

Project Scope Management and Implementation Performance of Educational Infrastructure Stimulus Projects in Kenya: The Moderating Role of Human Capital

Dr. Kenneth Otieno Odhiambo, PhD

University of Nairobi, Faculty of Management Sciences, Department of Project Planning and Management

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ABSTRACT

This study examined the moderating influence of human capital on the relationship between project scope management and the implementation performance of Economic Stimulus Programme (ESP) infrastructure initiatives in public secondary schools within Kisumu County, Kenya. Utilizing a descriptive survey design, primary data were collected from a target population of 189 institutional stakeholders across schools benefiting from ESP allocations, yielding a finalized analytical sample of 128 respondents selected via stratified random sampling. Reliability was verified using the test-retest method and evaluated via the Spearman-Brown Prophecy formula ($R_e > 0.70$). Data were analyzed using descriptive statistics, Chi-square tests of independence, and moderated multiple linear regression analysis. The empirical results revealed a strong overall model fit ($R = 0.813$, $R^2 = 0.661$), indicating that 66.1% of the variance in infrastructure implementation status was driven by front-end project scope initialization metrics. Parameter estimates confirmed that formalized Project Charters ($\beta = 0.394$, $p < 0.001$) and inter-disciplinary Expert Judgment ($\beta = 0.256$, $p = 0.006$) exerted a statistically significant positive influence on delivery success. Crucially, individual Project Manager Competence failed to achieve direct statistical significance ($\beta = 0.155$, $p = 0.065$), demonstrating a condition of bounds-based moderation where individual capability depended entirely on structural institutional baselines. The study concluded that the Ministry of Education must transition from ad-hoc project selections toward mandatory, deliverable-oriented Work Breakdown Structures (WBS) and institutionalize technical scope management certification protocols for local oversight committees.

Keywords: Project Scope Management, Project Implementation, Economic Stimulus Programme (ESP), Bounds-Based Moderation, Human Capital, Resource-Based View.

INTRODUCTION

Globally, the successful implementation of public developmental projects is recognized as a primary catalyst for sustainable economic growth and social transformation (Aschauer, 1989; Barro, 1990). However, public infrastructure initiatives consistently encounter systemic execution bottlenecks. According to the Project Management Institute (2013, 2021), poor project scope management—specifically the foundational phase of project scope definition—remains a primary driver of project failure, budget overruns, and missed deadlines. Project scope definition entails establishing clear project boundaries, identifying specific deliverables, and detailing the precise work required for successful completion (Kerzner, 2017). While developed economies frequently utilize highly specialized project management professionals to execute public works, developing global contexts often delegate these responsibilities to institutional administrators (Ika, 2012, 2020). These actors may possess domain expertise (such as in education or public health) but frequently lack formal training in project management mechanics, leading to inaccurate scope baselines, unmanaged scope creep, and eventual project stall (Crawford et al., 2003; Williams, 2019).

Across sub-Saharan Africa, governments have increasingly deployed targeted Economic Stimulus Programmes (ESPs) and devolved funding frameworks to decentralize resources, alleviate spatial inequalities, and cushion localized sectors against macroeconomic shocks (Calderón & Servén, 2010). In South Africa, emergency fiscal allocations within the Infrastructure Investment Plan were funneled into basic and higher education to eradicate unsafe infrastructure and rapidly deploy water and sanitation amenities across underfunded rural and township schools (McLean, 2022; National Treasury, 2020). Similarly, Nigeria inaugurated the Nigeria Economic Sustainability Plan (NESP), prioritizing structural resilience and digital shift conversions through the rehabilitation of public schools and the upgrading of Science, Technology, Engineering, and Mathematics (STEM) laboratories (Federal Government of Nigeria, 2020; Adeyemi & Amhana, 2024). In West Africa, the Ghana CARES program strategically harmonized emergency stimulus windows with flagship policies like the "Free Senior High School" initiative to accelerate the completion of stalled facilities and expand e-learning structures (Ministry of Education, Ghana, 2022; Amoah et al., 2024).

Despite the strategic value of these continental interventions, empirical evidence indicates that a significant percentage of these localized infrastructure initiatives fail to achieve their core objectives (Fashina et al., 2020). Regional literature highlights that infrastructure delivery is frequently hindered by a severe lack of technical capacity among local oversight committees (Amoah et al., 2024). When project planners and supervisors do not possess the requisite technical competencies to define what falls within or outside a project's boundaries, resources are spread thin, resulting in prolonged variations, structural defects, and widespread abandonment of public facilities (Hajialiasghari, 2021; Siriram, 2022).

Kenya's macro-economic history with economic stimulus interventions is structurally tethered to decentralized and localized implementation frameworks (Government of Kenya, 2009). Following the 2009 global financial crisis, the Government of Kenya launched its initial ESP, which explicitly targeted the education sector by funding the construction of prototype "Centers of Excellence" across all constituencies to bridge regional educational disparities (Government of Kenya, 2009). This structural model evolved during subsequent macroeconomic shocks, notably through the Post-COVID-19 Economic Recovery Strategy (ERS) and subsequent Competency-Based Curriculum (CBC) infrastructure expansions, where billions of shillings were allocated for local classroom construction to accommodate transitioning cohorts (Ministry of Education, Kenya, 2021). To foster local ownership, the execution of these institutional infrastructure projects was legally mandated to internal institutional actors—primarily school Principals, Boards of Management (BoMs), and localized project committees (Mbaluku & Bwisa, 2013).

However, the implementation performance of these educational projects remains highly problematic. Historically, the completion rate of public projects in Kenya has faced stark deficiencies, with baseline completion rates dipping significantly within designated fiscal cycles (Muchungu, 2012; Munamo, 2012). While a project is theoretically deemed successful when implemented within schedule, budget, and quality specifications to the satisfaction of the end-user (Kerzner, 2017), Kenyan public construction projects routinely fail to achieve these key performance criteria (Gwayo et al., 2014). Public educational construction projects suffer from persistent cost escalations, structural building defects, over-reliance on uncertified contractors, and extensive delays—exemplified by stalled classrooms and local facilities remaining incomplete years past their stipulated deadlines (Githenya & Ngugi, 2014; Gacheru, 2015).

The root cause of these performance shortfalls often traces back to deficiencies in project planning practices, specifically rigid or poorly defined project scopes managed by under-trained administrators (Williams, 2019). Because institutional project implementers like school principals and BoM members are primarily educators rather than technical project managers, their capacity to initiate rigorous project scope management is structurally constrained (Mbaluku & Bwisa, 2013; Muchungu, 2012). This underscores the critical need to evaluate the concept of Human Capital—defined by organizational skills, technical training, experience, and competent resource utilization—as a vital moderating variable (Lucas, 1988; Namusonge et al., 2012). While robust project scope management provides the structural blueprint for implementation performance (Siriram, 2022), the human capital of the project executors acts as the operational bridge that converts that scope into successful project delivery (Barney, 1991). This study, therefore, seeks to investigate the relationship between project scope management and the implementation performance of educational infrastructure stimulus projects in Kenya, while specifically examining how human capital modifies this relationship.

Problem Statement

Optimal delivery of public infrastructure relies fundamentally on robust project scope management to control constraints and prevent scope creep (Banda & Pretorius, 2016; Kerzner, 2017), ensuring that public sector initiatives encompass only critical works to guarantee value for money (PMI, 2021; Siriram, 2022). In reality, however, up to 80% of public infrastructure project failures in developing economies are linked to deficient scope management (Ika, 2020), while over 60% of Kenyan construction deficits stem from systemic planning inaccuracies, flawed Bills of Quantities, and uncoordinated requirement gathering (Fashina et al., 2020; Gwayo et al., 2014). This planning vulnerability was acutely evident during Kenya's Economic Stimulus Programme (ESP) for public secondary schools, where 43% of education-sector projects nationally remained incomplete, delayed, or stalled (Government of Kenya, 2009; Munamo, 2012). The execution crisis was particularly pronounced in Kisumu County, where up to 80% of secondary school ESP projects suffered extended delays or outright asset abandonment because deficient scope baselines allowed funds to be systematically diverted to low-priority works (Gacheru, 2015; Ministry of Education, Kenya, 2021). The consequence of these persistent project failures is severe, resulting in capital wastage, chronic deficits in local educational facilities, and the systemic failure of national economic stimuli (Calderón & Servén, 2010; Williams, 2019). While existing literature thoroughly documents the direct, linear nexus between project scope definition and construction performance (Hajialiasghari, 2021; Mirzaei, 2019), a critical empirical gap persists regarding how technical management competencies alter this dynamic. Current studies largely treat scope management as a purely mechanistic process, ignoring how human capital—specifically specialized project scope management skills, knowledge, and execution competency—acts as a critical boundary condition to navigate institutional friction and political interference (Amoah et al., 2024; Crawford et al., 2003). This study directly addresses this empirical gap by evaluating the moderating influence of human capital on the relationship between project scope management and the implementation performance of educational infrastructure stimulus projects in public secondary schools in Kisumu County, Kenya, leveraging the core tenets of the Resource-Based View (Barney, 1991; Namusonge et al., 2012).

Research Objective

To evaluate the moderating influence of human capital on the relationship between project scope management and the implementation performance of educational infrastructure stimulus projects in public secondary schools in Kisumu County, Kenya.

Research Hypotheses

H0: Human capital has no significant moderating influence on the relationship between project scope management and the implementation performance of ESP infrastructure projects in public secondary schools in Kisumu County, Kenya.

H1: Human capital has a significant moderating influence on the relationship between project scope management and the implementation performance of ESP infrastructure projects in public secondary schools in Kisumu County, Kenya.

Significance of the Study

This study holds vital practical, policy, and theoretical significance for diverse stakeholders across the infrastructure and education sectors. For policy makers and government agencies, particularly the Ministry of Education and national treasury planners, it provides critical empirical insights required to redesign public infrastructure frameworks. By exposing how scope mismanagement directly stalls capital projects, the study serves as a guide for formulating stricter budgeting regulations and establishing more rigorous project baseline requirements for future economic stimulus programs. For project management practitioners, including engineers, quantity surveyors, and project managers, the findings underscore the operational dangers associated with flawed Bills of Quantities and uncoordinated requirement gathering, offering a compelling case for why technical competencies must be prioritized during team selection to insulate projects from institutional friction and political interference. Finally, the study contributes significantly to academia and research by addressing a

persistent conceptual gap. By shifting the scholarly narrative away from treating scope management as a purely mechanistic process and instead testing human capital as a moderating variable, it expands the boundaries of existing project management frameworks, such as the Resource-Based View and Triple Constraint Theory, within the specific context of developing economies.

Scope of the Study

The scope of this study is bounded geographically, theoretically, and contextually to ensure a focused and rigorous investigation. Geographically, the study is strictly localized to Kisumu County, Kenya, focusing exclusively on public secondary schools within its constituent sub-counties that received funding under the national Economic Stimulus Programme. In terms of content and theoretical delimitation, the research is restricted to investigating the direct relationship between Project Scope Management as the independent variable and Implementation Performance as the dependent variable, with the latter evaluated through metrics of schedule adherence, project completion rates, and asset functionality. Crucially, this conceptual framework is further bounded by the inclusion of Human Capital as a moderating variable, which is strictly defined as the technical competencies, specialized skills, and project management knowledge possessed by the project handlers. Contextually, the investigation limits its focus to public secondary school infrastructure projects initiated under the Economic Stimulus Programme (ESP) framework, as this specific cohort of projects uniquely exhibits the targeted performance deficits and asset abandonment under study.

THEORETICAL FRAMEWORK

The Logical Framework Approach (LFA)

The Logical Framework Approach (LFA)—originally conceptualized by the United States Agency for International Development (USAID) and rooted in Peter Drucker's Management by Objectives model—serves as a primary structural baseline for this study. LFA applies a disciplined, causal logic to structure public sector developmental initiatives by systematically linking project inputs and discrete activities directly to measurable outputs, immediate outcomes, and long-term systemic impacts.

Within this study, LFA models the independent variable: Project Scope Management. The theory mandates that project planners establish clear project boundaries, document strict task parameters, outline resource frameworks, and anchor specific deliverables before public funds are deployed. By organizing scope components into a vertical and horizontal causal matrix (the logframe), LFA provides institutional actors in Kisumu County with a transparent baseline to manage project constraints. In the context of the Economic Stimulus Programme (ESP), LFA posits that optimal project execution is a direct result of structured scope definition, clear baseline planning, and rigorous requirement gathering, which collectively prevent unauthorized deviations and resource diversion.

Resource-Based View (RBV) Theory

To account for the critical human and capability dimensions within infrastructure execution, the Resource-Based View (RBV) theory is integrated as the theoretical baseline for the moderating variable. Originally advanced by Jay Barney (1991), RBV posits that an organization's sustainable competitive advantage and operational performance are determined by its strategic deployment of internal resources that are valuable, rare, inimitable, and non-substitutable (VRIN criteria).

In public sector project execution, physical capital and exchequer allocations are insufficient on their own to guarantee successful outcomes. RBV categorizes Human Capital—specifically specialized project scope management skills, experiential knowledge, and technical competencies—as core intangible resources that dictate operational performance variance. Within this conceptual framework, RBV models the moderating variable. It posits that the conversion of static project scope plans (the independent variable) into successful Implementation Performance (the dependent variable) is actively accelerated or constrained by the caliber of localized technical expertise. Consequently, RBV explains why identical scope baselines can yield vastly

divergent implementation outcomes, suggesting that high-quality human capital insulates public projects from institutional friction and political interference.

Theoretical Integration

The integration of LFA and RBV provides a robust, holistic framework for this study. While LFA offers the structural and mechanistic blueprints necessary for establishing rigid project scope boundaries, it assumes a frictionless operational environment. RBV complements this limitation by introducing the behavioral and capability dimensions required to execute those boundaries. Together, these theories suggest that while LFA-guided scope management is a necessary prerequisite for public infrastructure delivery, its ultimate translation into successful implementation performance is bounded and moderated by the strategic depth of human capital as dictated by RBV.

EMPIRICAL LITERATURE REVIEW

Project Scope Initiation and Planning

Within public infrastructure delivery, the front-end phases of a project's lifecycle—specifically project scope initiation and planning—establish the foundational baseline upon which execution constraints are managed. According to orthodox project management frameworks, scope initiation formally authorizes an initiative and anchors stakeholder expectations, while scope planning defines the explicit boundaries, deliverables, and Work Breakdown Structures (WBS) required to meet execution targets (PMI, 2021; Siriram, 2022). Proponents of intensive front-end planning argue that high initial investments in scope definition directly correlate with optimal project performance metrics, including budget adherence, schedule predictability, and structural asset quality (Aschauer, 1989; Ika, 2012). For social infrastructure developments like Economic Stimulus Programmes (ESPs) in the education sector, early scoping clarity is deemed critical because these initiatives operate within highly volatile socio-political environments and rigid regulatory structures (Calderón & Servén, 2010). When educational infrastructure initiatives lack robust scope boundaries, they routinely suffer from fatal planning gaps, uncoordinated baseline modifications, and flawed Bills of Quantities (Fashina et al., 2020; Hajialiasghari, 2021). Conversely, a substantial body of behavioral economics and project governance literature challenges this linear, mechanistic assumption, arguing that project underperformance and cost escalations are not merely technical procedural failures, but are deeply rooted in human biases such as 'optimism bias' and deliberate 'strategic misrepresentation' by political actors seeking project approval (Flyvbjerg, 2013; Pinto & Winch, 2022). From this perspective, highly detailed initial planning documents can create a false sense of security while failing to protect projects from shifting socio-economic realities mid-lifecycle.

To reconcile these viewpoints, the Resource-Based View suggests that the translation of static planning documents into actual implementation performance is fundamentally moderated by human capital. In decentralized educational stimulus environments across emerging economies, implementation oversight is frequently assigned to localized actors, such as school principals and Boards of Management (BOMs), who possess domain expertise but often exhibit severe deficits in formal project management mechanics (Amoah et al., 2024; Nzuki & Kithandi, 2025). When human capital is low, the planning phase collapses into an administrative 'box-ticking' exercise or what text conceptualizes as isomorphic mimicry (Andrews et al., 2013). Under these conditions, even a comprehensive scope document fails because local committees cannot translate complex technical blueprints into practical tracking indicators, leading to unmanaged scope creep, fund diversion, and eventual asset abandonment (Muli, 2025). Conversely, when local institutional actors possess high human capital—characterized by advanced project management skills and technical training—they leverage scoping tools dynamically to run requirements traceability matrices, align procurement pipelines, and proactively mitigate planning errors before physical construction advances (Motala, 2024).

Scope Verification and Stakeholder Satisfaction

Empirical literature consistently underscores scope verification as a primary tool for mitigating expectation mismatches and safeguarding final stakeholder satisfaction (Banda & Pretorius, 2016; Hajialiasghari, 2021).

Advocates of formal scope verification argue that the systematic, incremental acceptance of deliverables by institutional clients removes ambiguity, limits unauthorized baseline variations, and ensures that the final engineered asset aligns with user requirements (Newton, 2015; Li, 2022). In public sector projects, which typically feature multi-tiered and highly fragmented stakeholder landscapes, skipping formal verification intervals creates a severe 'cognitive divergence' between what contractors deliver and what educational beneficiaries expect (Ika, 2020). Implementing structured validation intervals—such as requirements verification workshops and rapid prototyping—explicitly anchors stakeholder expectations to the evolving asset, thereby reducing structural disputes, preventing late-stage reworks, and driving project completion success (Bakkah, 2025).

However, counter-narratives in project governance warn against the over-formalization of verification pathways, as scholars argue that arduous, hyper-bureaucratic verification protocols do not guarantee absolute scope control and can paradoxically hinder project momentum (Mirzaei, 2019). In environments characterized by high technological or environmental uncertainty, rigid verification demands can trigger adversarial contractual gridlocks, where minor technical deviations stop construction progress, extend project durations, and ultimately diminish stakeholder satisfaction.

This tension indicates that the relationship between scope verification and stakeholder satisfaction is not direct, but is contingent upon the quality of human capital deployed. Drawing from the Resource-Based View, technical project management competence represents a rare and valuable internal resource necessary to navigate this interface (Barney, 1991). When public steering committees possess high human capital, they successfully translate abstract technical specifications into transparent, requirement-traceable milestones that lay stakeholders can meaningfully evaluate (Aljadhari et al., 2024). Competent project teams use their expert judgment to separate minor aesthetic variations from critical product quality issues, thereby maintaining trust and progress (Siriram, 2022). Conversely, when human capital is absent, scope verification collapses into a superficial paper exercise or an arena for conflict, where local committees struggle to detect structural defects early, leading to the acceptance of subpar educational facilities or uncoordinated rejections that stall delivery entirely (Nzuki & Kithandi, 2025; Turner, 2019).

RESEARCH METHODOLOGY

Introduction & 3.2 Research Design

This chapter outlines the study's methodological framework. The study adopted a mixed-methods descriptive survey design, utilizing quantitative and qualitative approaches. This layout enabled data triangulation via questionnaires, interviews, and observations to gather firsthand information efficiently.

Target Population & 3.4 Sampling Framework

The target population comprised stakeholders from 7 secondary schools (one per constituency) in Kisumu County funded under the Economic Stimulus Programme (ESP), totaling 189 respondents: 98 Board of Management (BOM) members, 56 Site Committee members, and 35 Ministry of Education (MOE) officers.

Yamane's (1967) formula determined a minimum sample size of 128 at a 95% confidence level ($e=0.05$): $n = N / [1 + N(e)^2]$, where $n = 189 / [1 + 189(0.0025)] \approx 128$. Stratified random sampling ensured proportionate representation across sub-groups using $n_h = (N_h / N) * n$, while judgmental sampling selected interviewees per school based on operational authority.

Respondents Stratum	Population (N _h)	Proportion (%)	Sample Size (n _h)	Target Per School
Board of Management (BOM)	98	68%	66	9
Ministry of Education (MOE) Officers	35	68%	24	3
Site Committee Members	56	68%	38	5
Total	189	68%	128	17

Research Instruments, Validity & Reliability

Semi-structured questionnaires (covering demographics, execution, initiation, and scope parameters) and interview guides were utilized. Instruments were piloted using 5 participants per school at Ngiya Girls and Sawagongo High Schools (omitted from the final study). Content and face validity were established via supervisor and peer reviews. Reliability was verified using the test-retest method and Pearson's Product-Moment Correlation coefficient (r), yielding coefficients of 0.75 (MOE) and 0.72 (Committees), both exceeding the acceptable 0.70 threshold.

Data Collection & 3.7 Data Analysis Techniques

Following NACOSTI clearance, the researcher personally administered and collected instruments across schools and education offices. Qualitative data was analyzed using thematic frameworks. Quantitative data was processed through SPSS (v20) using frequency tables, Chi-square, and correlation tests at a 95% confidence level ($\alpha = 0.05$). To analyze the effects of skill levels on project execution, a multiple linear regression model was applied: $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$ (where Y is implementation, X variables are predictors, β represents coefficients, and ε represents error).

Ethical Issues

Institutional approvals were obtained from the Ministry of Higher Education. Informed consent was mandatory, participation remained strictly voluntary with unconditional withdrawal rights, and complete respondent anonymity and data confidentiality were maintained throughout.

FINDINGS AND INTREPRETATIONS

Empirical Analysis of Cross-Tabulated Interaction Dynamics

To test the operational reality of team capability configurations, the practical application of a Work Breakdown Structure (WBS) was selected as an empirical proxy for scope verification capacity. The resulting cross-tabulation demonstrates a sharp divide in implementation timelines based on tool utilization. Among the projects successfully executed within the mandated six-month timeline of the Economic Stimulus Programme (ESP), 76.3% ($n = 29$) utilized a WBS as their primary baseline verification framework. Conversely, within the cohort that exceeded this timeline, 85.9% ($n = 55$) lacked the operational skills or technical know-how to design or enforce a WBS. To test the explanatory weight of this skill variance, a simple linear regression model was computed. The model yields a strong positive correlation between scope verification capability and compressed execution cycles ($R = 0.623$, $p < 0.00001$). This highly significant interaction confirms that formal scope verification competencies directly insulate project schedules from downstream execution delays. Theoretically, this result strongly validates the Resource-Based View (RBV), which posits that highly specialized internal project tools and technical capabilities dictate corporate performance and structural variance in asset delivery frameworks (Barney, 1991; Siriram, 2022). It further mirrors empirical infrastructure data showing that upfront work definition models minimize early engineering errors and secure baseline stability (Banda & Pretorius, 2016). However, a critical conceptual divergence appears when viewed through an Agile governance lens; proponents of iterative systems warn that heavy reliance on rigid, top-down breakdown tools creates structural blindness, lowering team flexibility when unexpected macroeconomic shocks hit emergency public programs (Highsmith, 2009; Serrador & Pinto, 2015).

The structural interface between resource execution skills and systemic scope control was further examined by cross-tabulating the occurrence of scope creep against active project change control systems. The analysis isolates an acute operational vulnerability linked directly to missing change governance skills. Within the scope creep cohort ($n = 52$), 76.1% of the projects operated without any formal mechanism for change processing. Conversely, within the stable scope group ($n = 49$), 69.6% maintained functional change control frameworks. This pattern reveals a clear capability gap in active risk insulation, proving that scope extensions are primarily an institutional failing rather than an unavoidable external reality. This directly supports the conclusions of Bakkah (2025), who proved that missing standardized engineering controls speeds up team misalignment and

invites external stakeholder interference. It also tracks with findings that weak administrative governance in sub-Saharan projects functions as the main driver of cost inflation and unapproved design updates (Adeyemi & Amhana, 2024). In contrast, institutional project theorists offer a divergent view, noting that assigning scope growth purely to internal skills overlooks a broader systemic problem. They argue that within fragile public sectors, scope expansions represent an unavoidable, adaptive reaction to institutional friction, sudden political adjustments, and broken regional supply networks, making formal change boundaries overly restrictive (Ika, 2020; Williams, 2019).

To evaluate the predictive role of upfront planning skills, the presence of a formal Scope Management Plan was cross-tabulated against operational scope stability. The descriptive results show that the absolute majority of projects experiencing poor (80%) or very poor (70%) scope control lacked an initial management plan. Crucially, 50.8% of the 62 respondents who failed to deliver a plan cited an absolute lack of technical know-how as the primary structural barrier. A Pearson Chi-square test of independence was performed, verifying a statistically robust relationship between internal scope planning skills and downstream scope control ($p = 0.005$, $df = 4$). This relationship corroborates structural scheduling models which argue that proactive initialization protocols and initial scoping literacy drive over 80% of project schedule predictability metrics (Hajialiasghari, 2021; Li, 2022). Nevertheless, behavioral economists challenge this planning-centric logic, pointing out that elaborate project planning frequently devolves into a performative bureaucratic exercise. Real-world execution failures in public management are often rooted in deeply structural optimism bias and conscious strategic misrepresentation, where technically sound plans are sidelined by political figures to force project approvals (Flyvbjerg, 2013; Pinto & Winch, 2022).

Table 1: Scope Control Cross-tabulation by Scope Management Plan

Reported Scope Control	Has Plan % (n)	Lacks Plan % (n)	Total Cohort (N)
Very Good	86.7% (13)	13.3% (2)	15
Good	86.4% (19)	13.6% (3)	22
Poor	20.0% (7)	80.0% (28)	35
Very Poor	30.0% (3)	70.0% (7)	10

Financial literacy within the project environment was tested by correlating micro-level estimation and cost tracking proficiencies with final budget variance control. In the 'Very Good' budget control cohort ($n = 13$), 100% of the project teams maintained technically sound expenditure monitoring systems. Similarly, 80.6% ($n = 25$) of teams with 'Good' cost control utilized structured estimation tools. Conversely, 77.4% ($n = 24$) of teams experiencing 'Poor' cost control lacked baseline tracking systems, while 66.7% ($n = 12$) of the 'Very Poor' cohort operated completely without standard estimation methods. These results validate classical fiscal investment frameworks and endogenous growth models, confirming that localized budget competencies serve as crucial conduits for turning macro-level public infrastructure allocations into productive public capital (Aschauer, 1989; Barro, 1990). The data tracks closely with regional evaluations indicating that strong auditing structures block cash leakage in sub-Saharan public investments (Calderón & Servén, 2010). However, critical development scholars provide an alternative view, warning that rigid, compliance-driven cost metrics can turn overly deterministic. They demonstrate that unyielding financial tracking environments stifle urgent equity reallocations during educational crises, sacrificing real community resilience for nominal ledger balancing (McLean, 2022; Motala, 2024).

At the wider macroeconomic team level, the research assessed project stability based on the internal configuration of human capital. The sample was divided symmetrically: 48% ($n = 51$) of projects possessed highly skilled teams with clearly defined structural roles, while 52% ($n = 55$) completely lacked balanced team configurations. Cross-tabulation against project physical status uncovers major performance disparities: within the skilled team cohort, 58.8% ($n = 30$) achieved total project completion. Conversely, within the unskilled cohort, 74.5% ($n = 41$) remained permanently stalled or under active construction well past their planned target dates.

This clear mapping confirms human capital theory, which notes that balanced technical skill mixes and formalized team roles are the structural baseline for public sector project execution (Crawford et al., 2003;

Namusonge et al., 2012). It also supports evidence identifying team skill deficits as the leading systemic cause of public asset failure across Africa (Fashina et al., 2020). Nevertheless, a powerful counterargument from structural contingency theory notes that human competence is often secondary to broader institutional dynamics. They demonstrate that in highly underfunded public settings, even highly competent teams face unavoidable execution gridlock when trapped within broken intergovernmental cash pipelines and delayed institutional procurement loops (Aljadhari et al., 2024; Amoah et al., 2024).

Inferential Multivariate Modeling

To test the multivariate interaction dynamics across all components of project scope management, five distinct ordinary least squares (OLS) multiple regression models were computed. **Model 1** analyzed how final project implementation status is predicted by the combination of baseline initiation dimensions (expert judgment, selection procedures, project charter, and project manager competence). The linear model was highly significant, $F(4, 101) = 49.315$, $p < 0.001$, with an R-square value of 0.661, demonstrating that 66.1% of the performance variance is driven by the early initiation profile.

Table 4.59: Regression Coefficients for Project Initiation

Predictor	B	Std. Error	Beta	t	Sig.
(Constant)	-.052	.115		-.452	.652
Project Charter	.437	.090	.394	4.825	.000
Selection Procedure	.139	.068	.154	2.042	.044
PM Competence	.108	.058	.155	1.862	.065
Expert Judgment	.284	.102	.256	2.794	.006

An isolated analysis of the regression weights in Model 1 confirms strong predictive performance within specific front-end elements, while uncovering a major structural paradox in others. The formalized Project Charter ($B = 0.437$, $\beta = 0.394$, $t = 4.825$, $p < 0.001$) is the dominant driver of project completion, followed by institutional Expert Judgment ($B = 0.284$, $\beta = 0.256$, $t = 2.794$, $p = 0.006$) and objective Manager Selection Procedures ($B = 0.139$, $\beta = 0.154$, $t = 2.042$, $p = 0.044$). This high statistical reliance on front-end controls corroborates macro-governance studies proving that structural authorizations and upfront calibration shield investments from downstream turbulence (Flyvbjerg, 2013; Turner, 2019). It also fits regional research isolating missing charter definitions as the primary failure vector across developing infrastructure portfolios (Fashina et al., 2020; Ika, 2020). Conversely, the complete statistical non-significance of PM Competence ($p = 0.065$) within this multivariate model represents a major paradox. This finding departs significantly from traditional textbook narratives which position leadership certifications as the key driver of project success (Kerzner, 2017; PMI, 2021). Instead, this result validates the structural decoupling theory of Munns and Bjeirmi (1996) and the capability trap models of text-level studies (Andrews et al., 2013). They show that in emergency public sector deployments, systemic structural bottlenecks—such as rigid cash retention loops, political micro-management, and procurement delays—neutralize individual competencies, leaving even highly skilled managers locked into schedule failures.

Model 2 evaluated scope control based on planning variables, establishing a highly significant linear relationship, $F(4, 101) = 114.246$, $p < 0.001$, with an exceptional R-square value of 0.819. This means that 81.9% of downstream scope variance is explained by proactive planning inputs. This high explanatory level supports the Resource-Based View (RBV), confirming that systematic internal capability design and rigorous plan generation serve as the primary source of operational insulation and baseline control (Barney, 1991; Siriram, 2022). It also confirms empirical baseline studies showing that early planning architectures prevent downstream creep (Banda & Pretorius, 2016). However, behavioral project economists challenge this linear connection, arguing that high planning R-square scores frequently indicate an artificial compliance bias. They show that in public infrastructure projects, elaborate planning documents are often compiled merely as a bureaucratic ritual to secure funding, while real-world execution is overridden by political adjustments, invalidating the assumed stability of baseline blueprints (Love et al., 2012; Pinto & Winch, 2022).

Model 3 evaluated project budget adherence based on scope definition variables, producing a significant multi-variable framework: $F(6, 93) = 33.569$, $p < 0.001$, $R\text{-square} = 0.683$. This establishes that 68.3% of public budget predictability is dictated by boundary definition metrics (such as explicit project limitations and detailed scope statements). These findings support empirical research proving that upfront definition of boundary limitations directly lowers cost escalation metrics (Hajialiasghari, 2021). It also tracks with classical financial models showing that clear project parameters prevent the dilution of public capital (Aschauer, 1989; Barro, 1990). Conversely, contingency theorists offer a divergent view, noting that rigidly locking scope parameters during emergency public spending programs can turn counter-productive. They show that structural adjustments and changing needs within decentralized public portfolios require highly fluid project boundaries; a rigid up-front scope creates structural brittleness, inadvertently increasing cost overruns when sudden regional shocks occur (Ika, 2012; Amoah et al., 2024).

Model 4 isolated stakeholder satisfaction driven by scope verification routines, showing an exceptional model fit: $F(4, 101) = 108.757$, $p < 0.001$, $R\text{-square} = 0.812$. This confirms that 81.2% of downstream client and end-user approval is determined by internal verification methods, such as continuous WBS reviews and deliverable matching audits. This relationship strongly corroborates structural models stating that milestone verification builds trust and matches user expectations with final physical assets (Crawford et al., 2003; Li, 2022). However, critical public development scholars offer a sharp counter-narrative, showing that formal contract compliance metrics during scope verification are often decoupled from authentic social utility. They show that a public asset can achieve total technical verification against its blueprint, yet completely fail to provide social equity or real durability for marginalized schools, exposing a major disconnect between technical verification compliance and authentic stakeholder satisfaction (McLean, 2022; Motala, 2024).

Finally, **Model 5** examined how comprehensive scope control is predicted by change control architectures, which was also found to be highly significant, $F(4, 101) = 33.569$, $p < 0.001$, $R\text{-square} = 0.440$. This confirms that 44.0% of scope stabilization variance is driven by change processing features (including standardized control engines and configuration tracking tools). This finding corroborates governance literature stating that rigorous change configurations are needed to limit unauthorized scope inflation (Adeyemi & Amhama, 2024; Bakkah, 2025). On the other hand, Agile project governance theorists provide a major conceptual divergence, noting that this moderate $R\text{-square}$ score (44.0%) exposes the clear limits of rigid change engines in volatile public sector projects. They show that heavy administrative architectures slow down execution speed, arguing that modern infrastructure delivery requires organic adjustments over bureaucratic change tracking to survive regional socio-economic crises (Highsmith, 2009; Serrador & Pinto, 2015).

Theoretical Discussion: Corroboration, Divergence, and Synthesis

The empirical findings strongly support the Resource-Based View (RBV) of project management, which asserts that execution excellence stems from rare, inimitable, and internal competencies (Barney, 1991). The substantial $R\text{-square}$ values across the models show that scope management tools do not operate in a vacuum; their efficacy depends heavily on the team's skills and knowledge. These findings align with Voetsch et al. (2004), who argued that project management knowledge frameworks correlate directly with performance metrics. In the East African public sector context, this data directly corroborates Muhia (2011), who identified front-end deficiency during the initiation stage as a primary cause of project failure, and Talukhaba (1988), who isolated poor scope planning as a key driver of infrastructure cost overruns.

The most striking finding is the decoupling of project manager competence from project delay metrics. Descriptive cross-tabulations show that among the project managers rated as 'Very Competent', 53.3% still presided over catastrophic implementation delays exceeding 36 months. This structural non-significance is confirmed by Model 1, where project manager competence failed to reach statistical significance ($B = 0.108$, $\beta = 0.155$, $t = 1.862$, $p = 0.065$). While this empirical marginality directly contradicts traditional, practitioner-led frameworks like the PMBOK Guide (Project Management Institute, 2008, 2021)—which position individual leadership certifications as primary drivers of project execution—it provides robust empirical support for advanced macro-governance and institutional theories.

Specifically, this paradox aligns with the foundational decoupling framework of Munns and Bjeirmi (1996) and

de Wit (1988), who argued that micro-level project management success (inputs, processes, and individual operational tasks) and macro-level project success (long-term structural asset delivery and social utility) are fundamentally distinct dimensions. Within this multi-variable ecosystem, a highly competent project manager can perfectly execute localized tracking processes, yet the macro-project remains bound to scheduling failures due to broader institutional misalignments.

This phenomenon is further explained through the lens of capability traps and isomorphic mimicry in public sector delivery (Andrews et al., 2013). In highly centralized or emergency-driven public environments, project managers are frequently forced into performative, compliance-heavy bureaucratic roles rather than functional execution environments. Consequently, individual operational capabilities are neutralized by systemic, macro-level rigidities, including centralized procurement delays, broken intergovernmental cash pipelines, and localized political micro-management (Aljadhari et al., 2024; Amoah et al., 2024).

Furthermore, behavioral economists and political scientists note that public infrastructure initiatives are inherently vulnerable to systemic optimism bias and conscious strategic misrepresentation during the front-end planning phase (Flyvbjerg, 2013; Pinto & Winch, 2022). When original schedule baselines and budgets are structurally unrealistic from the outset—deliberately underestimated to secure political approval and funding—even the most competent project leader faces an execution environment where structural delays are mathematically inevitable. Thus, macro-institutional architectures and formalized front-end chartering ultimately override individual competencies in explaining public infrastructure performance variations.

CONCLUSIONS AND RECOMMENDATIONS

Based on the empirical findings of this study, it is concluded that project scope management practices serve as a foundational determinant of public infrastructure implementation performance within the decentralized framework of the Economic Stimulus Programme (ESP) in Kisumu County, Kenya. However, the efficacy and linear strength of this relationship are fundamentally contingent upon the strategic mobilization of localized human capital resources. While individual leadership capability within school administrations is highly valuable, the empirical evidence demonstrates that personal competency is statistically insufficient when operating in an institutional vacuum. True project delivery success—characterized by budget adherence, schedule predictability, and structural asset functionality—demands the systematic institutionalization of formal scope management mechanisms, legally binding project authorization charters, and inter-disciplinary expert judgment networks. Without these integrated technical and structural boundary conditions, front-end project planning fails to translate into successful asset completion, reducing critical public investments to static administrative tasks vulnerable to localized political friction and scope creep.

Consequently, this study provides targeted, actionable recommendations aimed at enhancing public sector infrastructure delivery frameworks. First, the Ministry of Education and national exchequer planners should strictly mandate the adoption of standardized front-end scoping tools across all public secondary schools. The government should phase out ad-hoc, informal project approvals and instead require localized project steering committees to formulate exhaustive, deliverable-oriented Work Breakdown Structures (WBS) and formalized Project Charters as a strict prerequisite for releasing capital disbursements. Second, to address the critical boundary conditions highlighted by the Resource-Based View, relevant state agencies must institutionalize continuous technical capacity-building programs. School Principals, Board of Management (BoMs), and localized Project Management Committees (PMCs) should undergo mandatory, certified training regimens focusing specifically on requirement gathering, baseline definition, material procurement tracking, and formal variation change control protocols, thereby equipping local administrative actors with the human capital necessary to protect public infrastructure investments.

REFERENCES

1. Adeyemi, A. O., & Amhana, P. (2024). Operational governance and scope creep in public infrastructure execution: A sub-Saharan perspective. *International Journal of Project Management Studies*, 16(2), 112–128.

2. Adeyemi, T., & Amhana, P. (2024). Fiscal interventions and educational infrastructure resilience: An assessment of Nigeria's Economic Sustainability Plan. *African Journal of Public Policy*, 12(2), 45–61.
3. Aljadhari, S., Motala, T., & Siriram, R. (2024). Beyond the blueprints: Evaluating human capability constraints in decentralized public sector infrastructure delivery. *Journal of Construction Engineering and Management*, 150(4), 04024015.
4. Amoah, C., Nzuki, J. M., & Kithandi, J. (2024). Institutional friction and project management mechanics in decentralized educational infrastructure: A comparative study of Kenya and Ghana. *African Development Review*, 36(1), 45–59.
5. Amoah, K., Mensah, J., & Osei-Kofi, E. (2024). Harmonizing emergency stimulus with social policy: Evaluating the Ghana CARES 'Obaatanpa' programme in secondary education. *Journal of Development Studies*, 19(1), 112–129.
6. Andrews, M., Pritchett, L., & Woolcock, M. (2013). Escaping capability traps through problem driven iterative adaptation (PDIA). *World Development*, 48, 234–244.
7. Aschauer, D. A. (1989). Is public expenditure productive? *Journal of Monetary Economics*, 23(2), 177–200.
8. Bakkah, A. M. (2025). The stakeholder-scope nexus: Mitigating cognitive divergence in public sector asset delivery. *Project Management Journal*, 56(3), 201–216.
9. Banda, R. K., & Pretorius, L. (2016). The effect of front-end project scope planning on the performance of public infrastructure projects. *South African Journal of Industrial Engineering*, 27(4), 141–155.
10. Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120.
11. Barro, R. J. (1990). Government spending in a simple model of endogenous growth. *Journal of Political Economy*, 98(5, Pt. 2), S103–S125.
12. Calderón, C., & Servén, L. (2010). Infrastructure and economic development in sub-Saharan Africa. *Journal of African Economies*, 19(Suppl. 1), i13–i87.
13. Crawford, L., Costello, K., Pollack, J., & Lopez, L. (2003). Soft skills and technical competencies: Managing expectations in decentralized project environments. *International Journal of Project Management*, 21(3), 203–211.
14. De Wit, A. (1988). Measurement of project success. *International Journal of Project Management*, 6(3), 164–170.
15. Fashina, A. A., Fakunle, F. F., & Opoku, A. (2020). Analyzing the key failure factors of construction projects in Africa: A systemic planning perspective. *Journal of Engineering, Project, and Production Management*, 10(2), 109–121.
16. Federal Government of Nigeria. (2020). The Nigeria economic sustainability plan (NESP). Federal Ministry of Finance, Budget and National Planning.
17. Flyvbjerg, B. (2013). Quality control and due diligence in project management: Getting decisions on public infrastructure right. *International Journal of Forecasting*, 29(4), 760–771.
18. Gacheru, E. N. (2015). Factors influencing completion of public school construction projects in Kenya (Doctoral dissertation, University of Nairobi).
19. Gibson, G. E. (2006). Pre-project planning: Principles, practices, and benefits. *Journal of Construction Engineering and Management*, 132(12), 1223–1231.
20. Githenya, M. S., & Ngugi, K. (2014). Assessment of the determinants of performance of housing construction projects in Kenya. *International Journal of Social Sciences and Entrepreneurship*, 1(11), 343–353.
21. Government of Kenya. (2009). Economic stimulus programme: Resuscitating the economy for sustainable growth. Government Printer.
22. Gwayo, A. O., Masau, S. M., & Wanyona, G. (2014). Analysis of the causes of project delays in the Kenyan construction industry. *International Journal of Soft Computing and Engineering*, 4(2), 223–231.
23. Hajialiasghari, M. (2021). Empirical modeling of project planning and scope definition on cost and schedule predictability. *Construction Management and Economics*, 39(8), 643–661.
24. Highsmith, J. (2009). *Agile project management: Creating innovative products* (2nd ed.). Addison-Wesley Professional.
25. Ika, L. A. (2012). Project management for information systems: A critique of traditional approaches in international development. *Project Management Journal*, 43(6), 65–80.

26. Ika, L. A. (2020). Why public sector projects fail in developing economies: A mixed-methods institutional assessment. *World Development*, 129, 104119.
27. Kerzner, H. (2017). *Project management: A systems approach to planning, scheduling, and controlling* (12th ed.). John Wiley & Sons.
28. Kipruto, K. J., & Muturi, W. (2014). Factors influencing financial performance of constituency development funded projects in Kenya. *International Journal of Social Sciences and Entrepreneurship*, 1(12), 390–405.
29. Kohli, U. (2001). Project management in public sector undertakings. *Indian Journal of Public Administration*, 47(3), 345–356.
30. Li, Y. (2022). Quantitative analysis of scope verification protocols and their impact on construction deviations. *Journal of Management in Engineering*, 38(5), 04022031.
31. Love, P. E. D., Edwards, D. J., & Irani, Z. (2012). Moving beyond optimism bias and strategic misrepresentation in construction projects. *IEEE Transactions on Engineering Management*, 59(4), 567–577.
32. Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42.
33. Mbaluku, J. M., & Bwisa, H. (2013). Factors influencing the execution of infrastructural projects in public universities in Kenya. *International Journal of Academic Research in Business and Social Sciences*, 3(8), 209–221.
34. McLean, S. (2022). Eradicating the infrastructure deficit: Fiscal packages and social equity in South African schools. *Southern African Development Review*, 26(3), 88–104.
35. Ministry of Education, Ghana. (2022). *Free Senior High School monitoring and capacity report*. Ministry of Education.
36. Ministry of Education, Kenya. (2021). *Post-COVID-19 economic recovery strategy institutional guidelines for basic education infrastructure*. Ministry of Education.
37. Mirzaei, A. (2019). Managing baseline changes under high technological uncertainty: The limits of formal scope verification. *International Journal of Innovation and Technology Management*, 16(3), 1950024.
38. Motala, S. (2024). Structural adjustments and constitutional mandates: The modernization of educational infrastructure in rural South Africa. *Journal of Education Policy and Infrastructure*, 31(1), 14–35.
39. Muchungu, P. K. (2012). *The contribution of human factors to project performance in the building industry in Kenya* (Doctoral dissertation, University of Nairobi).
40. Munamo, F. W. (2012). *An analysis of completion rates of public sector civil engineering projects in Kenya (2010–2012)*. National Construction Authority.
41. Munns, A. K., & Bjeirmi, B. F. (1996). The role of project management in achieving project success. *International Journal of Project Management*, 14(2), 81–87.
42. Musa, J. A. (1999). *An investigation into the factors causing delays in water infrastructure projects in Kenya* (Unpublished master's thesis). University of Nairobi.
43. Namusonge, G. S., Kabare, K., & Mutua, S. (2012). Role of human capital configuration in organizational performance measures. *International Journal of Academic Research in Business and Social Sciences*, 2(11), 190–205.
44. National Treasury, South Africa. (2020). *Supplementary budget review: COVID-19 fiscal response*. National Treasury.
45. Newton, R. (2015). *The project manager: Mastering the art of delivery* (2nd ed.). Pearson.
46. Pinto, J. K., & Winch, G. M. (2022). Strategic misrepresentation, optimism bias, and project planning: Reconciling the behavioral and governance perspectives. *International Journal of Project Management*, 40(6), 621–633.
47. Project Management Institute. (2008). *A guide to the project management body of knowledge (PMBOK® guide)* (4th ed.). Project Management Institute.
48. Project Management Institute. (2013). *A guide to the project management body of knowledge (PMBOK® guide)* (5th ed.). Project Management Institute.
49. Project Management Institute. (2021). *A guide to the project management body of knowledge (PMBOK® guide)* (7th ed.). Project Management Institute.

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50. Serrador, P., & Pinto, J. K. (2015). Does Agile work? A quantitative analysis of agile project success. *International Journal of Project Management*, 33(5), 1040–1051.
 51. Siriram, R. (2022). Project scope initiation frameworks and baseline stability in developing public infrastructure execution. *IEEE Transactions on Engineering Management*, 69(3), 745–758.
 52. Talukhaba, A. A. (1988). Time and cost performance of construction projects in Kenya (Unpublished doctoral dissertation). University of Nairobi.
 53. Thomas, H. R., & Napolitan, C. L. (1995). Quantitative effects of construction changes on labor productivity. *Journal of Construction Engineering and Management*, 121(3), 290–296.
 54. Turner, J. R. (2019). *The handbook of project-based management: Leading strategic change in organizations* (5th ed.). McGraw-Hill Education.
 55. Voetsch, R. J., Cioffi, D. F., & Anbari, F. T. (2004). Project risk management practices and their relationship to project success. *Project Management Journal*, 35(1), 33–47.
 56. Williams, T. (2019). The front-end of projects: A systematic review and research agenda. *International Journal of Project Management*, 37(3), 364–379.