International Journal of
Project Management
(IJPM)

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International Journal of Project Management
ISSN 2790-5578 (online)
Vol.7, Issue 1, pp 1 - 22, 2024

www.ajpojournals.org

An Investigation of Factors Influencing Construction Project Planning in South Sudan's Public Road Projects

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Article history
Submitted 04.11.2024 Revised Version Received 10.12.2024 Accepted 14.01.2025

Abstract

Purpose: The purpose of this study is to investigate the factors influencing project planning in public road projects in South Sudan. It aims to identify key challenges and opportunities, contributing to the development of more effective planning practices to enhance infrastructure development and support economic growth.

Materials and Methods: A descriptive research design was employed, incorporating both qualitative and quantitative approaches. Primary data were collected through structured questionnaires targeting professionals in public road projects across South Sudan. Secondary data were gathered from existing literature and official reports. Data analysis utilized the Relative Importance Index (RII) to rank factors influencing project planning.

Findings: The study identifies intergovernmental factors, resource availability, technological infrastructure, and project-specific characteristics as critical determinants of project planning adequacy. It reveals significant gaps in defining project objectives, realistic scheduling, cost estimation, and risk management. The findings underscore the need for enhanced intergovernmental coordination, investment in skilled labor, and adoption of advanced project management tools to address planning deficiencies.

Implications to Theory, Practice and Policy: The research builds on institutional and contingency theories, highlighting the interplay of environmental, organizational, and contextual factors in planning outcomes. For practitioners, it provides actionable insights to improve project planning practices. For policymakers, the study recommends strengthening governance frameworks, standardizing processes, and fostering transparency in planning and implementation.

Keywords: *R42-Project Planning, Public Road Projects, South Sudan, Infrastructure Development, Resource Management*

1.0 INTRODUCTION

Infrastructure development is vital for economic growth and societal progress in any nation, particularly in developing countries like South Sudan. Robust transportation networks are essential for enabling trade, improving access to services, and fostering national cohesion. In South Sudan, where the economy largely depends on agriculture and oil exports, efficient road infrastructure is indispensable for market access, economic diversification, and reducing poverty. Despite its strategic importance, road infrastructure in South Sudan remains severely underdeveloped, hindering economic activity and social development. The lack of proper road networks isolates communities, increases transportation costs, and hampers service delivery, exacerbating the country's developmental challenges. Recent reports indicate that over 80% of South Sudan's road network is in poor condition, significantly impacting transportation costs and access to essential services World Bank, (2020).

South Sudan, which gained independence in 2011, is the youngest nation in the world. However, decades of civil conflict have left it grappling with an acute infrastructure deficit. According to the Africa Development Bank, (2019), only about 2% of the country's roads are paved, with the majority being dirt roads that become impassable during the rainy season. As the nation strives to rebuild, developing its public road network is a key priority, given the strategic importance of connectivity for economic recovery and social cohesion.

The planning and execution of public road construction projects in South Sudan face unique challenges. The nation is characterized by a fragile political environment, limited financial resources, and a lack of technical capacity, all of which hinder effective project implementation. Efficient planning is critical as it ensures resource optimization, risk mitigation, and timely project delivery. However, the absence of systematic planning processes often results in project delays, budget overruns, and poor-quality infrastructure that fails to meet public needs Munns & Bjeirmi, (1996) and Harold Kerzner (2015).

Understanding the factors influencing planning and execution in public road projects is essential for addressing these inefficiencies. These factors include political instability, weak governance, limited local expertise, and challenging environmental conditions. This research focuses on identifying and analyzing these factors to improve the planning and execution of road construction projects in South Sudan, contributing to sustainable development.

The existing body of knowledge on infrastructure development in South Sudan primarily addresses the broad challenges of post-conflict reconstruction and economic recovery. However, few studies have examined the specific challenges associated with the planning and execution of public road projects. While studies by Ali et al. (2021) and the African Development Bank (2022) highlight the difficulties in implementing infrastructure projects in fragile contexts, they lack a comprehensive focus on the interplay of factors that directly affect project planning and execution in South Sudan.

These challenges have significant implications for the planning processes of public road construction projects. Political instability often disrupts project timelines, while weak governance

structures can lead to inefficiencies, corruption, and misallocation of resources(Aali-Bujari & Venegas-Martínez, 2021) (Ali et al., 2021; World Bank, 2020). Limited financial resources constrain the scope of planning, reducing investments in feasibility studies, environmental impact assessments, and stakeholder consultations (African Development Bank, 2019; Ofori, 2015). Moreover, the lack of local expertise results in poorly defined project scopes and inadequate risk management strategies, further complicating the planning phase (Munyoki et al., 2020). The unpredictable environmental conditions, including heavy rains and flooding, exacerbate these challenges, making it difficult to develop reliable construction schedules and cost estimates (Mohammed & Adamu, 2022). Addressing these issues requires a tailored approach to planning that accounts for South Sudan's unique context and enhances the resilience of infrastructure projects (Ali et al., 2021; Nyoni & Batta, 2020).

Moreover, global research on construction project planning often assumes stable political and economic conditions, which are not representative of South Sudan's unique post-conflict environment. Consequently, there is a critical gap in understanding how local socio-political, economic, and environmental factors impact project outcomes. This study seeks to address this gap by conducting a detailed investigation into the specific challenges and opportunities in the planning and execution of public road construction projects in South Sudan.

Problem Statement

The failure to complete projects on time is a significant issue in many developing countries, where 79% of projects do not meet their objectives. Critical problems such as performance issues, cost overruns, delays, and quality shortcomings often stem from weaknesses in the selection, planning, execution, and control phases of projects. (Munyoki, 2016) highlights ineffective planning as a crucial factor contributing to project failures, especially in nations like South Sudan. The lack of thorough planning leads to projects starting without comprehensive project outlines, which hinders effective execution.

The repercussions of these failures extend beyond individual projects, influencing the economy and political landscape. Overextended project timelines require additional resources, driving up labour, materials, and equipment costs. This increased expenditure affects the specific project and has a ripple effect on other initiatives and the broader economy, restricting access to essential public services and stifling overall economic growth. Critical areas such as infrastructure, construction, manufacturing, and IT play a vital role in generating outputs for multiple sectors of the economy.

Inadequate infrastructure is a critical challenge in various regions, as pointed out by a baseline survey from the Institute of Certified Public Accountants of Kenya (2014). South Sudan also faces significant infrastructural deficiencies that hinder development, highlighted by the Audit Report on the Juba-Bahr el Ghazal Road, which revealed fund mismanagement and poor construction practices. These issues create substantial barriers to progress and sustainability, which are crucial for the nation's growth.

A notable case is South Sudan's oil-for-road agreement with China, which is intended to leverage oil resources for infrastructure improvements. However, lacking solid project plans and cost

estimates has resulted in resource management inefficiencies and increased risks. The Project Management Institute PMI, (2013) emphasises that poor planning consistently leads to project failures across various domains. This underscores the need for meticulous planning in road construction projects to avoid incomplete reporting and flawed success metrics from the beginning. This study aims to investigate how project planning influences the success of road construction projects in South Sudan, focusing on challenges encountered in significant initiatives like the Juba-Bahr el Ghazal Road.

By tackling this research problem, the study endeavours to contribute constructively to the discourse on public road project planning in South Sudan. The goal is to unearth insights that can refine the planning and execution processes, paving the way for more efficacious project delivery. In doing so, the research holds the potential to catalyse a paradigm shift in how road construction projects are conceptualised, planned, and implemented in South Sudan, ultimately leading to the realisation of robust and reliable public infrastructure that stands the test of time and serves the needs of its citizens. Investigating the factors influencing project planning in South Sudan's public road projects is not merely an academic exercise but a critical inquiry with tangible implications for the nation's development trajectory. However, rectifying the systemic flaws that impede progress and laying a solid foundation for a future where infrastructure facilitates, rather than frustrates, the journey towards prosperity and stability is a crucial step.

2.0 LITERATURE REVIEW

Theoretical Review

Institutional Theory

Institutional theory has been pivotal in shaping our understanding of organizational behavior and decision-making processes across various sectors, including construction Scott's Institutionalism is a foundational theory in the field, articulated by Scott, (1995). For example, in South Sudan, the absence of a comprehensive regulatory framework for construction planning hinders effective implementation, as highlighted by World Bank (2020), which notes that weak regulatory enforcement increases project delays and non-compliance by contractors. The normative pillar reflects societal norms and professional standards, such as those set by industry associations. However, according to Fashina et al.(2021), South Sudan's construction sector suffers from limited professional development opportunities, which weakens adherence to global standards. Lastly, the cultural-cognitive pillar captures shared beliefs and values that guide decision-making. For instance, Makoond et al. (2020) observed that cultural biases toward resource allocation often favor certain localities, exacerbating regional disparities in project implementation.

DiMaggio & Powell (2000) introduced the concept of Institutional Isomorphism, which describes how organizations within similar fields tend to become more alike due to coercive, mimetic, and normative pressures. Coercive isomorphism stems from legal requirements and regulations; mimetic isomorphism emerges from the desire to emulate successful peers; and normative isomorphism is driven by professional norms and standards. Coercive isomorphism results from legal requirements and regulatory pressures. In South Sudan, coercive forces are weakened by

inconsistent enforcement of building codes, as identified by UNDP (2019), which has led to substandard infrastructure development. Mimetic isomorphism, where organizations emulate successful peers, is common in South Sudan's construction projects as contractors adopt similar methodologies to mitigate risks. However, this approach often leads to uniformity, limiting innovation Fashina et al.(2021). Lastly, normative isomorphism, driven by professionalization and shared industry standards, remains underdeveloped due to the lack of robust professional bodies in the country.

Further enriching the discussion, Douglas C. North, (1990) through North's Transaction Cost Economics focuses on the costs associated with economic exchanges and the structures that organizations adopt to minimize these costs. North argued that institutions play a critical role in shaping economic performance by reducing uncertainty and facilitating transactions. In South Sudan's context, the numerous challenges, including corruption and inadequate infrastructure, can elevate transaction costs, thereby influencing planning and decision-making processes in construction projects.

In this study, the institutional theory provides a comprehensive framework to understand the complexities influencing construction project planning in South Sudan's public road projects. Integrating insights from Scott's Institutionalism, DiMaggio and Powell's Institutional Isomorphism, and North's Transaction Cost Economics, the study able to identify the external and internal factors shaping project planning outcomes. This theoretical foundation not only enhances the study's academic rigor but also contributes practical insights that can inform policymakers and practitioners in the field.

Resource-Based View (RBV) Theory

The Resource-Based View (RBV) theory, primarily developed by Birger (1984) and Jay Barney, (1991) posits that a firm's sustained competitive advantage stems from its unique and valuable resources and capabilities. These resources must be valuable, rare, inimitable, and non-substitutable (VRIN) to provide a lasting competitive edge Jay Barney (1991).

This study utilize the RBV to examine how access to resources like skilled labor, advanced technology, financial capital, and effective project management practices affects project planning success. For instance, the availability of experienced engineers and planners (a valuable and rare resource) could significantly influence the quality of planning and the ability to mitigate risks. Similarly, access to modern surveying equipment and project management software (rare and potentially inimitable resources) can enhance planning efficiency and accuracy. Conversely, a lack of these resources could lead to delays, cost overruns, and ultimately, project failure Jay Barney, (1991).

Access to skilled labor, such as experienced engineers and project planners, is a valuable and rare resource in the South Sudanese construction sector. As argued by Jay Barney (1991) these resources can significantly enhance the quality of project planning and risk mitigation strategies. However, empirical studies have identified skill shortages in developing countries as a major challenge to construction project success Ofori-Kuragu et al.(2016) . In South Sudan, where the

Engineering Council reports a limited pool of qualified construction professionals 'South Sudan Engineering Council, 2022', this scarcity is a key hindrance to efficient project planning.

Similarly, access to advanced technology, including modern surveying equipment and project management software, exemplifies resources that are not only rare but also potentially inimitable. Studies in infrastructure development have shown that technology adoption improves planning efficiency and accuracy, reducing delays and cost overruns Chan & Chan (2004). In South Sudan, however, the lack of access to such technologies due to financial constraints and limited technical expertise exacerbates planning challenges. For instance, the unavailability of modern GIS tools and simulation software in many public works projects often results in suboptimal decision-making and resource misallocation

Furthermore, the RBV emphasizes the importance of organizational capabilities in leveraging resources effectively. This includes the ability to coordinate diverse teams, adapt to changing conditions, and manage risks. The study investigate how strong organizational capabilities within the South Sudanese public works sector contribute to or hinder effective project planning. For example, strong internal coordination mechanisms might overcome the scarcity of certain resources, whereas a lack of such capabilities could exacerbate the negative impact of resource constraints Birger (1984).

In this study the RBV provides a robust theoretical framework for analyzing the impact of resources and capabilities on construction project planning in South Sudan. By examining the VRIN attributes of resources and the development of key organizational capabilities, the research can gain valuable insights into what makes some projects more successful than others. The findings can inform policy recommendations to improve resource allocation and enhance planning processes within the public sector. This framework aids in understanding the contextual factors impacting resource utilization and contributes to a better comprehension of the challenges specific to the South Sudanese context (Birger, 1984; Jay Barney, 1991).

Systems Theory

System theory, extensively developed by classical theorist Ludwig (1968), effectively supports the exploration of factors influencing construction project planning in South Sudan's public road projects. System Theory asserts that complex entities, such as construction projects, should be understood as integrated wholes rather than merely as collections of individual parts. The central idea is that different components of a system interact and influence one another, which is vital for comprehending the intricate dynamics involved in construction project planning.

The central premise of System Theory is the interaction between different system components, emphasizing how changes in one element can affect the entire system. This concept is highly relevant to construction projects in South Sudan, where factors such as stakeholder engagement, resource availability, and political stability are deeply interlinked. For instance, Zarewa (2019) Oyedele et al. (2013) Barriers to Effective Stakeholder Management in the Delivery of Multifarious Infrastructure Projects in Nigeria. These challenges are exacerbated in South Sudan by the lack of consistent communication channels among stakeholders, including government agencies, contractors, and local communities.

Moreover, resource constraints, including financial and material shortages, frequently disrupt planning processes. According to a study by Gidado (2004), resource allocation inefficiencies significantly contribute to delays and cost overruns in developing countries. In South Sudan, limited government budgets and dependency on external funding amplify these issues, further complicating project timelines and execution strategies.

Boulding (1956), another notable contributor to System Theory, introduced the notion of mutual coupling systems, highlighting the interdependence present in planning processes. This interdependence is crucial for understanding the diverse stakeholders involved in public road projects in South Sudan, ranging from government agencies to local communities, and it underscores the importance of collaboration and communication.

Applying System Theory to this research reveals that a comprehensive understanding of the factors influencing construction project planning necessitates considering the interconnected elements within the system. This approach enables a nuanced analysis of how various factors, be they social, economic, or political, impact road construction projects. Therefore, System Theory not only frames the investigation but also provides methodological guidance for assessing the complexities inherent in construction project planning in South Sudan Boulding, (1956) and Ludwig (1968).

Contingency Theory

Contingency Theory has emerged as a significant framework in understanding organizational behavior and effectiveness, particularly in dynamic environments like construction project planning Fiedler (2015). This theory, prominently developed by classical theorists such as Fred Fiedler, posits that there is no one best way to manage an organization or project; instead, the optimal course of action is contingent upon various internal and external factors. In the context of public road projects in South Sudan, it is essential to explore the nuances of this theory to understand the interplay of different variables influencing project planning. .

Moreover, the work of other researchers, including Paul Lawrence and Jay Lorsch, expanded on these ideas, highlighting the importance of aligning organizational strategies with environmental demands. Their research underscores the principle that effective project planning must consider the unique challenges posed by the construction environment in South Sudan, which may involve adapting strategies to fit local conditions and stakeholder needs Lawrence & Jay, (2014). Empirical studies have highlighted that inadequate financial resources hinder the planning and execution phases of road projects, often leading to delays and incomplete projects Ngong et al. (2023). These resource limitations necessitate an adaptive planning approach that accounts for funding cycles and integrates contingency plans to mitigate disruptions.

Resource scarcity and its impact on project planning also underscore the relevance of Contingency Theory. A study by Paul (2023) found that many public road projects in South Sudan face equipment shortages and logistical challenges, which often derail planning processes. In such scenarios, project managers must adapt by prioritizing resource allocation or exploring partnerships with international organizations to fill gaps. This adaptability, as advocated by Contingency Theory, enhances the likelihood of project success in resource-constrained environments.

In conclusion, Contingency Theory serves as a vital lens for examining the factors impacting construction project planning in South Sudan's public road initiatives. By recognizing that no single management style fits all situations, this theory encourages project planners to adapt their strategies based on contextual realities. Such an adaptable approach can improve project outcomes, ultimately contributing to the nation's broader efforts to develop its infrastructure.

Conceptual Framework

Conceptual Framework

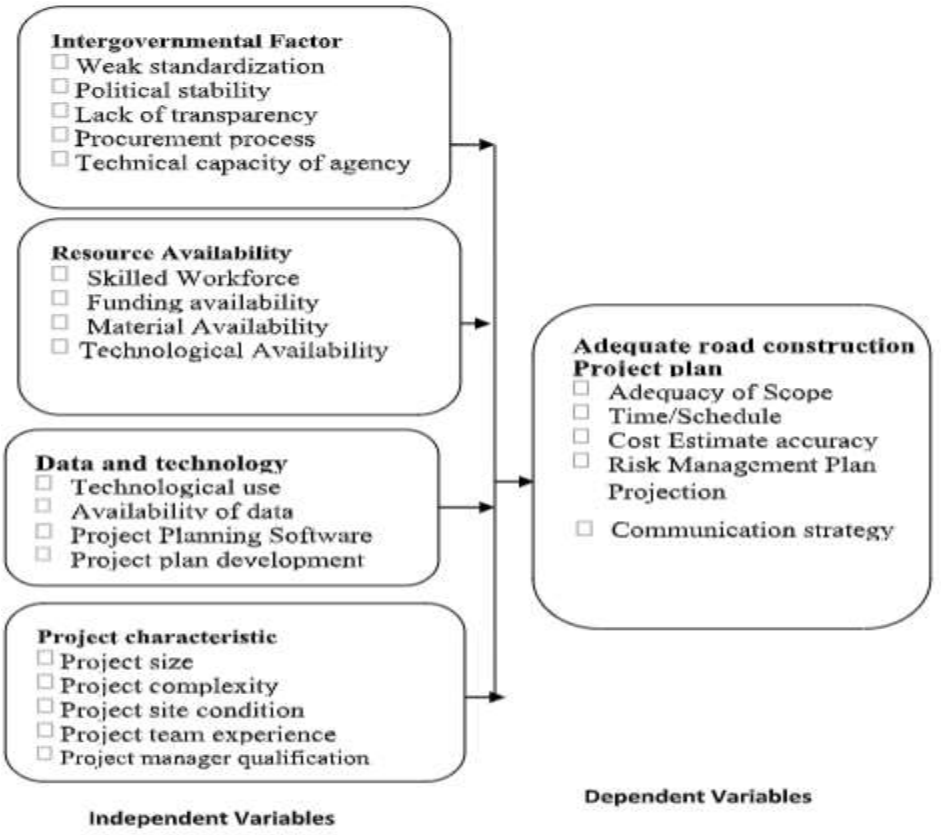

Figure 1: Conceptual Framework

Source; Researcher (2024)

Research Gaps

Despite the growing body of literature on construction project planning, significant gaps remain in understanding the specific factors influencing planning processes in the unique context of South Sudan. Studies conducted in other countries, such as Zambia, have identified key challenges like political influence, poor prioritization, and contract procurement issues Majumder et al. (2022). However, these studies often lack the depth and specificity required to understand the South Sudanese context. For example, while Benedict (2018) and Khanani et al.(2021)underscored the importance of effective planning in improving project performance, they did not adequately

address the unique challenges of operating in a fragile and conflict-affected environment like South Sudan.

Factors such as ongoing insecurity, weak governance structures, and limited access to resources significantly differentiate South Sudan from more stable countries like Kenya or Zambia. These unique challenges necessitate a localized investigation to understand how they impact planning processes, resource allocation, and ultimately, project success. This study aims to examine the relationship between critical factors such as political instability, resource constraints, stakeholder engagement, and community perceptions, and project delays in South Sudan's public road projects.

The contexts in Kenya and Zambia, while facing their own development challenges, differ significantly from South Sudan. Kenya and Zambia have more established governance structures, relatively stable political environments, and more developed infrastructure. In contrast, South Sudan grapples with ongoing conflict, weak institutions, underdeveloped infrastructure and a fragile security environment. These factors significantly impact the planning and implementation of infrastructure projects. For example, the constant threat of violence can disrupt project timelines, hinder access to construction sites, and displace communities, leading to unforeseen delays and cost overruns. Moreover, the presence of armed groups, the lack of reliable data, and the limited capacity of government institutions pose unique challenges to contractors and international professional that are not fully captured by studies conducted in more stable contexts.

3.0 MATERIALS AND METHODS

Research Design

A research design is an arrangement of conditions for data collection and analysis that combines relevance to the research purpose with economy in the procedure C.R.Kothori (2016). The study adopted a mixed of qualitative and quantitative research design to systematically investigate and quantify the factors influencing project planning in the public road sector. Quantitative research was chosen for its strength in providing statistical evidence and generalizing findings across a larger population Alan Bryman (2016). This approach allows for the collection of numerical data that can be analyzed to identify patterns, relationships, and significant factors affecting project planning.

Given the budget constraints that precluded the use of focus groups, the study utilized semi-structured questionnaires as the primary data collection tool. Semi-structured questionnaires were selected for their ability to combine structured, quantitative data with some flexibility for detailed responses Alan Bryman, (2016). This method allowed for the collection of specific, quantifiable data on various dimensions of project planning while also capturing nuanced insights through open-ended questions.

Target Population

A target population is all the members of a natural or hypothetical set of people, events or objects to which a researcher wishes to generalise the research study results Alan Bryman (2016). The study was carried out in South Sudan. Currently, there are national trunk roads are currently

ongoing. Therefore, the target population for this study consisted of employees in all the 7 Government road projects in South Sudan.

Sampling Techniques and Sample Size

The study determined the sample size by following the recommendations of Mugenda & Mugenda, (2003), which suggest selecting 30% of the target population for a representative sample when recommend that when the target population is small (less than 1000 members), a minimum sample of 30% is adequate for research. Based on data from the Ministry of Roads and Bridges, four companies engaged in significant road projects in South Sudan were identified. These projects include the Juba-Tereka Road, Tereka-Rumbek Road, Wau-Aweil-Meriam Road, Juba-Napal Road, and Juba-Road Road. To ensure a proportional representation of personnel from each company, a stratified sampling approach was employed, taking into account the total number of personnel employed.

The sample size was calculated as 30% of the personnel from each company, resulting in the following distribution: Company Reg No. 671, with 100 personnel, contributed 30 participants; Company Reg No. 1075, with 55 personnel, contributed 17 participants; Company Reg No. 791, with 50 personnel, contributed 15 participants; and Company Reg No. 2086, with 45 personnel, contributed 13 participants. This stratification led to a total sample size of 75 participants.

The source of the company registration data was the Department of Register of Companies and Corporates within the Ministry of Justice and Constitutional Development. By stratifying based on company personnel size, the study ensured equitable representation across the major road projects, allowing the collected data to reflect diverse experiences and practices in construction project planning within South Sudan. This approach was particularly vital for capturing variations among companies, given their differing roles and capacities within the road construction sector.

Data Collection Process

Distribution of Questionnaires

The semi-structured questionnaires were distributed directly as electronic means were not suitable. Direct delivery was used for respondents located within Juba and neighbouring areas. To improve the response rate, the enumerator filled out the questionnaires in the office. The process took approximately an hour per questionnaire, so one enumerator filled out at least four daily questionnaires.

Data Collection Period

Data collection was conducted over three months. This timeframe allowed for comprehensive engagement with the sample, sufficient response collection, and management of any logistical issues that arose.

Response Management

To maximize the response rate, follow-up visited are conducted to non-respondents, and reminders were to set time for the assessment. Efforts were made to address any queries or concerns from respondents promptly, ensuring clarity and completeness of the data collected.

Data Analysis and Presentation

Data was collected, examined, and checked for completeness and clarity. The data was collected and analyzed quantitatively. Numerical data was collected using questionnaires, which were coded, entered, and analyzed using descriptive statistics with the help of the Statistical Package for Social Scientists (SPSS) program 20. Frequency tables with varying percentages were used to present the findings, and tables of mean and standard deviation obtained from SPSS were also used to represent the findings. Qualitative data was analyzed based on the content matter of the responses. Responses with common themes or patterns were grouped into coherent categories. Descriptive statistics involved the use of absolute and relative (percentages) frequencies, measures of central tendency and dispersion (mean and standard deviation, respectively). Quantitative data was presented in tables and graphs, and explanations were presented in prose. In addition, the researcher used the Relative Importance Index to establish the strength of the relationship between construction planning and its determinants.

This study used the Relative Importance Index (RII) as a statistical tool to analyze and establish the relationship between construction planning and its determinants. The RII is a widely recognized method in construction management research to rank variables according to their relative importance based on participants' responses. It is particularly effective in identifying and prioritizing factors influencing construction project planning by quantifying subjective assessments into measurable values.

Calculation of the Relative Importance Index:

The RII was computed using the following formula:

$RII = \sum W / (A * N)$

Where:

W is the weight assigned to each factor by the respondents, based on the Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).

A is the highest possible weight (in this case, 5, which represents "very important").

N is the total number of respondents.

The RII ranges from 0 to 1, where values closer to 1 indicate that the factor is more important in influencing construction project planning.

4.0 FINDINGS

Response Rate

The study focused on 75 respondents involved in public road construction projects in South Sudan. Out of the 75 distributed questionnaires, 72 were completed and returned, resulting in a 96 per cent response rate. This response rate is considered reliable for data analysis. According to Mugenda, & Mugenda (2003), a response rate of 50 percent is adequate for generalization, 60 per cent is good, and 70 per cent and over is excellent

Table 1: Response Rate

Response	Frequency	Percent
Returned	72	96%
Unreturned	3	4%
Total	**75**	**100%**

Construction Project Planning Adequacy

Table 2: Assessing Construction Project Planning Adequacy

Statements	SD	D	N	A	SA	Mean	Std. Dev
How clearly defined are project objectives, deliverables, and limitations within the project plan?	57% (41)	32% (23)	6% (4)	3% (2)	3% (2)	1.63	.926
How detailed are project timelines and milestones in the schedule plan? Are they clear and realistic?	6% (4)	51% (37)	36% (26)	3% (2)	4% (3)	2.49	.822
Are these schedules actively used to monitor progress and identify potential delays?	54% (39)	1% (1)	42% (30)	1% (1)	1% (1)	1.94	1.073
How accurate are cost estimates typically included in the project plans?	7% (5)	6% (4)	44% (32)	32% (23)	11% (8)	3.35	.995
How effectively are budgets monitored throughout the construction phase?	53% (38)	3% (2)	1% (1)	3% (2)	40% (29)	2.75	1.941
How well do project plans identify, assess, and propose mitigation strategies for potential risks and challenges?	21% (15)	25% (18)	24% (17)	21% (15)	9% (7)	2.74	1.278
To what extent do project plans outline strategies for communicating with and involving relevant stakeholders (government agencies, communities, contractors)?	21%	26%	13%	15%	25%	2.97	1.510

The findings from the analysis shown in Table 2 provide crucial insights into the adequacy of construction project planning in South Sudan's public road projects, revealing significant gaps in several planning dimensions.

The results indicate that project objectives, deliverables, and limitations are inadequately defined within project plans, as evidenced by 57% of respondents strongly disagreeing with the clarity of these elements, and only 3% agreeing. The mean score of 1.63 and a standard deviation of 0.926 highlight a lack of consensus on effective project scoping and goal setting. This aligns with findings from Ofori et al. (2021), who emphasized that poorly defined objectives are a leading cause of project inefficiencies in sub-Saharan Africa. Clearly defined project parameters are critical for guiding implementation and ensuring stakeholder alignment, and their absence could lead to mismanagement and scope creep.

Regarding the detail and realism of project timelines and milestones, 51% of respondents disagreed with their adequacy, resulting in a mean score of 2.49 (SD = 0.822). The findings suggest that while timelines are included, they are often not realistic or actionable. This is consistent with research by Amare et al. (2017) and Rivera et al. (2020), who noted that unrealistic scheduling is a common issue in developing countries, often leading to delays and cost overruns. The lack of detailed and actionable milestones likely hampers effective monitoring and progress evaluation.

The active use of schedules for progress monitoring received similarly low ratings, with 54% of respondents strongly disagreeing. The mean score of 1.94 (SD = 1.073) further underscores that schedules are rarely used as a tool to identify and address delays proactively. This finding reflects the challenges identified by Ahmed and Hassan (2019), who observed that monitoring mechanisms are often underutilized in low-resource settings due to limited technical capacity and oversight.

Cost estimates appear to be moderately adequate, with 44% of respondents being neutral and a mean score of 3.35 (SD = 0.995). However, 32% of respondents agreed that cost estimates were accurate, indicating that some efforts are made to estimate costs appropriately. Nevertheless, these findings also suggest room for improvement, as inaccuracies in cost estimation can lead to budgetary constraints during implementation, a concern highlighted by World Bank (2021).

Budget monitoring during the construction phase emerged as a significant concern, with 53% of respondents strongly disagreeing that it is effectively conducted. The high standard deviation (1.941) suggests considerable variability in opinions, reflecting inconsistencies in budget tracking practices. According to Nyakundi, (2015), effective budget monitoring is crucial for mitigating financial risks and ensuring fiscal discipline in construction projects. The findings imply that inadequate budget oversight may contribute to financial inefficiencies and delays in South Sudan's road projects.

Project plans demonstrate moderate inadequacy in identifying, assessing, and proposing mitigation strategies for potential risks. With a mean score of 2.74 (SD = 1.278), the responses reveal that many risks remain unaddressed in planning phases. This corroborates the work of Mahe & Umar (2021), who noted that risk management practices are often overlooked in public infrastructure projects, leading to vulnerabilities during execution.

The extent to which project plans outline strategies for stakeholder communication received mixed responses, with a mean score of 2.97 (SD = 1.510). While 25% of respondents strongly agreed on the adequacy of these strategies, 26% disagreed, and 21% strongly disagreed, reflecting divergent experiences with stakeholder involvement. Effective communication with stakeholders, including government agencies, communities, and contractors, is crucial for project success, as emphasized by Kalu & Rugami (2021). The variability in responses highlights the inconsistent implementation of communication strategies in South Sudan's public road projects.

Factors Influencing Construction Project Planning

According to the study, the factors influencing construction project planning include intergovernmental factors related to planning, Availability of resources for planning, availability of data and technology for planning, characteristics of the project being planned, and external factors.

Inter-Governmental Factors

The following is a survey of respondents' views on the most influential factors in construction planning. According to the table, national design and construction method plan standards were identified as the most influential factor in construction project planning, with a relative importance index of 0.84. Additionally, lack of transparency in the planning process (0.80), political instability (0.77), procurement regulation (0.72), and knowledge-sharing mechanisms were listed as the top five most significant factors influencing construction project planning in South Sudan. Other determinants include government agency technical expertise (0.42), government policies (0.37), availability of administrative support (0.36), prequalification criteria for contractors (0.35), and public trust in government institutions (0.34), in that order

Table 3: Intergovernmental Factors That Affect Project Planning

S/N	Statement	SD	D	N	A	SA	RII	R
1	Lack of national standards	3	6	9	120	165	0.84	1
2	Lack of transparency	3	10	21	128	125	0.80	2
3	Political instability	5	6	21	156	90	0.77	3
4	Weak procurement process	1	4	84	136	35	0.72	4
5	Knowledge-sharing mechanisms	5	40	51	64	70	0.64	5
6	Government agency technical expertise	23	52	54	12	10	0.42	6
7	Government policies	41	4	84	4	0	0.37	7
8	Weak consultancy	35	48	24	16	5	0.36	8
9	Poor capacity of contractors	31	68	9	12	5	0.35	9
10	Public trust in government institutions	41	40	15	16	10	0.34	10

Note: SD stands for strongly disagree for factors with little to no influence, D-Disagree for a factor with minor influence, N-Neutral for a factor with a moderate influence, A-Agree for a factor with significant influence, and SA-Strongly Agree for a factor with powerful influence.

Also, RII is the Relative Importance Index, with values between 0 and 1, where 0 is the lowest and one is the highest. The Most Influential determinants score close to 1.

Resource Availability

The findings reveal vital factors influencing construction project planning for public road projects in South Sudan. The allocated budget is the most critical factor (RII of 0.75), highlighting the importance of financial resources (Smith & Jaggar, 2007). Cost estimating and risk management are closely followed by an RII of 0.74 (El-Sayegh, 2008). The qualifications and experience of the project team rank third (RII of 0.72), emphasising the need for skilled personnel (Zou et al., 2007). The availability of experienced planners is fourth (RII of 0.60), indicating challenges in sourcing qualified staff (Ofori, 2000). Financing models have a moderate influence (RII of 0.45) crucial for sustainability (Dey, 2009), while team structures and skill sets (RII of 0.44) and capacity-building initiatives (RII of 0.38) suggest areas for improvement through effective collaboration and training (Love et al., 2004; Fellows & Liu, 2015).

Table 4: Resource Availability-Related Factors

S/N	Statement	SD	D	N	A	SA	RII	R
1	Allocated budget.	5	12	21	148	85	0.75	1
2	Cost estimating and risk management practices	2	16	63	84	100	0.74	2
3	Team qualifications and experience	7	12	54	72	115	0.72	3
4	Availability of experienced planners	15	30	30	80	60	0.60	4
5	Financing models	22	42	60	24	15	0.45	5
6	Team structures and skill sets	28	38	36	36	20	0.44	6
7	Capacity-building initiatives	31	56	21	12	15	0.38	7

Availability of Data and Technology

Table 5: Availability of Data and Technology Related Data

S/N	Statement	SD	D	N	A	SA	RII	R
1	Technological infrastructure	12	28	45	48	95	0.63	1
2	Extensive utilisation of project planning software tools	19	16	57	52	65	0.58	2
3	Availability of reliable data	19	0	102	0	0	0.34	3
4	Established protocols for data collection, storage, and sharing	36	72	0	0	0	0.30	4

Project Characteristic

Table 6: Project Characteristic-Related Factors

S/N	Statement	SD	D	N	A	SA	RII	R
1	Project size	15	18	42	76	75	0.63	1
2	Experience of project team	14	32	42	56	70	0.59	2
3	Project external environment	15	34	39	44	80	0.59	3
4	Project funding source	15	38	42	48	60	0.56	4
5	Project complexity	22	18	45	64	50	0.55	5

5.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

The study concludes that various factors significantly influence the planning of construction projects for public roads in South Sudan. Intergovernmental elements such as national standards, transparency, and political stability are crucial in shaping the planning process. Resource-related factors, including budget allocation and the expertise of project teams, are also vital for effective planning. Moreover, the availability and utilisation of technological infrastructure and reliable data are essential for enhancing the planning process. Additionally, project characteristics, such as size, team experience, and funding sources, further impact the adequacy of planning. A lack of thorough planning often results in delays, cost overruns, and subpar outputs, highlighting the need for more structured and strategic approaches to project planning.

Recommendations

Strengthen Intergovernmental Coordination: Establishing clear and transparent processes is essential for enhancing construction project planning and fostering collaboration among various government agencies. By reinforcing political stability and ensuring the consistent application of regulatory standards, we can achieve more effective planning outcomes.

Increase Resource Availability: It is vital for the government and stakeholders to ensure adequate budget allocations and to invest in capacity-building programs that enhance the skills of project managers and planners. Developing sustainable financing models will provide long-term stability for public road projects.

Adopt Advanced Technological Solutions: The integration of advanced project management tools and reliable data collection protocols can significantly improve project planning. Prioritizing investments in technological infrastructure is crucial for better execution and planning.

Enhance Data Management Practices: Implementing precise data collection, storage, and sharing protocols is necessary to ensure that planners have access to accurate and up-to-date information for informed decision-making.

Address Project Characteristics: Project plans should be tailored to reflect specific characteristics, such as size and complexity. This involves thorough pre-planning to mitigate risks associated with large-scale and complex projects.

Stakeholder Engagement and Training: Developing comprehensive training programs for both public and private sector professionals is essential to improve technical expertise in project planning. Additionally, engaging stakeholders throughout the planning process helps align project expectations and minimizes potential conflicts. potential challenges.

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Gidado, K. (2004). *ENHANCING THE PRIME CONTRACTOR ' S PRE-CONSTRUCTION PLANNING 1 . Introduction Good planning before implementation is a critical requirement for successful delivery of any project . However , there is an indication that there is often an insufficient time and effort for planning construction projects , especially at tender or pre-contract stage . The planning approach or procedure or process used by contractors also vary from company to company and project to project . There seem to be no " best practice " or standardised procedure that is capable of improving the accuracy of predictions of project cost and time . " If everybody involved in a project can work to an agreed set of processes and procedures , the industry will not only be more efficient , but it will be in a much better position to meet the client ' s business needs and objectives " (Process Protocol level 2 (1999)). The changes the construction industry is experiencing in recent years have spirally increased the complexity of construction processes and thus make pre- construction planning at the right amount of detail and at the right time as an essential ingredient for successful delivery of projects . The work described in this paper therefore addresses these issues or problems and proposes a model that integrates project complexity into construction planning . The work is laid out in the paper in five main parts : Parts one and two focused on identifying the deliverables of construction planning and the components of project complexity respectively . Due to the inconsistency of definitions in the industry , with simple things meaning differently to different people , these parts of the paper have gone in great detail , sometimes explaining rather simple procedures . Each part begins with the basic definitions of construction planning and project complexity respectively . The third part of the paper described the development of a working model that integrates construction planning and project complexity . Conceptual models were initially developed , which were then transformed into a practical ' real world ' model called Tabulated Method Statement (TBS). The fourth part described two things : (1) the findings of structured interviews that explored current practice with the aim of collecting views and opinions from practitioners on current policies , methods and procedures used for pre-construction planning ; and (2) the devel- opment of a Flowcharted Procedure for Pre-constructio…*. *5*(1), 87–106.

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Acknowledgments and Conflicts of Interest Declaration

I would like to express my heartfelt gratitude to the Pan African University of Basic Sciences, Technology, and Innovation for providing an enabling environment and the resources necessary to complete this work. Special thanks go to my supervisors, Dr. James Okaka and Prof. Titus Kivaa, both from Jomo Kenyatta University of Agriculture and Technology (JKUAT), for their invaluable guidance, mentorship, and support throughout the research process. Their insights and constructive feedback have been instrumental in shaping this manuscript.

I hereby declare that this manuscript is original and has not been previously submitted to any other journal or publication for consideration. No conflicts of interest are associated with this work.