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IMPACT OF PROJECT SCOPE DEVELOPMENT AND CONFORMANCE ON TIMELY DELIVERY OF TETFUND BUILDING PROJECTS: A CASE STUDY OF KADUNA POLYTECHNIC

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Abstract

This study analyzes the impact of project scope development and conformance on the timely delivery of Tertiary Education Trust Fund (TETFund) building projects in Kaduna Polytechnic, Nigeria. Using a qualitative research approach with 24 informants across four stakeholder groups (contractors, consultants, procurement officers, and planning unit personnel), the study identifies critical factors affecting scope development, examines the effects of ineffective scope development, explores scope conformance approaches, and proposes ways to improve scope management. The findings reveal that clear objectives, sufficient time allocation, well-defined deliverables, and experienced personnel are the most influential factors affecting scope development. Ineffective scope development leads primarily to compromised quality (92%), decreased stakeholder satisfaction (88%), delays (83%), and budget overruns (79%). Regular progress meetings (96%), audits/walkthroughs (92%), and stringent change management (83%) were identified as the most

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effective approaches for ensuring scope conformance. The study recommends allocating sufficient time for scope development, engaging experienced personnel, adopting standardized methodologies, implementing robust documentation practices, and enhancing end-user consultation to improve scope management practices for successful project delivery.

Introduction

Public construction projects in developing countries, particularly Nigeria, continue to experience challenges with timely delivery, cost overruns, and quality issues (Amade et al., 2015). The Tertiary Education Trust Fund (TETFund), established to address infrastructural deficiencies in Nigerian tertiary institutions, has invested significantly in building projects across universities, polytechnics, and colleges of education. However, many of these projects fail to meet their intended objectives within planned schedules and budgets.

Poor scope management has been identified as a critical factor contributing to project failures (PMI, 2021). Project scope defines the work required to deliver a product, service, or result with specified features and functions (Larson &Gray, 2021). It serves as the foundation for planning, execution, monitoring, and control throughout the project lifecycle. Despite its importance, scope management practices in public sector construction projects in Nigeria remain inadequate, leading to significant inefficiencies (Omonori&Lawal, 2020).

This research examines the impact of project scope development and conformance on the timely delivery of TETFund building projects in Kaduna Polytechnic. The study aims to analyze factors affecting scope development, assess the effects of ineffective scope development, explore approaches for ensuring conformance to project scope, and identify ways of improving scope management practices for successful project delivery.

Project Scope Management

Project scope management encompasses the processes required to ensure that a project includes all the work required, and only the work required, to complete the project successfully (PMI, 2021). It involves defining and controlling what is and is not included in the project. The PMBOK Guide identifies six processes in project scope management: plan scope management, collect requirements, define scope, create WBS, validate scope, and control scope (PMI, 2021).

Effective scope management begins with thorough planning and clear definition of project requirements. This includes identifying stakeholders, understanding their needs,

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and documenting these requirements in a way that can be measured and verified (Hussain et al., 2019). The scope statement, work breakdown structure (WBS), and scope baseline serve as critical tools for communicating the project scope to stakeholders and guiding the project team throughout the project lifecycle.

Larson and Gray (2021) emphasize that scope management is not a one-time activity but an ongoing process that requires continuous monitoring and control to prevent scope creep, which is the uncontrolled expansion of project scope without adjustments to time, cost, or resources. Nazeer et al. (2023) further highlight that poor scope definition at the early stages of a project can lead to significant challenges during execution, including rework, disputes, and project failure.

Scope Development in Construction Projects

Scope development in construction projects involves defining the project boundaries, deliverables, constraints, and acceptance criteria. It is a critical phase that sets the foundation for successful project execution (Larson &Gray, 2021). According to Winch (2010), scope development in construction projects is particularly complex due to the involvement of multiple stakeholders, the unique nature of each project, and the long duration of the construction phase.

Factors affecting scope development in construction projects include the clarity of client requirements, the expertise of the project team, the availability of information, time constraints, and the complexity of the project (Hussain et al., 2019). El-Sawalhi and Salah (2015) found that clear project objectives, effective communication, and stakeholder involvement are crucial for successful scope development in construction projects.

In the Nigerian context, Omonori and Lawal (2020) identified inadequate planning, poor stakeholder engagement, and insufficient time allocation as key challenges affecting scope development in public sector construction projects. These challenges are compounded by the bureaucratic nature of government procurement processes, limited technical expertise, and inadequate funding mechanisms (Amade et al., 2015).

Scope Conformance in Construction Projects

Scope conformance refers to the extent to which the project deliverables align with the defined scope baseline. It involves monitoring and controlling the project scope to ensure that only approved changes are implemented (PMI, 2021). In construction projects, scope conformance is particularly challenging due to the dynamic nature of the construction environment, the involvement of multiple stakeholders, and the long duration of projects (Winch, 2010).

Approaches for ensuring scope conformance include regular progress monitoring, comprehensive documentation, effective change management, and stakeholder

engagement (Larson &Gray, 2021). Hussain et al. (2019) emphasize the importance of a robust change control system, clear communication channels, and regular verification and validation of deliverables to ensure scope conformance in construction projects.

In Nigeria, Omonori and Lawal (2020) found that inadequate monitoring and control, poor communication, and lack of stakeholder involvement are key challenges affecting scope conformance in public sector construction projects. These challenges often lead to scope creep, disputes, and project failures.

TETFund Projects in Nigerian Tertiary Institutions

The Tertiary Education Trust Fund (TETFund) was established by the Tertiary Education Trust Fund Act of 2011 to improve the quality of education in Nigerian tertiary institutions through infrastructure development, research, and staff training (TETFund, 2022). TETFund projects include the construction of classrooms, laboratories, libraries, administrative buildings, and other facilities essential for teaching, learning, and research. Despite significant investments, many TETFund projects face challenges with timely delivery, cost overruns, and quality issues. Studies by Amade et al. (2015) and Omonori and Lawal (2020) have identified poor project management practices, inadequate planning, and limited stakeholder engagement as key factors contributing to these challenges. However, there is limited research specifically examining the impact of scope development and conformance on the delivery of TETFund projects, particularly in polytechnics, which this study aims to address.

Research Design

This study employed a qualitative research approach to explore the impact of project scope development and conformance on the timely delivery of TETFund building projects in Kaduna Polytechnic. The qualitative approach was chosen due to its suitability for exploring complex phenomena and capturing rich, contextual data from stakeholders' perspectives (Creswell & Creswell, 2018).

Population and Sampling

The study population comprised professionals involved in TETFund building projects at Kaduna Polytechnic, including contractors, consultants, procurement officers, and planning unit personnel. A purposive sampling technique was used to select 24 informants with relevant experience and knowledge of TETFund projects. The distribution of informants across stakeholder groups was as follows:

iii. Contractors: 6 informants
iv. Consultants: 6 informants
v. Procurement Unit (PU): 6 informants

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vi. Physical Planning Unit (PP): 6 informants

The informants had varied professional backgrounds, including engineering, architecture, quantity surveying, and project management, with experience ranging from 6 to 16 years in their respective fields.

Data Collection

In-depth interviews were conducted with the 24 informants using a semi-structured interview guide. The interview questions were designed to address the four research objectives: factors affecting scope development, effects of ineffective scope development, approaches for ensuring scope conformance, and ways of improving scope management. Each interview lasted approximately 45-60 minutes and was audio-recorded with the permission of the informants.

Data Analysis

The interview data were transcribed verbatim and analyzed using thematic analysis. The analysis followed a six-step process: familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report (Braun & Clarke, 2006). NVivo software was used to facilitate the coding and thematic analysis process. The themes were organized according to the research objectives, and the frequency of mentions across stakeholder groups was calculated to identify the most influential factors and approaches.

Demographic Information of Informants

The study involved 24 informants with diverse professional backgrounds and experience levels. Table 1 presents a summary of the informants' demographic information.

Table 1: Demographic Information of Informants

Characteristic	Distribution
Position	Contractors (6), Consultants (6), Procurement Officers (6), Project Managers/Engineers/Architects (6)
Experience	6-9 years (10), 10-12 years (9), 13+ years (5)
Professional Affiliation	COREN/NSE (11), NIQS/NIOB (8), PMP/PMI (5), ARCON (3), CIPS (2)
Department/Unit	Physical Planning (8), Procurement (8), Works Department (8)

The diverse backgrounds and experience levels of the informants provided rich insights into the research problem from different perspectives, enhancing the validity and reliability of the findings.

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Factors Affecting Scope Development

The study identified ten significant factors affecting scope development in TETFund building projects at Kaduna Polytechnic, as presented in Table 2.

Table 2: Factors Affecting Scope Development

Factor	Contractors	Consultants	PP	PU	Total (%)
Clear Objectives	6	6	6	6	24 (100%)
Insufficient Time	6	5	6	6	23 (96%)
Deliverables	6	5	6	6	23 (96%)
Timelines	6	4	6	5	21 (88%)
Resource Allocation	5	6	4	6	21 (88%)
Lack of Experienced Personnel	4	6	5	5	20 (83%)
Incomplete Scope Documents	5	4	6	4	19 (79%)
Failure to Consult End-Users	4	6	3	6	19 (79%)
Inadequate Site Information	5	4	5	3	17 (71%)
Changes in Government Policies	3	5	4	5	17 (71%)

Clear objectives emerged as the most critical factor, with unanimous agreement across all stakeholder groups (100%). This finding aligns with research by Nazeer et al. (2023), who emphasized that clear objectives are essential for aligning expectations, reducing conflicts, and preventing scope creep. When objectives are well-defined, they provide a shared understanding of project goals and deliverables among all stakeholders, reducing the risk of misaligned priorities, rework, delays, and cost overruns.

Insufficient time and well-defined deliverables were equally influential (96%). Time constraints often lead to rushed planning, inadequate risk assessment, and poor stakeholder consultation, particularly among contractors and procurement officers who face practical challenges in meeting deadlines while managing resources. Well-defined deliverables provide a clear framework for measuring project success, guiding procurement activities, and ensuring that milestones are met. This finding supports research by Hussain et al. (2019), who found that adequate time allocation and clear deliverables are crucial for successful scope development in construction projects.

Timelines and resource allocation (both 88%) are closely linked factors that significantly impact scope development. Realistic timelines serve as benchmarks for measuring progress and coordinating efforts across stakeholders, while efficient resource allocation ensures that personnel, equipment, and materials are available when needed. This finding aligns with the work of El-Sawalhi and Salah (2015), who identified resource planning and scheduling as critical factors for successful project delivery.

The lack of experienced personnel (83%) was particularly emphasized by consultants and procurement officers, who rely on expertise to navigate complex projects and ensure alignment between client expectations and contractor capabilities. This finding supports

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research by Omonori and Lawal (2020), who identified limited technical expertise as a key challenge affecting scope management in Nigerian public sector construction projects.
Incomplete scope documents and failure to consult end-users (both 79%) highlight the importance of thorough documentation and stakeholder engagement. These factors are crucial for avoiding scope creep and ensuring that the project delivers intended value to the client. Inadequate site information and changes in government policies (both 71%) can also pose significant challenges, requiring flexibility and contingency planning to accommodate new conditions or regulations.

Effects of Ineffective Scope Development

The study identified four main effects of ineffective scope development on project delivery, as presented in Table 3.

Table 3: Effects of Ineffective Scope Development

Effect	Contractors	Consultants	PP	PU	Total (%)
Compromised Quality	6	5	5	6	22 (92%)
Decreased Stakeholder Satisfaction	6	4	6	5	21 (88%)
Delays	5	5	4	6	20 (83%)
Budget Overruns	4	6	5	4	19 (79%)

Compromised quality emerged as the most significant effect of ineffective scope development, cited by 92% of informants. Unclear or incomplete scope definitions often lead to suboptimal choices in materials, workmanship, or design, resulting in defective work, rework, and disputes. This finding aligns with research by Hussain et al. (2019), who found that poor scope definition often leads to quality issues in construction projects.
Decreased stakeholder satisfaction was the second most significant effect (88%). Poorly defined or managed project scope can lead to misaligned expectations, scope creep, and ultimately, dissatisfaction among stakeholders. This can erode trust, damage relationships, and potentially impact future business opportunities. This finding supports research by Winch (2010), who emphasized the importance of stakeholder management in construction projects.
Delays (83%) and budget overruns (79%) were also significant effects of ineffective scope development. Project delays can lead to increased costs, missed deadlines, and reputational damage for organizations, while budget overruns often result from inaccurate cost estimates, unplanned changes, and rework. These findings align with research by Amade et al. (2015), who identified delays and cost overruns as common challenges in Nigerian public sector construction projects.

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Approaches for Ensuring Scope Conformance

The study identified three main approaches for ensuring conformance to project scope, as presented in Table 4.

Table 4: Approaches for Ensuring Scope Conformance

Approach	Contractors	Consultants	PP	PU	Total (%)
Regular Progress Meetings	6	6	5	6	23 (96%)
Audits/Walkthroughs	5	6	6	5	22 (92%)
Stringent Change Management	5	6	4	5	20 (83%)

Regular progress meetings emerged as the most commonly mentioned approach (96%). These meetings serve as critical touchpoints for monitoring progress, identifying deviations from the defined scope, and addressing issues proactively. Regular meetings also help identify potential risks or scope changes early, allowing for timely mitigation. This finding aligns with research by Larson and Gray (2021), who emphasized the importance of regular communication and monitoring in project management.

Audits and walkthroughs were the second most commonly mentioned approach (92%). These activities are essential for validating conformance to the defined scope and ensuring quality standards are met. Audits and walkthroughs can also help identify areas for improvement, highlight best practices, and provide valuable insights for future projects. This finding supports research by Hussain et al. (2019), who emphasized the importance of verification and validation in ensuring scope conformance.

Stringent change management processes were also commonly mentioned (83%). Well-defined processes for submitting, reviewing, and approving change requests ensure that scope changes are thoroughly evaluated, prioritized, and implemented in a controlled manner. This finding aligns with research by PMI (2021), which identifies change control as a critical process in project scope management.

Ways of Improving Scope Management

The study identified five main strategies for improving scope management in TETFund building projects, as presented in Table 5.

Table 5: Ways of Improving Scope Management

Strategy	Contractors	Consultants	PP	PU	Total (%)
Sufficient Time	6	6	6	6	24 (100%)
Experienced Personnel	5	6	5	6	22 (92%)
Standardized Methodologies	5	6	4	5	20 (83%)
Documentation Practices	4	6	5	5	20 (83%)
End-User Consultation	5	6	4	5	20 (83%)

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Allocating sufficient time for scope development was unanimously emphasized by all stakeholder groups (100%). This strategy is crucial for ensuring comprehensive and accurate scope definition, as time constraints can lead to rushed decision-making, incomplete analysis, and overlooking critical requirements. This finding aligns with research by Nazeer et al. (2023), who found that adequate time allocation is essential for thorough scope planning and risk assessment.

Engaging experienced personnel was the second most emphasized strategy (92%). Experienced professionals bring valuable industry knowledge, expertise in identifying potential risks and opportunities, and a deep understanding of best practices. This finding supports research by Omonori and Lawal (2020), who identified limited technical expertise as a key challenge affecting scope management in Nigerian public sector construction projects.

Standardized methodologies, robust documentation practices, and end-user consultation were equally emphasized (83%). Adopting standardized methodologies provides a structured approach to scope management, promoting consistency and efficiency. Robust documentation practices support informed decision-making, facilitate knowledge transfer, and ensure transparency and accountability. End-user consultation helps identify potential gaps or misalignments early on, minimizing the risk of rework or scope creep. These findings align with research by El-Sawalhi and Salah (2015) and Hussain et al. (2019), who emphasized the importance of structured processes, documentation, and stakeholder engagement in scope management.

Conclusion

This study examined the impact of project scope development and conformance on the timely delivery of TETFund building projects in Kaduna Polytechnic. The findings reveal that clear objectives, sufficient time allocation, well-defined deliverables, and experienced personnel are the most influential factors affecting scope development. Ineffective scope development leads primarily to compromised quality, decreased stakeholder satisfaction, delays, and budget overruns. The most effective approaches for ensuring scope conformance include regular progress meetings, audits/walkthroughs, and stringent change management. To improve scope management practices, the study recommends allocating sufficient time for scope development, engaging experienced personnel, adopting standardized methodologies, implementing robust documentation practices, and enhancing end-user consultation.

The findings of this study contribute to the existing body of knowledge on scope management in construction projects, particularly in the context of publicly funded projects in developing countries. The study provides empirical evidence of the impact of

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scope development and conformance on project delivery, offering practical insights for improving scope management practices in similar contexts.

Recommendations

Based on the findings of this study, the following recommendations are proposed for improving scope management practices in TETFund building projects:

1. **Allocate sufficient time for scope development:** TETFund and educational institutions should provide adequate time for planning, requirements gathering, documentation, and review to ensure comprehensive and accurate scope definition.
2. **Engage experienced personnel:** Educational institutions should prioritize recruiting, retaining, and continuously developing professionals with relevant experience and expertise in project management, particularly scope management.
3. **Adopt standardized methodologies:** TETFund should develop and promote standardized scope management methodologies, templates, and processes tailored to the unique requirements of educational institution building projects.
4. **Implement robust documentation practices:** Educational institutions should establish clear guidelines for documenting project scope, including templates, version control systems, and secure repositories to enhance accuracy, accessibility, and traceability.
5. **Enhance end-user consultation:** Educational institutions should establish formal processes for engaging end-users throughout the project lifecycle, including workshops, focus groups, and regular feedback mechanisms.
6. **Conduct regular progress meetings:** Project teams should schedule and conduct regular progress meetings involving key stakeholders to monitor progress, identify deviations, and address issues proactively.
7. **Implement rigorous audits and walkthroughs:** Educational institutions should establish a framework for independent project audits and walkthroughs to validate conformance to defined scope and quality standards.
8. **Establish stringent change management processes:** TETFund and educational institutions should develop clear processes for submitting, reviewing, and approving change requests to ensure controlled implementation of scope changes.
9. **Develop knowledge management systems:** Educational institutions should establish mechanisms for capturing, documenting, and sharing lessons learned from past projects to inform future scope management practices.

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10. **Leverage technology:** Educational institutions should explore digital tools and technologies, such as Building Information Modeling (BIM) and project management software, to enhance scope visualization, documentation, and control.

Suggestions for Further Research

While this study provides valuable insights into scope management practices in TETFund building projects, further research is recommended in the following areas:

1. Quantitative analysis of the impact of scope management practices on key project performance indicators, such as time, cost, and quality.
2. Comparative analysis of scope management practices across different types of tertiary institutions (universities, polytechnics, and colleges of education) receiving TETFund interventions.
3. Investigation of the impact of organizational culture and leadership on scope management practices in educational institutions.
4. Evaluation of the effectiveness of specific scope management tools and techniques in the context of educational institution building projects.
5. Exploration of stakeholders' perceptions of the value of end-user consultation in scope development and validation.

These areas of further research would contribute to a more comprehensive understanding of scope management practices in publicly funded construction projects in developing countries, particularly in the education sector.

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