively. However, these broad sectoral challenges do not automatically explain the performance of individual construction projects. Their practical effects become observable at the project-implementation level, where county governments must translate approved development priorities into specific building projects through planning, budgeting, procurement, scheduling, construction supervision and monitoring.

This distinction is particularly important in Kenya's devolved system of government where county governments are responsible for implementing numerous development projects identified through county planning and budgeting processes, including administrative buildings, health facilities, markets, educational facilities and other public infrastructure. County-level procurement bottlenecks, delayed financing, contractor-related constraints and coordination difficulties can therefore translate into project-specific schedule delays, cost pressures, scope changes and difficulties in achieving intended project outcomes. The relevant unit of concern is consequently not the Kenyan construction sector in its entirety,

but the management and performance of county government building construction projects during implementation.

Against this background, the present study focuses on county government building construction projects in eight Kenyan counties Nairobi, Mombasa, Kakamega, Nakuru, West Pokot, Garissa, Kajiado and Bungoma. The study targets the project-level actors involved in planning, implementing, supervising and monitoring these projects because they are directly positioned to provide evidence on how project-management practices influence project performance. This micro-level focus enables the study to move beyond general descriptions of national or regional construction-sector challenges and empirically examine the relationship between specific project-management dimensions and the performance of county government building construction projects. The study examines the influence of project schedule management dimension on the performance of county government building construction projects in Kenya. Unlike previous studies, project performance is measured using stakeholder satisfaction, benefits realization and strategic performance, while the project regulatory framework is examined as a moderating variable. Stakeholder Satisfaction is immediate stakeholder/user assessment of the project's outcomes and experience. Benefits realization is the operational and post-completion benefits generated by the completed facility, strategic Performance is contribution and alignment of the project with county and national strategic-development objectives.

This approach provides a more comprehensive understanding of how project schedule management dimension contribute to sustainable public value within Kenya's devolved system of government.

MATERIALS AND METHODS

The study adopted a mixture of both qualitative and quantitative design approach and sample of 200 respondents were considered. A census sampling technique method was used and data collected through the use of questionnaires. The geographical scope comprised eight counties: Nairobi, Mombasa, Kakamega, Nakuru, West Pokot, Garissa, Kajiado and Bungoma. These counties represented approximately 17% of Kenya's 47 counties. The study focused on one to two completed building construction projects per county. The unit of analysis was the county project team, while completed construction projects constituted the unit of observation. Data was analyzed by use of descriptive and inferential statistics such as measures of relationship including Karl Pearson's coefficient of correlation and multiple regression analysis to establish the relationship between each of the independent variables (project schedule management dimension) and the dependent variable (Performance of County government building construction projects in Kenya).

FINDINGS

Response Rate

A total of 200 questionnaires were distributed, and 189 valid responses were received, representing a 94.5% response rate, which was considered highly reliable for statistical analysis.

Table 1: Response Rate

Total Distributed	Responses Received	Percentage
200	189	94.5

The high response rate was due to effective follow-ups and regular engagements with respondents

Demographic Characteristics of Respondents

Gender Distribution

The gender distribution of respondents was analyzed to assess gender inclusivity in the county government building construction projects in Kenya. The results indicated that 73.01 % of respondents were male, while 26.99% were female

Table 2: Gender Distribution

Gender	Frequency (n = 189)	Percentage
Male.	138	73.01
Female	51	26.99
Aggregate	189	100

Level of Education

The level of education was analyzed to assess the competence and understanding the projects by the stakeholders. The results indicated that 69 % of respondents were Certificate holders in various fields, 48.15% Diploma, 28.04% Degree, 7.01% Masters, 1.05% PhD while 15.34% were without any formal training.

Table 3: Level of Education

Level of Education	Frequency (n = 189)	Percentage
Certificate	138	69
Diploma	91	48.15
Degree	53	28.04
Masters	14	7.01
PhD	02	1.05
Others.	29	15.34
Aggregate	189	100

Work Experience

The level of experience was assessed in terms of years worked to establish the expertise of the work force

Table 4: Work Experience

Years of experience	Frequency (n = 189)	Percentage
0-2	16	8.46
3-5	36	19.05
6-9	47	24.87
Over 10	90	47.62
Aggregate	189	100

Pilot Results

The project schedule-management construct demonstrated good internal consistency. The six schedule-management items produced a Cronbach's alpha of .838, indicating satisfactory reliability. Construct validity was examined using factor analysis. All six items recorded factor loadings above .50 and were therefore retained. The Kaiser-Meyer-Olkin measure was .677, indicating sampling adequacy, while

Bartlett's test of sphericity was statistically significant ($p = .001$). The factor loadings ranged from .614 to .889. Overall instrument content validity was assessed using the Content Validity Index. The thesis reported a mean CVI of .97, providing strong evidence of content validity.

The following tables shows the overall cronbach's alpha and content validity index results.

Table 5: Overall Reliability Results

Variables	Cronbach's Alpha	No. of items	Remarks
Project schedule management	0.838	6	Reliable
Project Regulatory framework	0.762	5	Reliable
Performance of the county government construction projects	0.825	7	Reliable

The Content Value Index (CVI) (Polit and Beck, 2006) was used to assess the content validity of the instrument. This indicates the general consensus among the respondents about the items included in the initial pool, and the consequent strong evidence of content validity of the scale.

Table 6: Content Validity Test

Experts opinion	No. in agreement	CVI
1	17	0.96
2	18	1.00
3	16	0.93
Mean CVI		0.97

Descriptive Results

Descriptive analysis was used to describe the basic features of the data under study. It forms the basis of every quantitative analysis of data and includes the mean and standard deviation (Conradie & Paduri 2015). The mean is the numerical average of a set of data. It represents the central value around which the rest of the data cluster. It shows the typical or expected value and represents the general trend of the data. A high mean indicates that the respondents agreed that the project dimension influence performance of county government building construction projects. A low mean indicates that the respondents disagreed that the project dimensions' influence performance of county government building construction projects. The standard deviation (SD) showed how spread out or consistent the data was. A low standard deviation means the data points are close to the mean indicating a high consistency. A high standard deviation means the data points are spread out indicating high variability. The respondents agreed that Project schedule management generally contributes to stakeholder satisfaction, business growth and project efficiency. This was shown by an aggregate mean of 3.336 (std. dv = 0.761). Statistically, moderation was demonstrated by a significant interaction between the Independent Variable $\times$ moderator, therefore moderation was supported with an aggregate mean of 3.535 (std dev = 0.828).

Correlation Results

Linear regression focuses on determining relationship between the independent (explanatory variable) variable and one dependent variable. Regression analysis is a type of statistical evaluation that enables three things; firstly, description of relationships among the dependent variables and the independent variables can be statically described by means of regression analysis. Secondly, estimation of the values of the dependent variables can be estimated from the observed values of the independent variables. Thirdly, prognostication/prediction of risks factors that influence the outcome can be identified, and individual prognoses can be determined (Fahrmeir, 2009).

The regression results (Table 4.7) indicate that project schedule management dimension explains 12.6% ($R^2=.126$) of total changes in performance of county government building construction projects in Kenya. An F statistic of 48.611 and reported p value of $0.000 < 0.05$ imply that project schedule management dimension is a significant predictor of performance of county government building construction projects in Kenya. The results further indicate that project schedule management dimension had a positive and significant effect on performance of county government building construction projects in Kenya ($\beta=.323$, $P < .000$). This implied that an increase in project schedule management dimension by one unit would lead to increase in performance of county government building construction projects in Kenya by 0.323 units.

Estimated model;

$$Y = 3.702 + 0.323X_1$$

Where; Y- performance of county government building construction projects; X_1 -project schedule management dimension

Table 7: Regression Model

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.702	.198		17.792	.000
	Project schedule management dimension	.323	.047	.357	6.115	.000
	R Squared	.126				
	Adjusted R Squared	.123				
	F statistic	48.611				
	P value	.000				

a Dependent Variable: performance of county government building construction projects in Kenya

Regression Analysis with Moderation

Following the inclusion of the moderator (project regulatory framework) in the model, results (Table 4.8) indicate that the interaction term (X_5Z) had a positive and significant effect on performance of county government building construction projects in Kenya ($\beta=.292$, $P = 0.044 < 0.05$). Results also reveal that project schedule management dimension when interacted with project regulatory framework explain 39% ($R^2=.386$) of the total variations in performance of county government building construction projects in Kenya. A comparison between the R squared without moderation and R squared with moderation reveal that the R squared increased from 12.6% to 39%, implying that project regulatory framework increased the strength of project schedule management dimension in explaining performance of county government building construction projects in Kenya.

The moderator showed that the relationship between IV and DV changes in strength, direction, and significance at different levels of the moderator

Moderation was therefore established as the interaction between the independent variable and the moderator significantly predicted the dependent variable.”

Model with Moderation

$$Y = 6.413 + 0.292 X_5 * Z$$

Y= performance of county government building construction projects in Kenya

$X_5 * Z$ = (project management dimension * Project regulatory framework)

Table 8: Regression Model with Moderation

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	6.413	2.700		2.375	.018
	X5	-.628	.665	-.514	-.944	.346
	Z	-1.140	.592	-1.136	-1.926	.055
	X5Z	.292	.144	2.076	2.023	.044
	R Squared	.386				
	Adj. R Squared	.380				
	F statistic	59.008				
	P value	.000				

a Dependent Variable: Y

Hypotheses Testing

The first null hypothesis (H_{01}) predicted that project schedule management dimension did not have significant relationship with the performance of county government building construction projects in Kenya. A p value of 0.000 (Table 4.9) was less than 0.05 implying rejection of the null hypothesis in favour of the alternative. Therefore, project schedule management dimension had a significant relationship with performance of county government building construction projects in Kenya.

The second null hypothesis (H_{05}) predicted that project regulatory framework had no significant moderating effect on the relationship between project management dimension and performance of county government building construction projects in Kenya. A p value of 0.044 was less than 0.05 implying rejection of the null hypothesis in favour of the alternative. Therefore, government policies had a significant moderating effect on the relationship between project management dimensions and performance of county government building construction projects in Kenya.

Table 9: Hypotheses Testing Results

No	Hypotheses	P value	Decision
H01	Project schedule management dimension do not have a significant relationship with performance of county government building construction projects in Kenya	0.000<0.05	Reject
H02	Project Regulatory frameworks have no significant moderating effect on the relationship between project management dimensions and performance of county government building construction projects in Kenya.	0.000<0.05	Reject

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The study concludes that project schedule management has a positive and statistically significant effect on the performance of county government building construction projects in Kenya. The regression results established that project schedule management explained 12.6% of the variation in project performance ($R^2 = .126$), with a positive regression coefficient of $\beta = .323$ and $p < .001$. The null hypothesis that project schedule management does not significantly affect project performance was therefore rejected. The

findings demonstrate that activity definition and sequencing, duration estimation, schedule development and schedule monitoring contribute to improved project performance.

The secondary evidence reinforces this conclusion by demonstrating that procurement delays, delayed funding, weak planning and inadequate monitoring are associated with delayed implementation of county projects. The conclusion is therefore that schedule management should be treated as a continuous control process rather than merely the preparation of an initial project programme.

Finally, the findings also concluded that project regulatory frameworks had a significant moderating effect on the relationship between project management dimensions and performance of county government building construction projects in Kenya.

Recommendations

Managerial Recommendations

The study established that project schedule management dimension significantly influences the performance of county government building construction projects. Consequently, county governments should strengthen institutional project management capacity by adopting integrated project management practices throughout the project life cycle. Project managers should develop realistic project schedules using appropriate scheduling techniques such as the Critical Path Method (CPM), Gantt Charts and project management software to improve planning, monitoring and timely completion of projects. Regular progress reviews should be institutionalized to identify schedule deviations early and implement corrective actions before delays become critical.

Recommendations to County Governments

County governments should institutionalize project governance frameworks that enhance transparency, accountability and performance throughout the project life cycle. Each county should establish functional Project Management Offices (PMOs) responsible for coordinating planning, implementation, monitoring and evaluation of development projects.

County governments should also adopt integrated digital project management information systems to facilitate real-time monitoring of project progress, financial expenditure, contract administration and performance reporting. Such systems would improve decision-making, enhance accountability and reduce project implementation delays. Further, county governments should strengthen stakeholder engagement throughout project implementation to ensure that completed projects adequately address community needs and achieve their intended socio-economic benefits.

Policy Recommendations

The National Government should review and strengthen the policy framework governing county government infrastructure projects to promote effective project management and improved project performance. Existing public investment management policies should be harmonized to enhance coordination among implementing agencies and eliminate regulatory overlaps that delay project implementation.

The National Treasury should strengthen the implementation of Public Investment Management (PIM) guidelines by requiring counties to undertake comprehensive project appraisal, risk assessment and benefits realization analysis before project approval and financing.

The government should also develop national performance standards and key performance indicators for county government construction projects to facilitate benchmarking, monitoring and continuous improvement in project delivery.

Recommendations to Regulatory Agencies

Regulatory institutions including the Public Procurement Regulatory Authority, National Construction Authority, National Treasury, Ethics and Anti-Corruption Commission and the Office of the Auditor-General should strengthen compliance monitoring throughout the implementation of county government construction projects.

The study recommends regular technical audits, financial audits and compliance inspections to ensure adherence to procurement laws, construction standards, environmental regulations and financial management requirements. Regulatory agencies should also promote the adoption of digital monitoring systems that improve transparency and accountability in public infrastructure projects.

In addition, regulatory agencies should strengthen enforcement mechanisms against poor project management practices, non-compliance with procurement regulations and unethical conduct that contributes to project delays, cost overruns and poor-quality infrastructure.

Recommendations to Professional Bodies

Professional bodies including the Project Management Institute Kenya Chapter, Institution of Engineers of Kenya, Architectural Association of Kenya, Board of Registration of Architects and Quantity Surveyors and the Kenya Institute of Planners should collaborate with county governments to strengthen professional competence in public sector project management.

The professional bodies should expand Continuous Professional Development (CPD) programmes focusing on project planning, schedule management, cost control, scope management, project governance, stakeholder management, digital project management technologies, Building Information Modelling (BIM) and benefits realization management.

Professional institutions should also encourage certification of project managers and promote adherence to internationally recognized project management standards to improve the quality and performance of county government building construction projects.

Recommendations to Development Partners

Development partners and organizations supporting county governments should provide technical assistance in strengthening project management systems, institutional capacity and digital transformation. They should support capacity-building initiatives in project planning, monitoring and evaluation, risk management, governance and sustainable infrastructure development. Partnerships between county governments, universities and development agencies should also be encouraged to promote research and innovation in public infrastructure project management.

Recommendations for Future Research

Future studies should investigate other determinants of county government building project performance that were not examined in the present study, including project risk management, stakeholder management, procurement management, organizational culture, political influence, leadership, governance and digital transformation.

Researchers should also undertake longitudinal studies to assess project performance beyond project completion by examining benefits realization, sustainability, stakeholder satisfaction and long-term socio-economic impacts. Comparative studies involving all forty-seven counties and other public infrastructure sectors such as roads, water, health, education and energy projects would improve the generalizability of the findings.

Further research should examine the influence of emerging technologies, including Building Information Modelling (BIM), Artificial Intelligence (AI), Geographic Information Systems (GIS), drones and integrated Project Management Information Systems (PMIS), on the performance of public sector construction projects in Kenya.

Contribution to Project management Knowledge

This section demonstrates the original contribution the research makes to project management knowledge. Based on the findings, this study makes the following contributions:

- Extending project performance measurement beyond the traditional iron triangle (time, cost, and scope) to incorporate stakeholder satisfaction, benefits realization, and strategic performance.
- Developing and validating an integrated framework linking
- project schedule management to the performance of county government building construction projects.
- Providing empirical evidence on the moderating influence of the
- project regulatory framework on the relationship between project schedule management dimension and project performance in Kenya's devolved system.
- Contributing contemporary Kenyan evidence to project
- management literature using recent county government building construction projects.
- Supporting the application of Complexity theory, theory of constraints, Project management competency theory, and Project management maturity theory in explaining performance of county government building construction projects.

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