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COLLEGE OF ENGINEERING, DESIGN, ART AND TECHNOLOGY

SCHOOL OF BUILT ENVIRONMENT

DEPARTMENT OF ARCHITECTURE

**AREVIEW OF SUCCESS FACTORS FOR DESIGN-BUILD CONTRACTS IN
UGANDA; A case study of Kampala**

BY

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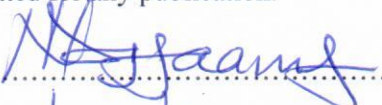
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DECLARATION

I NYARENGA Innocent do hereby declare that this research report is my original work and no part of this thesis has been presented to any institution for any academic award nor has it been submitted for any publication.

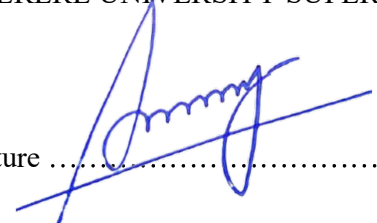
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APPROVAL

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ABSTRACT

The study review success factors for design-build contracts in Uganda; A case study of Kampala. This study was guided by the following objectives; to review factors that affect the performance of DB contract, analyze how these factors apply in the Ugandan construction industry, reveal the challenges faced by DB contracts in Uganda and to examine the different changes needed to DB contracts in Uganda.

Survey Method, the questionnaire was used to collect data from; Civil engineers, Architects and Quantity surveyors. The questions that these respondents answered on a Likert scale were drawn from these study objectives. The study employed the interview method. Interviews in this study helped the researcher obtain more information on the topic under investigation. The researcher interviewed contractors and architects in line with the study objectives and the interview guide.

The researcher reviewed documents in order to obtain recorded information that is related to success factors for design-build contracts in the developing economies, the study also used Archival records, to get information related to the study, when the research observed key documents and information about design and build were also further included in the study, a sample size of 40 respondents was taken from a total population of 45 respondents, who included civil engineers, Architects, quantity surveyors, and construction contractors.

The research confirmed that D&B offers significant advantages over traditional methods, including greater flexibility for early design adjustments, faster decision-making, and improved communication through single-point responsibility, enhanced time efficiency via integrated scheduling (e.g., Gantt charts, simplified client supervision, better cost control through negotiated savings, and stronger quality assurance and accountability. The Mbuya project demonstrated that early presentation of architectural designs, provision of financial guarantees by reputable institutions, and proactive risk identification (especially funder liquidity) substantially increased client confidence and project momentum. However, benefits were partly offset by delays in approvals, under-quoting, and coordination challenges within joint ventures.

To maximise D&B potential for affordable housing, the study recommends that contractors should be empowered for early-stage design changes, adopt robust scheduling tools, maintain direct and regular client communication, enforce rigorous quality supervision, secure financial guarantees, ensure realistic and detailed early cost planning, and present designs for client approval before contract award.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background of the study, the problem statement, purpose, objectives of the study, research questions, study scope, justification of the study, significance, hypotheses, as well as operational definitions of key terms and concepts.

1.1 Background of the study

The global housing crisis underscores the need for effective and efficient construction methods. Currently, approximately 1.6 billion people lack adequate housing and basic services, with projections suggesting that by 2030, this number could rise to 3 billion. Additionally, an estimated 100 million people are homeless (Abdalla et al., 2023). In the United States, Design-Build has grown dramatically since the 1990s and is now the dominant delivery method for large public and private infrastructure projects. According to the Design-Build Institute of America (DBIA, 2024), Design-Build accounted for over 50% of non-residential construction spending in 2023 (approximately US\$520 billion annually), surpassing traditional Design-Bid-Build for the first time, this shift was enabled by legislative changes: by 2024, 49 out of 50 states had enacted statutes authorizing public agencies to use Design-Build. Federal agencies such as the U.S. Army Corps of Engineers, General Services Administration (GSA), and Department of Transportation have aggressively promoted DB through “best-value” and “best-value” procurement. This pressing demand highlights the importance of cost-effective and efficient construction approaches, making the design-build model highly relevant in tackling housing shortages, particularly in developing nations (Emere et al., 2025).

The construction industry in Africa has experienced significant growth over the past two decades, driven by rapid urbanization, population growth, and massive infrastructure deficits. The African Development Bank (AfDB, 2024) estimates that the continent faces an annual infrastructure financing gap of US\$ 68–108 billion. To close this gap and accelerate project delivery, many African governments and international funding agencies have increasingly adopted alternative procurement methods, with the Design-Build (DB) contract model emerging as one of the most preferred approaches across sub-Saharan and North Africa. Design-Build, also known as turnkey or single-point responsibility contracting, integrates

design and construction under one entity, offering theoretical advantages of reduced delivery time, lower cost overruns, fewer disputes, and enhanced innovation compared to the traditional Design-Bid-Build (DBB) method (Saliu et al., 2024). Several high-profile African projects such as the Standard Gauge Railway (Kenya), the Dangote Refinery (Nigeria), the Grand Ethiopian Renaissance Dam (Ethiopia), the Merowe Dam (Sudan), and numerous road and power projects financed by China Exim Bank and the World Bank have been executed under Design-Build or Design-Build variants (Emere, Aigbavboa, & Oguntona, 2025).

Design-build contracts, an integrated project delivery approach, are increasingly favored globally due to their potential to streamline construction processes and enhance project outcomes. This approach combines design and construction responsibilities under one contract, fostering collaboration and reducing potential conflicts that often arise in traditional methods like design-bid-build (Moon et al., 2020).

In Uganda, the need for resilient and sustainable infrastructure is growing as the country seeks to enhance economic and social development. Design-build projects are increasingly recognized for their ability to address these needs efficiently. While the conventional design-bid-build model has traditionally dominated Uganda's construction industry, the shift towards design-build is gaining momentum due to its potential for collaboration and efficiency (Olweny et al., 2021). Government initiatives, private sector involvement, and international partnerships have been instrumental in this transition (Habib et al., 2022). The construction sector is a cornerstone of Uganda's economy, contributing significantly to economic growth and development. However, access to quality housing remains a significant challenge, with over 60% of urban Ugandans living in substandard housing (UN-HABITAT, 2017). High construction costs, compounded by high material prices, make affordable housing a distant reality for many Ugandans (Nantume, 2017). This underscores the urgent need for cost-effective, streamlined approaches like design-build to improve access to quality housing.

In developing economies, the success of design-build projects hinges on various factors that extend beyond technical dimensions. Key factors include effective communication, collaboration, risk management, client satisfaction, project management efficiency, and adherence to regulatory standards (Khalef & El-adaway, 2023). In Uganda, specific contextual challenges also play a role, such as the competence and experience of the project team, the adaptation to client needs, and regulatory compliance (Alleman & Tran, 2021).

In Uganda, design and build contracts, also known as turnkey or EPC (Engineering, Procurement, and Construction) contracts, are commonly used in both public and private sectors, especially for infrastructure and large-scale construction projects, some of these include, Kampala-Entebbe Expressway, this project was a major infrastructure effort led by the Uganda National Roads Authority (UNRA) (Nuwagaba, 2019). The contract for the expressway was a design and build agreement, allowing the contractor to design and execute the entire project to completion. Karuma Hydroelectric Power Plant, this project, one of Uganda's largest hydroelectric plants, was developed through a design and build contract with a Chinese contractor. The contractor was responsible for both the design and the construction of the power plant, covering all engineering, procurement, and construction aspects. Uganda Petroleum Institute Kigumba (UPIK) Expansion: The Government of Uganda used a design and build contract for the expansion of this institute, aiming to train professionals for the oil and gas sector. Under this contract, the contractor managed both the design and construction, ensuring the facility meets international standards (Stewart, 2024). Lugogo Mixed-Use Development Projects: Several private developments in Lugogo, Kampala, use design and build contracts to streamline projects, particularly mixed-use developments that combine residential, office, and retail spaces. These contracts allow developers to maintain a single point of responsibility and reduce the project timeline. Mukono-Katosi Road Rehabilitation, though initially awarded to a different contractor, faced delays until UNRA re-awarded it under a design and build contract. The new contract simplified project management and accountability, allowing a quicker turnaround time and achieving the intended road quality and standards. The construction of roads and essential services in Namanve Industrial Park has also been carried out under design and build contracts, enabling developers to complete projects quickly while managing quality and cost (Muvawala, Sebukeyera, & Ssebulime, 2021).

In developing economies like Uganda, international contract standards, such as those provided by the International Federation of Consulting Engineers (FIDIC), play a vital role in managing and executing Design-Build contracts. Design-Build is an approach where both the design and construction responsibilities are combined under a single contract, potentially streamlining the construction process (Baker et al., 2013). However, implementing FIDIC guidelines in these environments often faces unique challenges that can impact project success. FIDIC contracts, especially the "FIDIC Yellow Book," used for Design-Build projects, offer a structured framework that sets out roles, responsibilities, and risk allocations among parties. Applying this framework to Design-Build contracts in Uganda, specifically for projects like a housing

estate in Mbuya, requires understanding the essential success factors and adapting them to the local context (Fawzy et al., 2018). Financial Management and Funding: FIDIC contracts include strict provisions on payments, but financing for projects in developing economies may come with challenges, such as unreliable funding sources. Ensuring consistent funding and financial management, particularly in residential projects, becomes a success factor. FIDIC promotes structured communication channels (Danial & Misnan, 2022). However, successful Design-Build projects in Uganda also depend on engaging local stakeholders, such as regulatory authorities and community members, whose buy-in is essential for project continuity, while FIDIC contracts are internationally recognised, they may need adaptations to reflect local market conditions. For example, skilled labor may be limited, and procurement standards might differ, making local contractor training and support necessary for maintaining quality standards. FIDIC guidelines promote adherence to regulatory standards, but environmental and regulatory frameworks in Uganda may have unique challenges (Danial & Misnan, 2022). Design-Build contracts must address specific environmental and planning regulations relevant to the Mbuya housing estate to avoid project delays. FIDIC contracts emphasize timely project delivery, but projects in Uganda may face delays due to infrastructure limitations, supply chain disruptions, or administrative bottlenecks. Proactive planning and local adjustments to timelines become essential. Applying FIDIC standards to a housing estate in Mbuya provides an example of how international contracting frameworks can enhance project effectiveness. However, balancing FIDIC's requirements with the realities of Uganda's developing economy, like fluctuating costs and access to resources, demonstrates that local adjustments to FIDIC's success factors are essential for achieving project goals. Standard contracts play a significant role in guiding construction projects, especially within the design-and-build model. This contract model combines the design and construction phases under a single contractor, promoting efficiency and reducing the client's direct involvement. However, the complexity of design and build projects, where responsibilities span multiple phases, necessitates well-defined contracts to prevent disputes, allocate risk, and ensure clarity for all parties (Knapp et al., 2023).

Standard contracts in construction, such as those provided by the International Federation of Consulting Engineers (FIDIC) and the Joint Contracts Tribunal (JCT) in the UK, establish a framework of obligations and rights for both the contractor and the client (Mitchell, 2018). These contracts provide templates that can be tailored to the specific needs of each project while ensuring fundamental principles remain in place. In a design-and-build setting, these

contracts outline the contractor's responsibilities for both designing and delivering the project to the agreed specifications (Poole et al., 2021).

The National Social Security Fund (NSSF) of Uganda, as part of its ongoing development efforts, undertook Phase II of a housing estate project in Mbuya, Uganda. The project, with a contract reference number NSSF/WRKS/2014-2015/00136, was a large-scale design and build (D&B) contract with China National Aero-Technology International Engineering Corporation as the contractor (Ggoobi, Lukwago, & Bogere, 2020). The contract aimed to provide high-quality housing solutions to meet the growing demand in Kampala, with a completion target of within 24 months, from April 6, 2016, to April 6, 2018. Despite substantial planning and resources allocated, including a contract sum of UGX 14.5 billion (inclusive of VAT and contingency) and provisions for a performance security, liquidated damages, and advance payments, the project encountered numerous challenges that impacted its timeline, budget, and overall quality. Key issues arose in managing delays in statutory approvals, controlling project quality due to the lump-sum nature of the contract, and maintaining accountability within a joint venture framework where the contractor and consultant worked as a unified team (Mwalagho, 2020). Lessons learned so far reveal insights into procurement processes, inception and preliminary design activities, and scheme and detail design phases. However, persistent challenges in maintaining project schedules, quality assurance, and coordination among stakeholders have underscored the need for robust contract management strategies (Mwalagho, 2020). Additionally, areas such as contract completion activities, final accounting, and defect liability monitoring remain areas of training and development, as these stages are yet to be reached. Addressing these challenges is essential to ensure timely completion, adherence to quality standards, and alignment with NSSF's expectations for this flagship housing development. It is against this background that this study intends to investigate a review of success factors for design-build contracts in Uganda; a case of Kampala.

1.2 Statement of the problem

Uganda faces a severe urban housing deficit of over 2.4 million units, with formal housing in Kampala remaining unaffordable to more than 60% of urban households (low- and lower-middle-income earners below UGX 2 million/month). High construction costs and conventional procurement methods have confined most residents to substandard informal settlements.

The design-and-build (D&B) approach is globally recognized and locally promoted (World Bank & PPDA 2022) for its ability to reduce costs by 10–25%, shorten timelines, and encourage innovation through single-point responsibility. However, in Uganda, D&B projects frequently suffer delays, cost overruns, quality issues, and poor coordination, failing to deliver the expected affordability gains. The Mbuya Housing Estate Project in Kampala, a large-scale D&B development targeting over 2,000 units, illustrates this failure: despite adopting D&B for faster and cheaper delivery, it has experienced prolonged approvals, budget escalation, inconsistent quality, and final units priced beyond the reach of the intended 60% income group.

The core problem this study addresses is therefore: the persistent inability of design-and-build contracts in Uganda to produce genuinely affordable, good-quality housing for the majority low- and lower-middle-income population, despite the method's proven cost-saving potential. Using the Mbuya project as a case study, this research identifies the key barriers and success factors required for D&B to effectively contribute to solving Uganda's urban housing crisis.

1.3 Purpose of the study

The purpose of the study was to review success factors for design-build contracts in Uganda, a case study of Kampala.

1.4 Objectives of the study

- i. To identify factors that affect the performance of the DB contract.
- ii. To examine how these factors apply in the Ugandan construction industry.
- iii. To examine the challenges faced by DB contracts in Uganda.
- iv. To examine the different changes needed to DB contracts in Uganda.

1.5 Research Questions

- i. How do these factors affect the performance of DB contract?
- ii. How do these factors apply in the Ugandan construction industry?
- iii. How are the challenges faced by DB contracts in Uganda handled?
- iv. How are the changes needed in DB contracts in Uganda Handled?

1.6 Scope of the study

This section includes: the content scope, geographical scope and time scope.

1.6.1 Content scope

The content scope of the study was to concentrate on an analysis of the factors that determine the success of a design-build contract in Uganda a case of Kampala. This was specifically in line with the relationship between Collaboration and Integration on the success of a design-build contract, the importance of Effective Risk Management on the success of a design-build contract, the importance of Collaboration and Communication on the success of a design-build contract and the influence of Cost Control and Budget Management on the success of a design-build contract.

1.6.2 The geographical scope

The study was carried out in Kampala specifically analyzing key projects like the Mbuya Housing Estate because; this is one of the Housing estates in Uganda that was constructed using the model of Design & Build contractors.

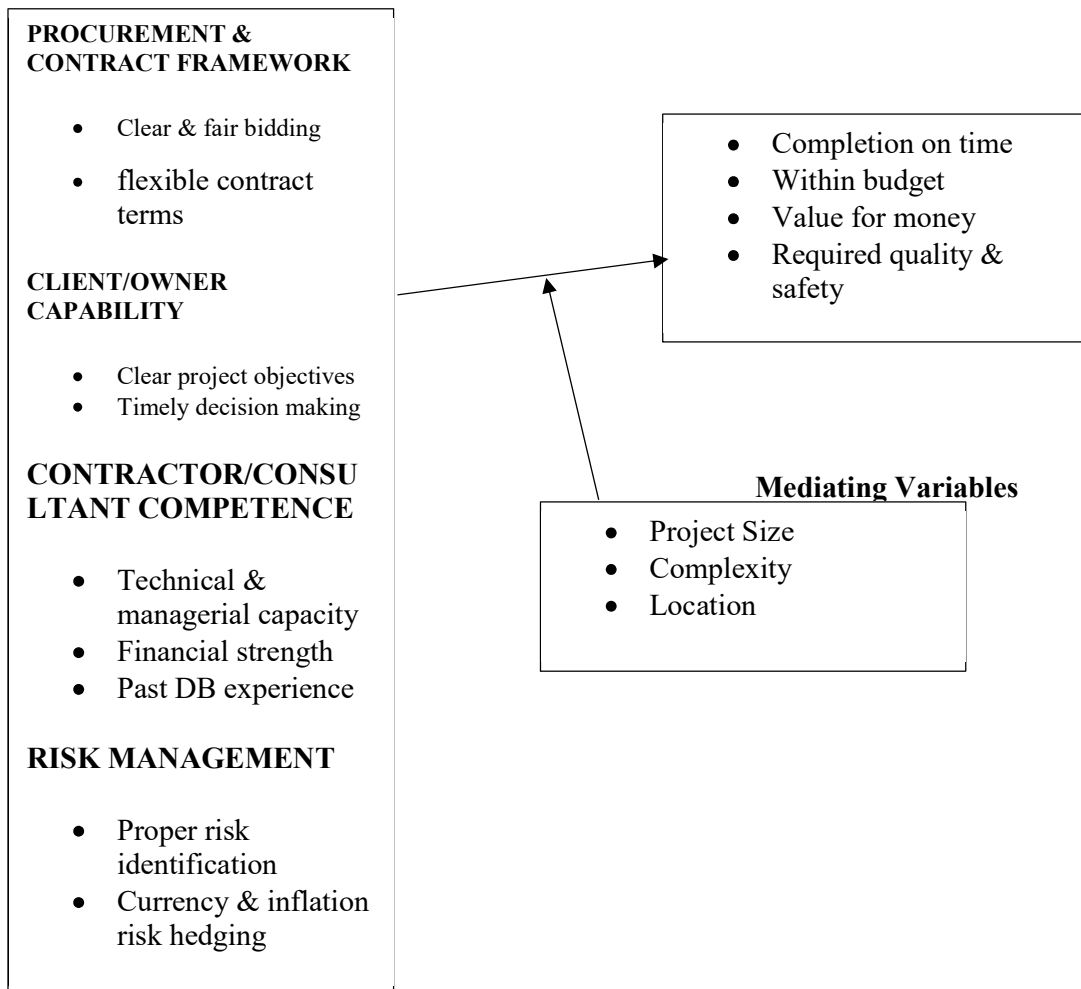
1.6.3 Time scope

The study was carried out for a period of 8 months from February 2024 to September 2024.

1.7 Conceptual frame work

Success Factors for Design-Build Projects (IV)

Project Success (DV)



1.8 Significance of the study.

This study is globally significant because it tackles the worsening worldwide housing crisis, where millions more are projected to lack decent shelter by 2030, and demonstrates how design-build (DB) contracts can deliver faster, more cost-effective solutions in resource-constrained environments. It captures the ongoing global shift from traditional design-bid-build to integrated DB methodologies, offering critical insights for construction industries striving to remain competitive. By contrasting the mature application of DB in developed economies with its emerging, yet problematic, adoption in developing countries, the research highlights DB's potential to improve efficiency, reduce costs, and accelerate delivery of resilient infrastructure where it is most needed.

In the Ugandan context, the study maps the evolution of the local construction landscape, analyses the impact of government policy, private-sector involvement, and international partnerships, and quantifies the sector's vital contribution to GDP and employment while addressing the acute shortage of affordable, quality housing. It exposes specific barriers such as high material costs, regulatory bottlenecks, and limited local expertise that undermine DB project success, and identifies interconnected challenges in communication, risk management, client capacity, and compliance. Ultimately, by proposing evidence-based strategies to overcome these obstacles, the research positions design-build as a powerful catalyst for sustainable urban development, poverty reduction, and inclusive economic growth in Uganda and similar developing economies.

The study will help in understanding the Global Relevance of Housing Challenges; this study addresses the global issue of inadequate housing and basic services, with projections of an increasing number of people lacking proper housing by 2030. The construction industry's role in providing cost-effective and efficient solutions becomes crucial on a global scale.

This study will also provide information on evolution of project delivery methodologies; the research recognizes the paradigm shift in project delivery methodologies, emphasizing the emergence of design-build. Understanding this shift is essential for keeping pace with advancements in the construction industry.

The study will provide information on Efficiency and Collaboration in Construction; Design-build projects foster collaboration and efficiency throughout the entire project lifecycle, as opposed to traditional methods. The study emphasizes the importance of collaborative integration, expediting decision-making and streamlining communication among project stakeholders.

1.9 Justification of the study

This study is highly justified at academic, policy, professional, and practical levels, given the increasing adoption of design-build (DB) contracts in Uganda and the persistent performance challenges that threaten their effectiveness in a developing-economy context.

Academically, while design-build has been extensively researched in developed economies and parts of Asia, empirical evidence from sub-Saharan Africa remains extremely limited and largely descriptive. Most Ugandan studies focus on traditional design-bid-build procurement, leaving a significant knowledge gap on how global best-practice success factors for DB

contracts translate or fail to translate into the local environment, characterized by resource constraints, regulatory weaknesses, and institutional capacity gaps. By systematically reviewing these factors through the lens of a major ongoing project in Kampala (the Mbuya Housing Estate), this research will make an original contribution to construction management literature in low- and middle-income settings.

From a policy perspective, the Government of Uganda has explicitly promoted design-build as a faster and more efficient delivery method under the Public-Private Partnerships Act 2015, the National Construction Industry Policy 2019, and Vision 2040 targets for urban housing and infrastructure. Yet several high-profile DB projects, including roads, hydropower plants, and housing estates, have experienced significant delays, cost overruns, and quality disputes. Without rigorous, evidence-based identification of context-specific success factors and required reforms, policymakers and procuring entities such as the National Social Security Fund (NSSF), Uganda National Roads Authority (UNRA), and Kampala Capital City Authority (KCCA) will continue to repeat the same mistakes, wasting scarce public resources and undermining confidence in the DB model.

Professionally, the construction industry in Uganda, dominated by small and medium-sized local firms, urgently needs clear guidance on how to compete successfully in design-build tenders increasingly awarded to large international contractors. Understanding which factors (e.g., early contractor involvement, risk allocation, client capacity, regulatory clarity) most strongly determine project outcomes will enable Ugandan architects, engineers, quantity surveyors, and contractors to build the necessary competencies, form strategic joint ventures, and adopt international standards such as the FIDIC Yellow Book more effectively.

In practice, the acute housing deficit in Kampala, estimated at over 500,000 units and growing by 8–10% annually due to rapid urbanization, demands faster and more reliable delivery methods. Lessons learned from its successes and challenges will directly inform the execution of similar large-scale housing and mixed-use developments planned across Greater Kampala, helping to close the urban housing gap while delivering value for money to both public and private clients.

Finally, the study is timely because Uganda is at a turning point in its construction procurement journey. With new mega-projects under the Parish Development Model and the Greater Kampala Metropolitan Area infrastructure programme increasingly adopting design-build approaches, establishing an evidence-based framework of success factors now will prevent

costly failures in the future and position Uganda to fully realize the time, cost, and quality advantages that have made design-build the preferred method in more mature markets worldwide. This research, therefore, responds directly to national development priorities while generating knowledge that is both locally relevant and globally comparable.

1.10 Chapter one summary

This chapter introduces the study by outlining its background, problem statement, purpose, objectives, research questions, scope, significance, justification, and key concepts. It situates the research within the context of a global housing crisis and the growing adoption of the design-build (DB) procurement method as a faster, more cost-effective alternative to traditional construction approaches.

Globally, design-build has become the dominant delivery method for large infrastructure projects, particularly in developed economies, due to its ability to integrate design and construction, reduce costs and delays, and enhance collaboration. In Africa, rapid urbanization and severe infrastructure financing gaps have accelerated the adoption of DB contracts for major projects. Uganda mirrors this trend, with design-build increasingly used in public and private sector developments such as roads, energy projects, industrial parks, and housing estates. Despite this uptake, Uganda continues to face a severe housing deficit, high construction costs, regulatory bottlenecks, and capacity constraints, which limit the effectiveness of DB contracts in delivering affordable and quality housing.

The chapter highlights that although design-build is theoretically well suited to addressing Uganda's housing challenges, many DB projects experience delays, cost overruns, quality issues, and coordination problems. The Mbuya Housing Estate Phase II, implemented under a design-build contract by the National Social Security Fund (NSSF), is presented as a key case illustrating these challenges. Difficulties related to statutory approvals, quality control under lump-sum contracts, stakeholder coordination, and contract management have undermined the project's intended affordability and timely delivery.

The problem addressed by the study is the persistent failure of design-build contracts in Uganda to deliver genuinely affordable, good-quality housing for low- and lower-middle-income earners, despite the method's proven cost-saving potential elsewhere. Consequently, the purpose of the study is to review the success factors for design-build contracts in Uganda, with

a focus on Kampala. The study aims to identify performance-influencing factors, examine their application in the Ugandan construction industry, assess challenges facing DB contracts, and propose necessary improvements.

The scope of the study is limited to Kampala, focusing on selected DB projects, particularly the Mbuya Housing Estate, and covers an eight-month period from February to September 2024. Content-wise, the study emphasizes collaboration and integration, risk management, communication, and cost and budget control as key determinants of DB success.

Finally, the chapter underscores the study's significance and justification. The research contributes to global and local debates on affordable housing and modern procurement methods, fills a critical empirical gap on design-build performance in sub-Saharan Africa, and provides evidence-based insights to inform policy, professional practice, and contract management reforms. By identifying context-specific success factors and barriers, the study positions design-build as a potential driver of sustainable urban development and inclusive economic growth in Uganda and similar developing economies.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section presents the literature of the study in line with the writing of other scholars, specifically on reviewing factors that affect the performance of DB contracts

2.1 Theoretical review

In understanding this study, the researcher used appropriate technology theory.

2.1.1 Appropriate Technology Theory

The Appropriate Technology Theory (ATT) emphasizes the importance of tailoring technologies and designs to the specific context of a community or region (Abusamra et al., 2025). In the context of design-build projects in developing countries, this theory is crucial because it encourages the consideration of local conditions, available resources, and the socio-cultural environment (Lopez, 2025). It discourages the imposition of solutions that may work in more developed contexts but are impractical or unsustainable in a developing country. Developing countries often face resource limitations, both in terms of finances and materials. Appropriate Technology Theory promotes the use of technologies that are affordable, locally available, and can be maintained with the resources at hand. In design-build projects, this means opting for construction methods and materials that are not only cost-effective but also aligns with the resources accessible to the local community (Akindele, 2025). The theory emphasizes involving the local community in the design and implementation process. This is essential for understanding their needs, preferences, and ensuring that the technology or design is culturally acceptable. In design-build projects, community participation is as it fosters a sense of ownership and increases the likelihood of the project's success and sustainability (Andriyani, Yohanitas, & Kartika, 2024).

Appropriate Technological Theory aligns with the sustainability goals of many development projects. By designing and implementing technologies appropriate to the local context, there is a higher likelihood that the project will be sustainable in the end (Nwala, Kabeyi, & Olanrewaju, 2025). Sustainable design ensures that the project meets immediate needs without compromising the ability of future generations to meet their own needs. The theory emphasizes the importance of building local capacity and skills (Wang, & Reynolds, 2024). In the context

of design-build projects, this means transferring knowledge and skills to the local community so that they can maintain, repair, and replicate the technology or design without external assistance. This capacity-building aspect contributes to the project's long-term success and resilience (Iwuanyanwu et al., 2024).

Appropriate Technological Theory encourages environmentally friendly solutions. In the design and construction of projects in developing countries, considering the local ecosystem and minimizing negative environmental impacts is crucial. This aligns with broader sustainability goals and ensures that the project does not harm the environment or the livelihoods of the local population (Zamiri, & Esmaili, 2024).

Choosing appropriate technologies and designs often involves utilizing local materials and skills. This approach can stimulate local economies, create employment opportunities, and contribute to the overall economic development of the community. In design-build projects, this economic dimension is essential for the project's success and its positive impact on the community (Shrestha et al., 2025). Appropriate Technological Theory is highly relevant to understanding design-build projects in developing countries because it advocates for solutions that are context-specific, sustainable, community-oriented, and economically viable. Incorporating this theory into the planning and execution of such projects increases the likelihood of success, community acceptance, and long-term positive impact (Obiki-Osafiele, et al., 2024).

Appropriate Technology Theory (ATT) provides a useful conceptual lens for understanding the determinants of success in Design-Build (DB) contracts, particularly in developing countries such as Uganda (Amiri et al., 2025). The theory emphasizes the use of technologies and project solutions that are affordable, locally manageable, culturally suitable, and compatible with existing resources and capacities (Wong, & Looi, 2024). In Uganda's construction sector characterized by limited technical capacity, high material costs, and constrained maintenance budgets ATT highlights the need for project delivery models that align with local realities. This makes ATT a relevant and practical framework for assessing factors that influence the performance of DB contracts (Sutrisno et al., 2024).

One of the core principles of ATT is that technologies and project systems should match the local technical and managerial capacity available within a community (Aini et al., 2025). This aligns strongly with DB success factors such as availability of skilled labor, contractor

competence, and effective project management (Song, & Zhao, 2024). DB projects in Uganda often face delays or quality challenges when designs or technologies exceed local capabilities or require specialized foreign expertise (Noroozi et al., 2024). ATT explains that DB projects are more likely to succeed when they incorporate materials, construction methods, and design systems that can be implemented, operated, and maintained by local professionals, artisans, and technicians (Mba et al., 2024).

2.2 Empirical literature review

This section reviews the literature inline to study objectives

2.2.1 The factors that affect the performance of the DB contract

Factors that affect the performance of Design build contract are analyzed in line with other authors, but as per the factors;

2.2.2 Time and Cost of Construction

Design-build (DB) is an integrated approach that delivers design and construction services under one contract with a single point of responsibility. It is increasingly popular not only in the U.S. but also in the international construction market due to its advantages such as shorter project duration, early project cost certainty and single point responsibility for clients (Hale et al. 2009).

Due to the completion of an increasing number of DB projects in the U.S., a number of empirical studies have been conducted into DB performance and in comparison with other delivery methods, DB is found to be superior to the traditional delivery system in terms of time and cost performance (Xia et al. 2012).

The vast majority of construction projects experience time and cost overruns, this is especially the case with the increasing size and complexity of modern construction projects, where time and cost overruns cause a significant capital loss for project owners (Cholakkal, 2025). DB offers a number of strengths to overcome such time and cost problems. It is considered the fastest project delivery system, for example, the main reason for its use (Nuako et al., 2024). This is because the DB system encourages an overlapping of the design and construction process; the number of change orders, a major source of project delays, is less likely due to the improved communication between the design team and design-builder. Project cost is also more certain with DB than with some other methods, as the DB contract is usually awarded on

a lump-sum basis during the early stages of projects, which provides the owner with an early estimate of project cost. Moreover, the DB method also allows design-builders to have total control over design, scope and budget; it is more likely that DB projects will be completed within budget and schedule (Shrestha, 2023).

The availability of DB project data over the years, a number of empirical studies have been made to investigate DB project performance, mainly in terms of cost and schedule such as the cost, schedule, and quality performance of three project delivery systems of DB, construction management at risk and traditional design-bid-build, finding the median cost and schedule growth of 155 DB projects to be 2.17% and 0% respectively - 5.2% and 11.4% less than design-bid-build (DBB) projects. The cost performance of construction projects is a success criterion for project sponsors, especially given the common occurrence of projects exceeding their budget estimates (Olatunji et al., 2024). Inaccuracies in projected cost estimates under uncertain conditions, often resulting in cost overruns, are a major concern for clients, project managers, contractors, and other stakeholders in the construction industry. Cost overruns are typically measured as the difference between actual costs and estimated costs, expressed as a percentage of the estimated costs (Akram et al., 2024). The negative impact of cost overruns in highway projects has led to scrutiny of the efficiency of public highway commissioners' worldwide, raising doubts about their ability to successfully initiate and deliver highway infrastructure projects. Consequently, the issue of cost overruns in highway projects has garnered significant scholarly attention, with researchers and other recent studies focusing on the factors contributing to these overruns in transportation projects (Bilgin et al., 2024).

The qualifications-based and best value selection method results in the lowest cost and schedule growth respectively, when an organization can minimize costs of the projects it is able to, the best value selection results in the lowest schedule performance is consistent. Meanwhile, the low-bid method has the highest cost growth. This is due to low-bid procured projects typically involving frequent change borders during the course of construction; the best value selection is usually outperformed by the other selection approaches in terms of quality, (Kizaba, & Yonah, 2024).

2.2.3 Selection of procurement method is competitive

In DB project delivery, selection of the appropriate procurement method is important to project success, the four primary procurement procedures are low-bid, best value, qualifications-based and sole-source procurement (Tayyab et al., 2023), as DB combines both design and

construction under one umbrella, project owners normally expect that DB contractors will provide the best value and not just the lowest price. It is imperative to compare the time and cost performance of DB projects using one-step low-bid, two-step best value, and qualification based procurement methods, finding that the best value (two-step) procurement method possesses the least cost and schedule growth, followed by the low-bid (one-step) and qualification-based procurement methods. The major reason for the improved performance of two-stage best value procurement is that the scope of the best value procurement method is typically well defined, with around 35% of design provided in the request for proposals (Khukhunaishvili, & Berishvili, 2024).

Additionally, the best value procurement method normally uses the process of short-listing to only qualified bidders with a proven record of accomplishment of time and cost performance, which will largely ensure and improve project performance (Zagia et al., 2025). The one-step low-bid method does not short-list bidders who are normally selected based on the lowest price. This may lead to the award to a low bidder who has a poor cost and schedule performance record, while simultaneously evaluating factors that are specific to each project. It enables owners to select the best-qualified design-builders for a specific project and leads to the best project performance. For the qualification-based method, although it should theoretically enhance performance as it uses prequalification, its advantages are outweighed by the lack of competition during the proposal stage (Xia et al., 2012).

The procurement and selection process for DB contracts can affect project performance by influencing the capabilities and expertise of the selected contractors and design professionals. Various procurement methods, such as competitive bidding, qualifications-based selection (QBS), and best value selection, can be used to assess their impact on project outcomes. Factors such as contractor qualifications, past performance, and team compatibility are considerations during the selection process (Larsson et al., 2022).

2.2.4 Project complexity

One of the primary factors influencing the performance of DB contracts is the complexity of the project. Complex projects with intricate designs, challenging site conditions, or unique requirements may pose significant challenges to DB teams. Project complexity affects various aspects of DB contract performance, including cost, schedule adherence, and quality of the final deliverables. Historically, project success in terms of cost, time, and quality has been poor in the construction industry (Riveros et al., 2022). It is a commonly held opinion that the reason

for the poor performance is the design and construction process being particularly complex for a number of reasons (Khalef, & El-adaway, 2023). Being able to measure the complexity at an early stage in a project will lead to a better understanding of the project and, therefore, could be of great benefit in successfully managing projects and reducing the risks associated with complexity. Effective communication and collaboration among project stakeholders play a role in the success of DB contracts. Different authors have highlighted the importance of establishing clear lines of communication, fostering trust among team members, and promoting collaboration throughout the project lifecycle. Poor communication and collaboration can lead to misunderstandings, delays, and conflicts, ultimately affecting project outcomes (Chadee et al., 2023).

2.2.5 Risk management

Effective risk management is crucial for mitigating uncertainties and enhancing the performance of DB contracts. There is a need for project managers to emphasize the importance of identifying, analyzing, and addressing risks early in the project lifecycle. Strategies such as risk allocation, contingency planning, and insurance mechanisms can help minimize the impact of risks on project cost, schedule, and quality (Hang et al., 2022).

The composition of the project team and the quality of leadership significantly influence the performance of DB contracts, as cohesive, multidisciplinary teams led by experienced project managers tend to achieve better outcomes. Hence, strong leadership, effective team coordination, and conflict resolution skills are essential for overcoming challenges and ensuring project success (Feng et al., 2022).

2.2.6 Collaboration

Poor collaboration generally affects the performance of DBS; consensus among researchers is that collaboration involves working together to achieve common goals, the intricacies of collaboration in the construction industry (CI) are multifaceted and influenced by various factors during project execution (Bidabadi et al., 2016).

Design and Build is an old method of construction, acquiring more popularity in recent years and in all kind of projects. In addition, its superiority and potential has been proven by research, due to its recent widespread use, this method has been affected by variations on its approach, resulting on slight changes and generating a series of alternative methods, However, none of

them an object of this study, as they have not shown substantial relevance, since they have been tailored to very specific requirements of particular projects ((Patel, Pettitt & Wilson, 2012).

The concept of collaboration overhauls traditional adversarial relationships between contracting parties, shifting towards more collaborative and caring environments. To facilitate effective partnering of a range of collaborative methods and joint activities with the purpose of enhancing the collaborative spirit among contracted parties, and collectively named collaborative tools are also required (Bayliss et al., 2004). Examples of collaborative tools are joint objectives, follow-up workshops, dispute resolution techniques, joint IT-database, joint project office, teambuilding activities, partnering facilitator, and joint risk management (Ng et al., 2002, Eriksson and Laan, 2007, Eriksson, 2008).

The basis of design-build is a single contract between the project owner and the design-build entity, usually managed by a general contractor that covers both the design and construction of the project. This method offers to the owner a single point of responsibility for the design and execution of the whole project, which might release pressure from the owner by transferring the warrants to the general contractor. On the other hand, the downside is the loss of a certain degree of control in the project by the owner. Design-build offers different options for the methodology, including financing and operation and maintenance as part of the total package, and has thus been named design-build-plus in those cases (Lahdenperä, 2011).

The allocation of risk for the design usually lies with the general contractor who manages the design-build entity. However, other risks in a project are individually assigned to the party best able to handle and minimize the risk. For each risk that the owner transfers to the design-builder, there is a corresponding cost; in some cases, this cost is already included into the contract price by added contingencies. (Lahdenperä 2011).

Opting for this construction method boasts a notable advantage in prompt project delivery, achieved through the concurrent progression of design and construction phases (Ssimbwa, 2023). The early completion not only proves advantageous in reducing construction financing time but also facilitates earlier occupancy, thereby minimizing the duration between the investment decision and income generation (Abdul Nabi, 2020). To capitalize on these benefits, the project owner must have a well-defined understanding of project objectives and requirements, ensuring a shared vision with the designer and contractor. This collaborative approach helps in producing an accurate project plan, mitigating unexpected scenarios (Afayo,

2021). However, initiating construction before finalizing the design poses a risk of unforeseen costs arising from imprecise lot estimates. Another noteworthy aspect of this method is the assurance of competitive quality, as the design-build entity bears sole responsibility, eliminating the possibility of deflecting defects to other parties (Mutikanga et al., 2022).

It is general knowledge that construction project owners have become more and more demanding, continuously changing their project's design. Responding to market demands, they request changes at any phase of a project (Ibbs, 2012). Even years ago, studies revealed that 20-25% of the construction period was lost due to inadequate design (Undurraga, 1996). In addition, lower quality level construction projects could be 78% attributable to design change requests (Koskela, 1992). Change is considered any addition, deletion or modification to the scope of a project that may cause the project to incur delays and add extra costs to the original contract. As such, it can take many forms; however, it is the owner-acknowledged change that must receive more attention than the other types of change since this type can present a risk to owners and contractors. In the minds of owners, a change could be something very simple, but that perspective (most likely) does not consider the multiple effects one change may have on many other areas of the project. Each change could add to the cost of the original contract and cause delays in the project execution, while there could also be cases where a change requested would not add to the project's cost and time (Fathi & Shrestha, 2021).

The construction industry is a complex and high-risk multi-actor business that over a long period of time, has received criticism for its relationships between contractor and client, where poor collaboration, ineffective communication, unbalanced risk allocation in contract provisions, limited trust, and lack of customer focus are cited amongst its shortcomings (Cheung et al., 2003, Eriksson et al., 2008). Collaborating, a concept that provides a governance framework for the establishment of collaboration, can be beneficial for all parties involved if implemented successfully (Eriksson, 2008). construction partnering in some countries like in Hong Kong (Chan et al., 2003), Sweden (Eriksson and Nilsson, 2008), the US (Naoum, 2003) and the UK (Bresnen and Marshall, 2000) argue that partnering increases the possibility that projects are completed within budget, on time, with the least number of conflicts, claims and work defects, and with a good client-contractor relationship

Poor collaboration between project participants has been identified as a serious impediment to achieving project objectives (Sebastian, 2011; Akintan & Morledge, 2013; Faris, Gaterell & Hutchinson, 2019), including H&S objectives. Scholars have criticised the CI for, specifically,

relationships between clients, designers and contractors, where poor collaboration is identified as one of the shortcomings (Sebastian, 2011; Akintan & Morledge, 2013; Faris et al., 2019).

2.2.7 Innovation

Learning must be managed due to the opportunities that such learning can offer to the innovation process for companies (Tidd et al. 2011). This learning can be divided into two main aspects: the acquisition of new knowledge and the feedback granted. Acquiring new knowledge depends on the external available resources and the capacity of a company to incorporate this knowledge. This is seen as a self-reinforcing cycle; the more knowledge the company acquires, the more easily new knowledge can be acquired (Cohen and Levinthal 1990). Receiving feedback makes companies to understand the outcome of the innovation and learn from the experience (Tidd et al. 2011). This can be done by evaluating the adopted knowledge, and it is often hard to achieve when different parties are involved in a process or are not involved in the entire process. Some mechanisms that have been discussed to improve this situation longer relationships between the construction players, provision for parties to be involved during a longer period in every project, the facilitation of dialogue and the building of trust. (Anheim and Widen 2021).

Design-build projects entrust a singular entity with the oversight of both the design and construction phases, promoting a smooth workflow and fostering collaborative endeavors (Kannengiesser, 2023). This unified approach stands in contrast to conventional project delivery methods, underscoring the significance of a cohesive team striving toward a shared objective Wang et al., (2023). Thus, the need to observe the evolving nature of design-build projects, emphasising their growing prevalence and the industry's gradual shift away from fragmented processes.

The bedrock of design-build projects lies in successful collaboration, surpassing conventional divisions between designers and builders (Al Asali, 2021), hence the need to underscore the necessity for transparent communication channels, mutual trust, and common objectives within project teams. Furthermore, findings from Wang et al., (2023) highlight the significance of early engagement of all stakeholders, facilitating interdisciplinary collaboration and well-informed decision-making.

In the digital age, technology plays a central role in enhancing collaboration on design-build projects. Notably, Building Information Modelling (BIM) serves to enable real-time

collaboration by establishing a unified platform for project stakeholders (Azhar et al., 2019). Existing literature indicates that the incorporation of technological tools is advantageous not only for communication but also for streamlining project processes and enhancing overall project performance.

Research consistently indicates a positive relationship among collaboration, integration, and project success in the design-build context. Oliveira and Isatto's (2021) study highlights that efficient collaboration results in better project outcomes, cost reduction, and increased satisfaction among stakeholders. Additionally, effective integration not only reduces the chances of errors but also speeds up project timelines and fosters innovation, as demonstrated by Mahmoud et al. (2018).

Despite the manifold benefits, obstacles endure in promoting successful collaboration and integration within design-build projects. Elements such as resistance to change, insufficient communication, and conflicting stakeholder interests pose substantial challenges, as identified by Chan et al. (2022). Recognizing these challenges is essential for formulating strategies to alleviate their effects and improve collaboration.

As the construction industry continues to evolve, recognizing the importance of a cohesive and collaborative approach becomes paramount. Future research should explore practical strategies to overcome barriers and foster a culture of collaboration to further enhance the outcomes of design-build projects. Ultimately, a holistic understanding of the collaborative and integrative processes in design-build projects is essential for driving innovation (Batdorj et al., 2020).

2.3 Design and build factors in the Ugandan construction industry

The construction industry has developed into one of the most important industries worldwide. It is one of the funders for a country's growth domestic product (GDP). In the USA, the engineering and construction (E&C) industry has needed a robust year, with E&C firms positioned as active participants in the construction of smart, future-connected buildings (Michelle, 2018).

2.3.1 Competence of contractors

In European countries like England, the construction manager remains the key person in construction and generally represents the contractors; their contributions towards the success of construction projects were undeniable, particularly during the construction phase. Given

that, the construction phase exploits many resources (workforce, materials, money, and machines), a competent construction manager is needed in order to manage those resources and geared up to achieve project objectives without delays in project completion (Ibrahim, 2010).

Construction of a commercial building involves three phases, namely conception, design and Construction. Timely completion of these projects is an indicator of a successful construction process. A construction project remains successful when it is completed on time, within budget, in accordance with specifications, and to stakeholders' satisfaction. The construction period is often used as a benchmark to assess the overall performance of the project. Generally, a project is successful once it has been completed as per the period proposed before the start of the project (Dvir & Shenhar, 2013).

Construction of commercial buildings remains an important industry to determine the growth of the economy in any country around the globe. This is because construction projects include many stakeholders and therefore boost the economic activities for the development of a country. Normally, the construction projects have a defined period of time during which all construction activities would be completed. However, it is rare for a construction project to meet the completion deadline. Construction project management involves proper planning, good coordination of activities, and control of a project from conception to completion. This comprises an understanding of the client's need in terms of quality, cost and time (Shenhar et al., 2007).

Locating and leasing a space is only the first step to creating the perfect commercial real estate Property for goals. Commercial real estate development is the next one. Rarely do commercial real estate spaces come exactly how owners and tenants desire. Each organization has its own goals and an ideal layout for productivity. There are many moving parts involved in successfully renovating and building commercial real estate to a tenant's specifications. The top commercial real estate developers handle every aspect of that development process and work closely with tenants to build the space they desire. Handling your commercial real estate development on your own, on the other hand, can quickly become time-consuming and expensive without professional experience. Each process of developing commercial real estate is slightly different based on the space and the tenant's specifications (Shrestha & Shrestha, 2024).

The building industry is often described as plagued by many problems and inefficiencies. The solution to all of these problems is said to be in using the concept of lean construction. Howell (2001) asserts “Give customers what they want, deliver it instantly with no waste” thus defining the word “lean” as factors of construction across all phases of a construction project as well as the requirements of the construction project’s stakeholders, fuzzy models can account for the uncertainty and vagueness of expert judgments obtained by a questionnaire survey in the absence of historical data (Gunduz and Elsherbeny 2021) and thus provide a useful way to evaluate and quantify the performance of COM in construction. An online survey of industry experts was used to assess the importance of 49 factors affecting COM performance across seven project management process groups. Following data collection and examination for reliability and intergroup variations, the data were evaluated using the Relative Importance Index (RII), and the ANFIS framework was developed to determine the COM performance index. Structural and behavioral cross-validations (CVs) were utilised to validate the developed framework. The proposed model was subsequently implemented in a mega construction project in Qatar.

2.3.2 Specification consideration

If a construction project is completed on schedule, without cost overruns, and within specifications, it is considered a success; however, many researchers have criticized this approach to defining success due to its overreliance on maintaining the original budget and schedule and its inability to reflect the stakeholders’ concerns and goals (Tripathi et al. 2019). Change orders in the construction industry are inevitable and complex, and they vary from project to project (Hanna and Iskandar 2017; Shrestha and Maharjan 2019). Safapour and Kermanshachi (2019) concluded that change orders have both obvious and hidden impacts on projects and that major challenges exist to identifying their hidden impacts. Change order documents only define roles and responsibilities and recognize the change order’s budget and schedule. Hence, the acknowledgment of change orders by all parties is not enough to manage them, resolve any disputes, or overcome differences in understanding among the construction project stakeholders.

Projects have to be effectively managed in multiple ways to deal with the impact of change orders and the disturbances they cause for construction project performance. Engaging and developing a preventive strategy can reduce the disturbances of change orders. These strategies are not only relevant to the cost and schedule but they can also potentially enable

communication, manage risks, and reduce problems and conflicts among the contracting parties, the goal of DBS research is not to accomplish the impossible goal of identifying the elusive “perfect DBS,” but rather to increase the body of knowledge available to owners in their pursuit to identify the right PDS for each project they undertake (Molenaar and Songer, 2018).

2.3.3 Project delivery

Up to the 1980s, construction in the United States generally followed a long, established pattern of delivering construction projects through a system known as design bid build (DBB). Over the last 30 years, other alternative project delivery systems (PDSs) have been developed off the DBB model. This exploration has caused many in the academic community to investigate the tangible benefits gained through the use of alternative PDSs. Konchar and Sanvido studied a diverse sampling of public and private vertical construction projects and found that in comparison to design bid build and construction management at risk, design build (DB) achieved significantly improved cost and schedule advantages.

Design build (DB) also gained popularity as an alternative PDS in America along with CMR throughout the late 1980s and 1990s (Konchar and Sanvido, 2019). DB strays from traditional project delivery by replacing the multiple individual contracts that an owner enters into with separate AE and contracting firms with a single contract entered into with a DB entity (McManamy 2021). This DB entity could be an independent design builder firm that offers either design and construction services in-house or maybe a joint venture between an AE firm and a contracting firm. Since the AE and construction parties are both members of the same entity in DB, both parties enter the process at the same time, at the beginning of the project. This allows for increased integration of and collaboration between the design and construction phases and, potentially, great reduction in project duration (Yates 1995). Additionally, with both the design and construction services being provided by the same entity, DB align the interests of design and construction stakeholders much more than in CMR or DBB where design and construction services are kept separate. Although there is some flexibility in the compensation structure in DB, generally DB contracts will be awarded on a lump sum basis similar to DBB. However, the methods for awarding contracts can often vary from the DBB low bid structure. Due to the variability that is typically present between designs submitted by DB entities in their bid packages, bid evaluation in DB is much more complicated than in DBB

where all construction contractors are bidding from the same set of completed construction documents (Palaneeswaran and Kumaraswamy 2010).

Girth and Lopez (2019) assert that design and build contracts, a prevalent procurement method in the construction industry, are known for their efficiency in project delivery by combining design and construction responsibilities under a single contractor. However, the integration of unique requirements that deviate from standard practices often introduces significant complexity into these contracts.

2.4 Defining the scope of the project

In design-bid-build construction, the owner and design team work together to develop the scope, program and design of the project before it goes out to bid (Kumar, & Kumari, 2025). Then the general contractor, subcontractors and material suppliers build per the specified design. The general approach is somewhat set in stone before the project begins, when adjustments are needed, each subcontractor or team has to decide how best to do so within the context of timeline, budget, materials and the surrounding processes (Opoku, 2025).

Design-build is a method of project delivery in which one entity, the design-build team, works under a single contract with the project owner to provide design and construction services, one entity, one contract, one unified flow of work from initial concept through completion. As such, the owner manages only one contract with a single point of responsibility (Shrestha, & Gibson, 2012), the designer and contractor work together from the beginning, as a team, providing unified project recommendations to fit the owner's schedule and budget. The entire team, leading to collaborative problem solving and innovation, without as many excuses and blame shifting (Nuwagaba, & Molokwane, 2020).

In design build, there is an enhanced culture of transparency which helps immeasurably not only in clearing up misunderstandings but in avoiding the blame-shifting and mistake-making that can prove enormously costly down the road. It puts everyone on the same page, giving all the opportunity to make themselves heard and get what they need to provide the most successful contributions to the project (Mutikanga, Abdul Nabi, Ali, El-adaway, & Caldwell, 2022).

2.4.1 Determining the projects of any size and budget

Overall, design-build can benefit projects of any size and budget. This method establishes early collaboration in the project planning and design phases, which leads to fewer problems down the road. That often translates to lower project costs and quicker project schedules. The streamlined communication flow and reduction in both burden and risk for the owner make the process easier and more efficient (Choi et al., 2020).

Multiple studies have investigated the bid award process utilized by public sector owners as they attempt to maintain a competitive and transparent environment in which to award DB projects. In research concerning DB projects in both the public and private sector, Palaneeswaran and Kumaraswamy (2000) classified DB bid evaluation processes into two categories: single-stage and two-stage contractor selection. In this classification system, single-stage evaluation included many different bid evaluation strategies, ranging from classic low-bid selection to highly complex forms of value-based analysis utilizing complex formulas to determine value delivered by various bids. Two-stage contractor selection in this system involves two stages: the first being some firm-based short-listing or prequalification process that bidders had to complete before being allowed to submit project-based proposals, and the second being an analysis of separate technical and cost proposal analysis, similar to a complex single-stage bid evaluation (Alleman, & Tran, 2020). The authors found that a multi-stage selection process that considered value criteria beyond cost to be the project award method ablest to capture the innovation and cost benefits of DB, while also noting that low-bid evaluation could be the adequate award method for straightforward and easily-defined projects (Lee, Jallan, & Ashuri, 2020).

2.4.3 Easier estimation of the project cost

The estimated cost of the project is established very early on in the process, which eliminates the risk of going over budget later on during construction. The design-build process allows for more simplified project management, since all team members are working together under a single contract. Perhaps one of the most beneficial aspects of using the design-build method is the speed at which projects can be completed. By simplifying every part of the process from the design-build team selection, to the design process, to construction of the entire project it becomes more efficiently managed and completed much faster than with the design-bid-build method (Tran, & Molenaar, 2018).

In addition, there is significant potential for cost savings to occur throughout the project. Fewer design changes and mistakes happen due to miscommunication. An increase in collaboration enables customization and innovation, which results in less time and fewer material wastage at each stage of the project. The result is often a smoother, better quality delivered, with no surprises, ultimately resulting in higher customer satisfaction. The design-build process also allows design-build teams to produce a repeatable project plan, which can be altered slightly for additional projects for the same client, or they can be customized to meet other client projects. This can be beneficial to both design-build teams, as well as owners (Alleman, & Tran, 2020).

Once the design is finalized and the subcontractors and suppliers are selected, the project will begin construction. Because of the early collaboration on the part of the project team, the project should go relatively smoothly. The design-build approach has been shown to reduce or even eliminate the need for change orders and helps keep costs in line with the budget (Migliaccio, Gibson, & O'connor, 2019).

2.4.4 Potential for unforeseen challenges to arise

There is always the potential for unforeseen challenges to arise. Nevertheless, because the project rests on a solid plan from the beginning, the team will have more bandwidth to deal with challenges as they occur. Once construction wraps up, the project will close out and the owner can move into their new building (Molenaar, & Gransberg, 2021), for the project performance and productivity, many studies have compared the advantages and disadvantages of design-build (DB) with the traditional design bid-build (DBB) delivery system. DB project delivery method brings various design disciplines and construction together, and this is supposed to minimize incidents of re-works that result in cost and time savings for the owner. Increasing globalization of projects and project management adds to a diverse mix, creating intercultural challenges for project managers. There is growing recognition that different types of projects require different approaches to their management, requiring management procedures tailored to the needs of the project, and project managers selected with appropriate competencies. Therefore, identifying appropriate success criteria is important for project owners and managers, who need a specific, measurable framework for tracking key project outcomes (Amin, 2024).

A Design and Build contract is one in which a single entity, usually a contractor, assumes responsibility for the design in whole or in part and for the construction and completion of a construction project. In D&B, the client will enter into a single contract with the D&B contractor to provide full design and construction services. The contractor and client are in a close contact throughout the project phases. Nevertheless, some clients still claim that the D&B procurement method are subjected to poor quality of project services (Zhao et al., 2024).

A survey conducted by Ling and Chong concluded that service performance is still lacking in D&B project. They recommended that in order to succeed, the D&B contractor should be capable of tackling the practical aspects of design and construction; build up the design management expertise and project management capability; achieve a high level of cooperation; share common project goals; and develop an ability to resolve conflicts among the project team. Contractor is supplying the procurement option of “buying” a finished building.

Success Factors (GSF) is known as a tool for measuring performance in an organization to achieve their mission. In building maintenance, CSF is becoming very important as it can identify the cause of failure as well as improve the system. The success of maintenance management initiatives depends on many factors, categorized success factors into five primary categories: leadership, culture, structure, roles and responsibilities, system infrastructure and measurement (Wanjau, 2025).

These five categories were based on the objective of the organization. According to the researchers, it is also essential to identify the constraints of the success factors. In understanding the constraints, the success factors and defense measures can be derived. Knowing the constraints will eliminate predicted work, which can bring about greater risks to the company's success. Knowing success factors in the operation of the business can strengthen management strategy, risk management process can be more focused, many issues will be corrected, and the probability of failure is greatly reduced (Zhao, Wang, & Zhang, 2024).

Every single activity within the organization will be directed towards achieving the overall success of the Company and a construction project is commonly acknowledged as successful when it is completed on time, within budget, and to satisfaction. Thus, project success is usually defined as meeting time, cost, quality objectives and satisfying project stakeholders. Project success could be refined into achieving product success, which meets quality output standards, and process success, which meets time and budget objectives (Coffie et al., 2025).

2.4.5 Examining the project participants and credentials

Design-Build Success Factors: Before explaining CSFs in D&B, it is necessary to talk more about project participants and their roles, as they are crucially involved in this method. Project participants play an important role in determining the success or failure of a project. Therefore, human-related factors should be well-performed in order to achieve good project outcomes. Project-related participants refer to related major parties in D&B projects including owners, contractors, design consultants, project management consultants and project managers or the project team.

Lehtiranta et al., (2020) explored a new dimension of the determinants for construction project success, i.e. the relationship between success and multi-firm project participants' satisfaction with each other. The results showed that correlations could be found between certain project participants' satisfaction with each other's performance and the owner's perception of project success.

Satisfaction with performance factors within the relationships between the owner and any other participant (i.e. the contractor, designer or project consultant), within the relationship between project consultants and designers and within the relationship between project consultants and contractors were reflected in the owner's perception of project success (Aigbavboa, & Kissi, 2025).

The construction sector, by its nature, is intricate and confronts various uncertainties that can negatively influence project results. In addressing these complexities, effective risk management has emerged as an indispensable element in the planning and execution of construction projects. Within the construction industry, risk is commonly described as the probability of an event happening that could have detrimental effects on project goals (Crews, 2022). Such events encompass potential delays, exceeding budgeted costs, safety incidents, and shifts in regulatory demands. Literature underscores the dynamic and intricate character of risks in construction endeavors, underscoring the necessity for a methodical and forward-thinking approach to risk management (Kostopoulos et al., 2022).

Many projects today involve numerous stakeholders and a complex value chain, making the concept of value to play a central role in project deliveries (Barima 2009). In this value chain, the stakeholders not only create value but also contribute to value creation together with other stakeholders (Aapaoja 2014). For the project stakeholders to create value, their processes must

be compatible in order to exploit and benefit from each other's expertise and resources (Pekkanen 2005). Ramaswamy and Gouillart (2010) have called this situation value co-creation and it is about redefining the process and methods of how organizations involve stakeholders in the value creation process. Value co-creation adds the perspective of project stakeholder collaboration and involvement during the value creation process (Aapaoja 2014). Paying attention to these concepts of value and value creation seems to be a new strategy that companies are adopting following the shift from goods to services offering and closing engagement with the clients during the value creation process. The objective of understanding the importance of the term of value is to understand at the same time the mechanism that companies have to deliver this value in different ways, according to the specific requirements of the client.

Efficient risk management commences by recognizing and evaluating potential risks. Various methodologies and tools, spanning from conventional approaches like brainstorming and checklists to sophisticated techniques such as Failure Mode and Effect Analysis (FMEA) and Monte Carlo simulation, have been devised for this purpose. After the identification and assessment of risks, the subsequent phase entails formulating strategies to minimize or manage these risks (Diaz, Reyes, & Baumgartner, 2022). Literature underscores that a proactive stance in risk management encompasses not only addressing recognized risks but also preparing for unexpected occurrences. Standard mitigation approaches encompass contractual mechanisms, contingency planning, insurance, and the application of advanced project management methodologies (Xi, & Cao, 2022).

The success of risk management initiatives in construction projects heavily relies on the active participation of stakeholders. Existing literature underscores the crucial role of engaging key stakeholders, such as owners, contractors, designers, and regulatory bodies, in the risk management framework (Al-Saady, & Rezouki, 2022). Approaches that foster collaboration, open communication, and shared responsibility have been proven to boost the effectiveness of risk management strategies. Technological advancements have brought about significant changes in how risk management is practiced within the construction industry. The adoption of technologies like Building Information Modeling (BIM), artificial intelligence, and data analytics is on the rise, contributing to more precise identification and analysis of risks. Literature suggests that incorporating these technological advancements into risk management

processes there can be elevation of decision-making and ultimate enhancement of overall project outcomes (Al-Saady, & Rezouki, 2022).

The success of risk management initiatives in construction firms is significantly influenced by the organizational culture and structure. Literature underscores the importance of fostering a culture that is conscious of risks, where all team members actively engage in identifying and managing risks (Nieto-Garcia, & Guzman, 2022). Additionally, the hierarchical arrangement within construction organizations and the relationships among project participants can affect the efficacy of risk management practices. This review offers a comprehensive exploration of risk management in the construction industry, encompassing key concepts, methodologies, and best practices (Frisk, Klonowska, & Einarson, 2022). It underscores the dynamic nature of risks in construction projects and stresses the significance of adopting a proactive and collaborative approach to risk management. The construction industry continues to advance, incorporating technological innovations and cultivating a risk-aware culture that will be crucial for enhancing project outcomes and ensuring the sustained success of construction endeavors (Batdorj et al., 2020).

In the realm of construction projects, design-build projects are widely embraced as a strategy that consolidates the design and construction phases into a single contract (Osei-Kyei, Narbaev, & Ampratwum, 2022). The prosperity of such endeavors hinges on various factors, with proficient risk management emerging as a pivotal determinant. This review of the literature aims to examine the relationship between effective risk management and the success of design-build projects. To lay a solid foundation, it is crucial to understand design-build projects. In contrast to conventional project delivery methods, design-build projects entrust a single entity with the responsibility for both the design and construction facets. This holistic approach is thought to enhance communication, streamline decision-making, and potentially yield cost and time efficiencies (Chenya et al., 2022).

2.4.6 Risk identification of the project

Every project has a risk, and one of the most important roles of a project manager is to ensure that these risks are minimized, if not eliminated (Zou, Kiviniemi, & Jones, 2017). Risks can be manmade or natural, and the effects of these can be very devastating; hence, the need to have in place measures to overcome these risks. However, most of these have been found to be ineffective in different ways (Ndlovu, 2020).

Design-build project is a methodology that enables the digitalization plans and designs of mega building infrastructure (Zhang, Skibniewski, Wu, Chen, & Deng, 2014). Most of the large construction projects have realized the importance of BIM in their operations and hence the growth of the use of BIM in the last couple of years (Tomek & Matějka, 2014). BIM methodology is crucial in the project life cycle, where key data from all stakeholders, including information about geography, components, costs, geometry, etc., is collected in such a manner that supports planning, designing, and construction management in a sustainable manner.

Due to the extensive resource and planning demands associated with large projects, employing a modeling tool becomes essential. This tool facilitates the simulation of events throughout the project's lifecycle, offering realistic outputs. This approach enables proactive measures to address challenges that may arise, making it crucial for organizations. Risks, characterized by unforeseen circumstances, necessitate understanding their effects, which proves advantageous for any organization. It is imperative to define, comprehend, and evaluate unforeseen circumstances to prevent, transfer, or manage them effectively (Azhar, 2011).

Risk managers must identify and assess risk elements and manage them as they arise. Previous studies mainly focused on common risks such as fire, theft, and natural disasters (Tomek & Matějka, 2014; Zhang et al., 2014). However, contemporary large construction projects face new challenges. Iovino and Tsitsianis (2020) highlighted that the reliance on modern technologies introduces challenges that traditional methods cannot address. The assumption that risks can be categorized and managed uniformly is no longer sustainable. In a study on emerging risks in construction projects, Zou et al. (2017) identified human resources errors as a significant risk, the anticipation of which is possible but its calculation remains uncertain. Aibinu and Venkatesh (2014) suggested that although such risks are often mitigated through allocation of funds and time, the accuracy of these allocations is not guaranteed.

In this context, the likelihood of allocating additional resources as a contingency is high. Some studies argue that advancements in project management tools and methods in modern times have significantly reduced the perceived risks associated with traditional elements (Zou et al., 2017; Chapman, 2006; Zhang et al., 2016). This implies that the examination of project risks should extend beyond their mere existence and encompass an evaluation of the methods employed to address them.

2.5 Risk management

Managing risks in construction projects involves a complex and multifaceted process that includes identifying, assessing, mitigating, and monitoring potential risks. Due to the dynamic and intricate nature of construction projects, successful risk management is crucial for project success. Various factors contribute to the success of design-build projects, and effective risk management plays a key role in influencing these outcomes (Bahamid et al., 2022). Existing literature indicates that the success of design-build projects is significantly influenced by an organization's risk management culture, the competence of project teams, and the use of advanced risk assessment tools (Shayan et al., 2022).

The combination of design and construction phases in design-build projects requires a thorough strategy for managing risks. Researchers contend that maintaining a smooth exchange of information between design and construction teams is vital for early identification of potential risks in the project lifecycle, enabling the implementation of timely and effective mitigation strategies. Numerous case studies and empirical research have delved into the connection between successful design-build projects and adept risk management. These investigations offer valuable insights into the practical application of risk management strategies and their influence on project outcomes (Shen et al., 2022).

Successful implementation of risk management is essential, and existing literature recognizes the presence of obstacles that can hinder this process. These impediments encompass shortcomings in risk assessment methodologies, inadequate communication among project stakeholders, and organizational resistance to change (Chatzimichailidou, & Ma, 2022), the prevailing consensus in the literature emphasizes the pivotal role of effective risk management in determining the success of design-build projects. Incorporating risk management seamlessly into project planning and execution enables organizations to better navigate uncertainties and challenges, ultimately resulting in enhanced project outcomes (Kassem, 2022).

2.6 The challenges faced by DB contracts

2.6.1 The construction materials

Affordability and access to resources, the cost of construction materials, particularly robust and durable ones like reinforced concrete, poses a significant challenge in Uganda. High material costs relative to income levels make it difficult for both contractors and clients to afford

materials necessary for design-build projects, hindering project feasibility and sustainability (Shrestha, & Fathi, 2019).

Construction is a vital sector for economic development in Uganda, with infrastructure projects driving growth and employment opportunities. However, one of the significant challenges faced by the construction industry is the fluctuating cost of construction materials. Understanding the factors influencing these costs is crucial for effective project planning, budgeting, and implementation (Bunde et al., 2024). Uganda's construction industry has experienced rapid growth in recent years, leading to increased demand for construction materials such as cement, steel, and aggregates, Fluctuations in supply and demand dynamics significantly affect material prices (Zhang, Liu, Gao, & Ma, 2019).

2.6.2 Limited domestic production capacity

Limited domestic production capacities for certain materials, coupled with import dependencies, contribute to supply chain challenges, leading to price volatility. Uganda's economy is susceptible to exchange rate fluctuations due to its dependence on imports for construction materials, and the changes in exchange rates, particularly fluctuations in the value of the Ugandan shilling against major currencies like the US dollar, directly influence the cost of imported materials. Inadequate transportation infrastructure and logistical challenges contribute to higher transportation costs for construction materials, especially in remote areas. Poor road networks and inefficient transport systems increase the overall cost of materials (Flammer, Hong, & Minor, 2019).

The successful execution of design-build contracts requires a skilled workforce proficient in both design and construction aspects. However, Uganda may face a shortage of professionals with the necessary expertise to effectively manage and execute integrated projects, leading to quality and performance issues. Compliance with building codes, regulations, and industry standards is crucial for the success of design-build projects. However, navigating Uganda's regulatory landscape, which may be characterized by bureaucracy and inconsistency, can present challenges for project stakeholders, potentially leading to delays and increased costs (Adepu et al., 2023).

Identifying, assessing, and managing risks throughout the project lifecycle is essential for project success. However, the lack of robust risk management practices and mechanisms in Uganda's construction industry may expose design-build projects to various uncertainties, including unforeseen costs, delays, and quality issues. Effective client communication and

understanding of project objectives are fundamental for project success. However, clients in Uganda may have limited awareness of the design-build approach and its potential benefits, leading to misaligned expectations, conflicts, and dissatisfaction with project outcomes (Abou Chakra, & Ashi, 2019).

2.6.3 Logistical challenges

Limited infrastructure and logistical challenges, such as inadequate transportation networks and supply chain inefficiencies, can impede the timely delivery of materials and equipment essential for design-build projects, causing disruptions and project delays. Building the capacity of local professionals and stakeholders in design-build methodologies is crucial for fostering the adoption and successful implementation of such projects in Uganda. However, the availability of relevant training programs and resources may be limited, hindering the development of a skilled workforce capable of executing design-build contracts effectively (Montalbán-Domingo, et al., 2019).

Design-build projects have become increasingly prevalent in the construction industry, offering a streamlined and integrated approach that brings together design and construction teams under a single entity. The success of these projects hinges not only on the technical expertise but also on effective collaboration and communication among team members. This literature review explores the pivotal role that collaboration and communication play in determining the success of design-build projects (Lam, Chan, & Chan, 2018).

A project has a strong focus on results and is part of a larger context of delivering the business objectives. To deliver this a temporary organization is formed, where there are four categories of roles known as governing, executing, organizing & managing and supporting roles. The project owner from the governing role is in charge of the business impact goal and project goal and he or she is the one who selects the PM. He or she is the chairperson of the steering committee and can initiate, follow-up and terminate the project. The PM from the organizing and managing role is tasked with the responsibility to organize, plan, delegate responsibilities, solve problems, resolve conflicts, communicate and lead the project. The project team performs the executing role and ensures that the delegated tasks are planned, organized, performed and completed. The resource owners, communicators, quality & HSE managers, reference groups are examples of project supporting roles. For the project to succeed, it also needs support from the operations team. CEO, COO, CFO, corporate management, suppliers, customers, users,

SME's, procurement specialists are not usually roles in the project, but they come under the primary stakeholder category (Tonnquist, 2013).

Successful design-build projects necessitate collaboration among various disciplines, including Architects, Engineers, Contractors, and other stakeholders. Research by Lam, Chan, & Chan, (2018), emphasizes the importance of interdisciplinary collaboration, highlighting how a cohesive team with diverse expertise can address challenges more effectively.

The concept of Integrated Project Delivery has gained attraction as a collaborative approach that aligns the interests and objectives of all project participants. Effective communication is for ensuring that all team members are well-informed throughout the project lifecycle. Huang and Lin (2020) discuss the significance of information flow and transparency, noting that clear communication mitigates misunderstandings and minimizes the likelihood of errors. The inherent complexity and uncertainty in design-build projects can impede communication and collaboration. Olander and Landin (2017) argue that developing adaptive communication strategies to address uncertainties is essential for maintaining project success. Several studies (Leung et al., 2018) underscore the correlation between effective collaboration and reduced project costs and timelines. Clear communication and collaboration contribute to efficient decision-making, preventing delays and cost overruns (Sharmin, 2025).

Successful collaboration fosters an environment where innovative ideas can flourish. Research by Mancini et al. (2021) highlights the positive impact of collaboration on the quality and innovation of design-build projects, resulting in enhanced project outcomes. Collaboration and communication are integral components of the success of design-build projects (Raghib et al., 2023). Interdisciplinary collaboration, the adoption of communication technologies, and addressing cultural and organizational barriers contribute to creating a conducive environment for project success. Understanding the challenges and leveraging the benefits associated with effective collaboration and communication are imperative for stakeholders engaged in design-build projects (Mosly, 2025).

2.7 Propose changes to Uganda's construction industry

Commencing with early cost planning in the design phase is crucial for achieving effective cost control in design-build projects. Studies indicate that projects incorporating thorough cost planning are better positioned to adhere to budgetary constraints. The amalgamation of design and construction facilitates improved identification and mitigation of risks. A diligently

executed risk mitigation strategy plays a pivotal role in cost control, averting budget overruns (Osei-Kyei, Narbaev, & Ampratwum, 2022).

Construction project is a series of tasks performed to construct a structure or building. It may also be referred to as a 'project' and comprises many small projects from different disciplines. Most of the construction project's lifecycle can be divided into conception, design, construction, commissioning and closure. In a construction project, there is generally no opportunity to build a prototype. It often requires integration of different disciplines from structural, civil, electrical, mechanical, geotechnical etc. Construction projects are goal oriented with a clearly defined scope and mostly operate in a matrix environment. There may be varied goals and solutions. The contract is a binding document or the bible that must be followed throughout the project. There is a high penalty associated with the late completion of a construction project (Smith, Merna, & Jobling, 2014).

In design-build projects, literature emphasizes the importance of incorporating performance-based budgeting. Efficient resource allocation is ensured by aligning budget allocations with project performance indicators. Successful design-build initiatives implement ongoing monitoring mechanisms to assess budget performance. The ability to flexibly adjust the budget in response to project developments is essential for achieving successful outcomes (Shayan, Pyung Kim, & Tam, 2022).

The dynamic nature of design development poses challenges to accurate cost estimation. Research indicates that design changes and uncertainties can significantly affect project budgets. Effective communication between design and construction teams is imperative. Instances of miscommunication can lead to misunderstandings, delays, and cost overruns (Thaheem, 2022).

The adoption of BIM technology has shown promise in enhancing cost control and budget management. BIM facilitates collaboration, improves accuracy in quantity takeoffs, and supports better decision-making throughout the project lifecycle. Successful cost control and budget management contribute to client satisfaction. Meeting or exceeding client expectations within budget constraints is often considered a key success factor (Divya Sankar, Shashikanth, & Mahender, 2022).

Projects that effectively manage costs and budgets are more likely to be completed on schedule. Timely completion is a success criterion for design-build projects. Early cost planning, risk

management, performance-based budgeting, and the adoption of technological interventions emerge as components in achieving successful project outcomes (Adu Gyamfi, Aigbavboa, & Thwala, 2022), however, challenges such as uncertainty in design development and communication gaps must be carefully addressed to enhance the effectiveness of cost control and budget management strategies in design-build projects. Future research should continue to explore emerging technologies and innovative strategies to further refine and optimize cost management practices in the context of design-build projects (Zhao, 2022).

2.8 Gaps in the literature review

The literature review provides a comprehensive overview of collaboration and integration, effective risk management, collaboration and communication, and cost control and budget management in the context of design-build projects. However, there are some gaps and areas that could be further explored or emphasized, while each section provides valuable insights into its respective theme, there could be more integration and cross-referencing between the themes. For example, how does effective collaboration and communication impact risk management in design-build projects? Integrating these themes could provide a more holistic understanding of the interplay between various factors

The review could delve deeper into how cultural and regional differences affect collaboration, risk management, communication, and cost control in design-build projects. Construction practices and project management approaches can vary significantly across different regions and cultures, and acknowledging these variations could provide a more nuanced understanding. While the literature review touches on obstacles to collaboration, integration, and effective risk management, it could be expanded to provide a more in-depth analysis of these barriers. Moreover, proposing practical solutions or strategies to overcome these barriers would add practical value for practitioners in the construction industry.

The review focuses on the perspectives of researchers and industry experts. Incorporating the perspectives of various stakeholders involved in design-build projects, including owners, designers, builders, and regulatory bodies, could offer a more comprehensive understanding of the challenges and opportunities.

The review briefly mentions Building Information Modeling (BIM) as a technology facilitating collaboration. Future research could explore emerging technologies and their impact on project

success, especially in terms of collaboration, communication, risk management, and cost control.

Given the increasing emphasis on sustainability in construction projects, a discussion on how design-build projects address or integrate sustainability considerations could be a valuable addition to the literature review, the need for this study included the following;

This study is needed because of the gaps identified in the literature review of the study concerning collaboration and integration, risk management, communication, and cost control in design-build projects, while existing studies provide valuable insights; they lack a comprehensive approach that integrates these themes to present a holistic understanding of their interplay. To be more specific, the connection between effective collaboration and communication and its impact on risk management in design-build projects remains underexplored, and therefore addressing this gap would enhance the practical application of risk mitigation strategies in design-build projects.

Another gap is the lack of temporal analysis examining how collaboration, risk management, communication, and cost control have evolved in response to technological advancements and industry shifts. Understanding these trends over time could help policymakers and practitioners adapt to emerging challenges and opportunities in construction project management. Additionally, cultural and regional differences significantly influence project execution, yet the literature does not sufficiently address how these factors affect collaboration, risk management, and cost control in design-build projects. A regionalized analysis would provide tailored strategies that suit different construction environments.

Given the growing emphasis on sustainability in construction, this study will also assess how design-build projects integrate sustainable practices, addressing an important yet underexplored aspect in the literature. This study, therefore, has contributed to the advancement of knowledge in design-build project management, offering practical recommendations to enhance collaboration, risk management, communication, and cost control in the construction industry.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the methodology the researcher adopted for the study. It describes and discusses the research design, sample size and selection, the data collection methods used and their corresponding data collection instruments, data management and analysis procedure, as well as the steps that were taken to ensure validity and reliability during the study and measurement of variables.

3.1 Research Design

The study adopted a mixed case study design. Mixed methods research helps a researcher to analyze patterns, and formulate hypotheses that can guide future endeavors. Case study research is an in-depth, empirical inquiry that investigates a contemporary phenomenon (the “case”) within its real-life context, especially when the boundaries between the phenomenon and its context are not clearly evident (Yin, 2018). It relies on multiple sources of evidence, such as documents, archival records, interviews, direct observation, participant observation, and physical artifacts and benefits from the prior development of theoretical propositions to guide data collection and analysis. Unlike surveys or experiments, the case study method does not aim for statistical generalization but for analytical generalization, where findings are used to expand, refine, or challenge existing theories.

According to Amin (2005), if a researcher is seeking a more complete understanding of a relationship between variables, explanatory research is a great place to start. This will enable this study to have a Clear Project Scope and Objectives, to review factors that affect the performance of DB projects (used the Literature review to fulfil this), Analyze how these factors apply in the Ugandan construction industry, Reveal the challenges faced by DB projects in Uganda and propose changes to DB projects in Uganda.

The study adopted both quantitative and qualitative research approaches. According to Limone et al. (2022), quantitative research is a systematic investigation that primarily focuses on quantifying relationships, behaviours, phenomena, or patterns using statistical, mathematical, or computational techniques. It involves collecting numerical data through various methods such as surveys, experiments, or secondary data analysis. This data is then analyzed using

statistical tools to identify trends, test hypotheses, and make generalizations or predictions about a larger population, this approach was adopted because, by using numerical data and statistical methods, quantitative research minimizes subjective bias, leading to more reliable and objective results (Kurten et al., 2022). Qualitative research is a method of inquiry that seeks to understand and interpret the meaning and experiences of individuals or groups. Unlike quantitative research, which focuses on numerical data and statistical analysis, qualitative research emphasizes the exploration of phenomena in a more subjective, in-depth manner. It aims to gain insights into people's thoughts, feelings, and behaviors by collecting non-numerical data, such as interviews, focus groups, observations, and textual analysis (Köhler, Smith, & Bhakoo, 2022), this was also adopted because, it provides a deep, detailed understanding of participants' experiences, motivations, and perspectives. This depth can reveal insights that quantitative methods might overlook.

3.2 Study Population

Sekaran (2018) defines a population as the entire group of people, events or things that a researcher wishes to investigate. This is the total population that was used in the study; this specific population has been arrived at due to their experience and knowledge on the subject matter, on the review of success factors for design-build projects in the developing economies.

Table 3.1: Population of respondents

Category	Population
Civil engineers	13
Architects	12
Quantity surveyors	10
construction contractors	14
Clients	6
Total	55

Source: Primary Data (2024)

3.3 Study Sample

Mugenda and Mugenda (2003) argue that it is impossible to study the completely targeted population and; therefore, the researcher shall take a sample of the population. A sample is a subset of the population that comprises members selected from the population. Using Krejcie

and Morgan’s (1970) table for the sample size determination approach, a sample size of 40 respondents was taken from a total population of 55 respondents.

Table 3.2: Sample size and sampling technique

Category	Population	Sample size	Sampling technique	Data collection method
Civil engineers	13	9	Random sampling	Questionnaire
Architects	12	10	Random sampling	Questionnaire
Quantity surveyors	10	7	Purposive sampling	Questionnaire
construction contractors	14	8	Purposive sampling	Questionnaire
Clients	6	6	Purposive sampling	Interview
Total	55	40		

3.4 Sampling Techniques and Procedure

A number of sampling techniques was used to select respondents to the study namely; simple random and purposive sampling techniques. Simple random sampling was used because it ensures generalizability of findings and minimizes bias (Sekaran, 2003). Purposive sampling technique was used to select the company directors. These key informants were purposively sampled because they are believed to have specialized knowledge about the topic under investigation by virtue of the offices that they hold.

3.5 Data Collection Methods

The section presents data collection methods, including the survey method, interviews, and documentary review. The following data collection methods have been chosen because of their numerous advantages.

3.5.1 Survey Method

The study used the questionnaire method to collect data. The questionnaire was used to collect data from Civil engineers, Architects and Quantity surveyors. The questions that these respondents were to answer on a Likert scale were drawn from these study objectives: to review factors that affect the performance of DB contracts, analyze how these factors apply in the Ugandan construction industry, reveal the challenges faced by DB contracts in Uganda and to examine the different changes needed to DB contracts in Uganda. The questionnaire was used

because it allows for the collection of data from a large group of respondents in a short period, as suggested by Mugenda and Mugenda (1999: 107).

The questionnaire was used because it allows busy respondents fill it at their convenience. It also allows respondents to express their views and opinions without fear of being victimised (Oso & Onen, 2008).

3.5.2 Interview Method

The study employed an interview method. Interviews in this study helped the researcher obtain more information on the topic under investigation. The interview was used for getting information from construction contractors whose interviews were drawn from, reviewing factors that affect the performance of DB contracts, analyzing how these factors apply in the Ugandan construction industry, revealing the challenges faced by DB contracts in Uganda and examining the different changes needed to DB contracts in Uganda. Interviews were used because they fetch a variety of ideas needed for the study and give a deeper understanding of the topic. This method was also used because it offers the researcher an opportunity to adapt questions, clarify the questions by using the appropriate language, clear doubts, establish rapport and probe for more information (Kurten et al., 2022). The researcher interviews contractors and architects in line with the study objectives and the interview guide.

3.5.3 Document Review Method

The researcher reviewed documents in order to obtain recorded information that is related to success factors for design-build contracts in developing economies. This method was used because it enables the researcher to access data at his convenience, obtain data that are thoughtful, as the informants have given attention to obtaining them, and obtain data in the respondent's language (Oso & Onen, 2008).

3.5.4 Archival records.

The study also used Archival records to get information related to the study. This was due to the fact that the information obtained from archival records helped in the data collection of information about the topics from the experts. Some of the records were mainly from the documents about the design and build in the different organizations.

3.5.5 Personal observation

When the research observed key documents and information about design and build, this was also included in the study.

3.6 Data Collection Instruments

The instruments used in this study were a questionnaire, an interview guide and a document review checklist.

3.6.1 Self-Administered Questionnaire

The study employed a questionnaire as a tool of data collection. To civil engineers, architects and quantity surveyors. The questionnaire was based on these objectives; to review factors that affect the performance of DB contracts, analyze how these factors apply in the Ugandan construction industry, reveal the challenges faced by DB contracts in Uganda and to examine the different changes needed in DB contracts in Uganda. The questionnaires used were closed ended. Closed-ended questions were developed to help respondents make quick decisions; in addition, closed-ended questions helped the researcher to code the information easily for subsequent analysis and narrow down the error gap while analysing data, as observed by (Kallio et al., 2016).

3.6.2 Interview Guide

An unstructured interview was used as a tool for collecting in-depth information from the key informants, who were mainly the company constructors and contractors (Kallio et al., 2016). The interviews were mainly in line with; reviewing factors that affect the performance of DB contracts, analyzing how these factors apply in the Ugandan construction industry, revealing the challenges faced by DB contracts in Uganda and examining the different changes needed in DB contracts in Uganda. The guide had a list of topical issues and questions that were explored in the course of conducting the interviews. The guide was drawn with the questions soliciting for the perception of the key informants regarding the topic under study, “A review of success factors for design-build contracts in Uganda”. The interview guide was used because it yields in-depth data, which may not be possible with self-administered questionnaires (Mugenda & Mugenda, 1999; Kakoza, 1999).

3.6.3 Documentary Review Checklist

A document review checklist was used to collect more in-depth data on a review of success factors for design-build contracts in developing economies. This also enables the researcher to supplement the data that were acquired from the interviews and questionnaires. The researcher analyzed the documents and publications related to the study topic. The documents reviewed included data from various company reports.

3.7 Validity and Reliability of the Research Instruments

3.7.1 Validity

Validity is defined as the extent to which results can be accurately interpreted and generalized to other populations (Oso & Onen, 2008). While Borg & Gall (1989) as cited in Onyinkwa (2013), validity is defined as the degree to which results obtained by the research instrument correctly represent the phenomenon under study and Mugenda & Mugenda (1999) assert that the accuracy and meaningfulness of inferences are based on the research results.

Amin (2005) recommended a minimum CVI of 0.7 to be used. Validity was tested using the content validity index, which involves judges scoring the relevance of the questions in the instruments in relation to the study variables.

The formula for Content Validity Index is;

$$CVI = \frac{n}{N}$$

Where CVI = content validity,

n= number of items indicated relevant.

N = total no. of items in the instrument

In this study, validity was achieved by establishing content validity. The researcher achieved content validity by using the experts to assess the validity of the research instrument. The experts, especially research supervisors and consultants from Makerere University, were given data collection tools to assess whether the items in the instruments are valid in relation to the research topic, objectives, and questions. From the instruments, they declared some items valid and others invalid. Those declared invalid were dropped, others adjusted, while the valid ones

were maintained. The content validity index (CVI) was computed by dividing the number of items declared valid by the total number of items/questions in the data collection instrument.

Table 3.3 shows the content validity index (CVI) of the research instruments

Variables	Total items	Valid items	CVI
Factors that affect the performance of DB contract	18	15	0.833
factors apply in the Ugandan construction industry	11	9	0.8181
Challenges faced by DB contracts in Uganda.	10	7	0.7
Different changes needed to DB contracts	11	8	0.72
	50	39	0.78

Source: primary data

From Table 3.3 CVI was 0.78 (78%), and this was very good. According to Waner (2005), as cited in Barifaijo, Basheka and Oonyu (2010), if the CVI exceeds 0.7, the instrument is considered to have high content validity. The researcher analyzed the data collected and where need arose, the instruments were re-adjusted and re-designed to improve reliability and validity.

3.7.2 Reliability

According to Mugenda and Mugenda, (2003) reliability is the measure of the extent to which research instruments are able to provide the same results upon being tested repeatedly.

Crobach's coefficient alpha (α) as recommended by Amin, (2005, P.302) was used to test the reliability of the research instrument. The instrument is deemed reliable if reliable of 0.7 and above is obtained and therefore, it was adopted for use in the data collection.

Formula for reliability is

Equation 1: Reliability equation

$$\alpha = \frac{K}{K-1} \left(\frac{\sum SD^2 I}{SD^2 t} \right)$$

Where α = alpha reliability co efficiency.

K=Number of items included⁴ in the questionnaire

$\in SD^2I$ = sum of variance of individual items

SD^2t = variance of all items in the instrument.

The coefficient ranges between $\alpha=0.00$ for no reliability, $\alpha=1.00$ for perfect reliability. The closer alpha gets to 1.0 the better. If the study findings result to Cronbach's Alpha of 0.7 and above, this signified that the research instrument was good enough for the study. According to Amin (2005), all the measurements in the instrument that show adequate levels of internal consistency of Cronbach's alpha of 0.77 and above are accepted as reliable.

Table 3.4: Shows Reliability of research instruments

Variables	Alpha	Number of Items
Factors that affect the performance of DB contract	0.808	15
Factors apply in the Ugandan construction industry	0.673	9
Challenges faced by DB contracts in Uganda.	0.840	7
Different changes needed to DB contracts	0.670	8
	2.991	

Source: Primary SPSS data

Overall reliability= $2.991/4 = 0.74$ (74%). The table 3.3 shows reliability of instruments on different variable, with an average Alpha of 0.74 (74%), and this was good enough for the study according to Mugenda & Mugenda (1999) and Amin, (2003).

3.8 Data Collection Procedure

The researcher obtained a letter of introduction from Makerere University, which was presented to the authorities in construction and after that, he obtained a list of all the staff in the different construction firms and selected only those selected to be involved in the study. The researcher randomly selected respondents to participate in the study, a self-administered questionnaire was used to collect information from the above-mentioned respondents, and the researcher also purposively selected directors who were interviewed from the construction.

3.9 Data Analysis

3.9.1 Analysis of quantitative Data

Descriptive statistics, namely frequency counts and percentages, were used to analyze the respondents' demographic characteristics and the mean and standard deviation were used to analyze the respondents' opinions on the topic under investigation. The analysis was carried out to review factors that affect the performance of DB projects, analyze how these factors apply in the Ugandan construction industry, reveal the challenges faced by DB projects in Uganda and propose changes for DB projects in Uganda, as suggested by Sekaran (2003), Amin (2005) and Oso and Onen (2008). The statistical package that was used for the analysis of data in this study was SPSS version 21.0. The questionnaires from the field were coded and entered into SPSS. After analysis, the researcher manually entered data into SPSS. After that, the data were reviewed to check for any inconsistencies or missing values. The SPSS's missing values, which were skipped, were later re-entered, and all variables were recoded to ensure they are in the correct format for analysis.

3.9.2 Analysis of qualitative data

Qualitative data were analyzed using content analysis. Responses from key informants were grouped into recurrent issues. The recurrent issues, which emerged in relation to each guiding question, was presented in the results, with selected direct quotations from participants offered as illustrations.

Data from the field were collected, gathered, and coded as responses. The data was categorized as themes and sub-themes. Qualitative data were analyzed through thematic content analysis to identify recurring patterns and themes relevant to the study objectives.

3.10 Measurement of variables

Data on the respondent's views and opinions about the analysis of the factors that determine the success of a design-build project in developing countries was obtained using scaled variables from a self-developed questionnaire.

A five-point Likert ordinal scale ranging from strongly agree, which was assigned 5, agree, assigned 4, not sure, assigned 3, disagree, allocated 2 and strongly disagree, allotted 1 to obtain responses on the variables. Numerous scholars who have conducted similar studies such as Bowling, (1997), have used the Likert ordinal scale.

3.11 Ethical considerations

The researcher ensured that before giving questionnaires to the respondents, their consent was sought, and when they accepted to participate in the study, they were given questionnaires.

Confidentiality of the respondents' information was assured, and the researcher also informed them that the study was strictly for academic purposes and, therefore, they should not fear giving information. Participants were fully informed about the purpose, procedures, risks, benefits, and duration of the study. Consent was voluntary, without coercion, and participants had the right to withdraw at any time without penalty.

The study complied with all relevant laws, regulations, and institutional policies.

Only respondents who were selected were given questionnaires and only those meant to be interviewed were actually interviewed.

CHAPTER FOUR

PRESENTATION, INTERPRETATION AND ANALYSIS OF STUDY FINDINGS

4.0 Introduction

This chapter presents analyses and interprets findings according to the study objectives. It contains the response rate, demographic information of respondents, and findings according to the objectives of the study. Results on objectives and hypotheses are presented using descriptive and inferential statistics.

4.1 Findings on the profession of the respondents

This section presents the profession of the respondents

Table 4.1: the profession of the respondents

What is your profession	Frequency	Percentage
Civil Engineer	9	26.5
Architect	10	29.4
Quantity surveyors	7	20.6
Construction contractors	8	23.5
Total	34	100

Source: Primary Data

This indicates that the majority 29.4% of the respondents, were architects and 26.5% were Civil engineers, 23.5% were construction contractors, while 20.6 quantity surveyors. This indicates that the researcher sought information from respondents who have credible information regarding the information under study. Construction contractors were issued interview guides while the rest were issued questionnaires.

4.1.2 Response Rate

Thirty-four (34) questionnaires were distributed to respondents, and six (6) interviewees were targeted. Of the 34 questionnaires, all were returned fully completed, yielding a response rate of 100%. While there was 100% response rate in the interviews. The details are shown in Table 4.2.

Table 4.2: Response Rate

Instrument	Target Response	Actual Response	Response Rate
Questionnaires	34	34	100
Interview Guide	06	06	100
Total	40	40	

Source: Primary Data

The findings from the table above indicate that the percentage of the returned questionnaires was 100%. These findings, according to Creswell (2021), indicate that the response rate was good and therefore the study could be conducted since the response rate was 100% for both interviews and respondents.

4.1.1 Findings on the nature of design and build that the respondents are involved in

This section presents the nature of design and build that the respondents are involved in.

Table 4.3: Nature of design and build that the respondents are involved in

If yes in 2 above, what is the nature of Design and build project you are currently involved in?	Frequency	Percentage
Commercial Buildings	22	61.8
Infrastructural	12	38.2
Total	34	100

Source: Primary Data

The findings revealed that 61.8% of respondents are involved in commercial design-and-build projects, while 38.2% are engaged in infrastructure projects. This distribution suggests that commercial design and build projects dominate the current landscape of respondents' professional activities. This predominance of commercial projects could be indicative of several underlying factors. Firstly, the commercial sector might be experiencing a period of growth or increased investment, making these projects more prevalent and attractive to design and build professionals. Secondly, the commercial projects could potentially offer more complex and high profile opportunities, which may appeal to a significant portion of the industry. On the other hand, the substantial involvement in infrastructural projects by 38.2%

of respondents highlights a significant portion of the industry still dedicated to essential public works and large-scale infrastructure developments.

4.1.2 Estimated project duration from start to project completion

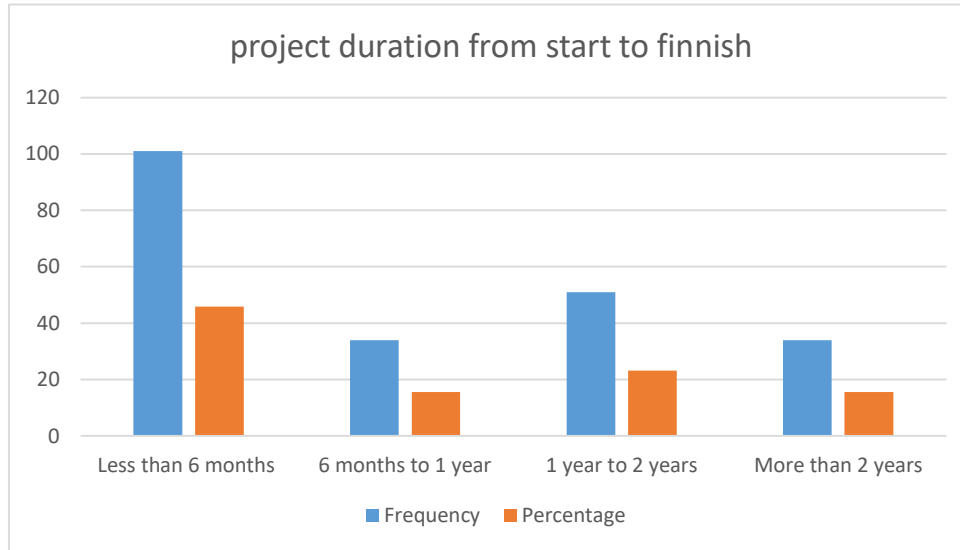


Figure 4.1: Estimated project duration from start to project completion

Source: Primary Data

The findings from the study indicated that the majority of the projects are within the time frame of less than 6 months at 45.9%, 23.2% will be between 1 year and 2 years, 15.5% will be more than 2 years, and 15.5% will be between 6 months and 1 year.

4.1.3 Findings on the cost of the project

This section presents the cost of the projects that the respondents were involved in

Table 4.4: Cost of the projects that the respondents were involved in

What is the estimated cost of the project you're handling currently	Frequency	Percentage
Below 5 billion	8	23.1
5.1 to 10 Billion	18	53.7
Above 10 billion	8	23
Total	34	100

Source: Primary Data

The majority of the projects fall within the 5 billion range, with 53.7% of the total projects. This suggests that mid-to-large scale projects are predominant. Projects estimated to cost above 5.1 to 10 billion and above 10 billion each represent 23% and 23.1%, respectively. This indicates that there are very large projects compared to mid-sized projects, with most projects falling in the mid-range. Resource allocation strategies can be optimized for projects below the 5 billion range. Understanding the distribution helps in identifying potential risk factors associated with different project sizes. Mid-range projects might have different risk profiles compared to very large or very small projects. Insights into the cost distribution can aid in more accurate budget forecasting and financial planning, ensuring funds are allocated where they are most likely to be needed. This analysis of project cost estimates reveals a concentration in the mid-range budget category (Above 10 billion). The distribution provides valuable insights for project managers and stakeholders, helping them to make informed decisions about resource allocation, risk management, and budget planning.

This finding was also further indicated by the respondents from the interviews who asserted that;

“The projects I have been involved in concerning design and build are always mega projects, and as a result design and build is often seen as something applicable for big projects only”

4.1.4 Findings on the duration respondents have spent in the construction industry

The figure below shows the duration the respondents have spent in the construction industry

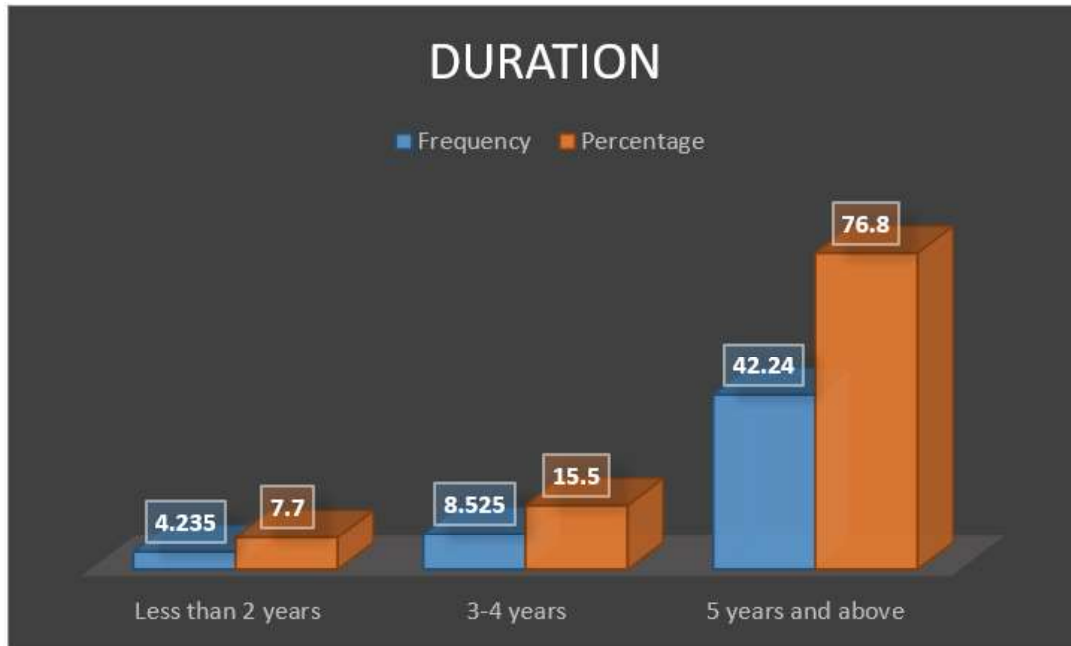


Figure 4.2: The Duration the respondents have spent at the construction industry

Source: Primary Data

The majority of respondents 76.8% have been in the construction industry for 5 years or more. This suggests that the survey sample is predominantly composed of seasoned professionals. Their extensive experience is likely to provide a wealth of knowledge and insights into industry trends, challenges, and best practices. Respondents with 3-4 years of experience constitute 15.5% of the sample. This group is likely transitioning from entry-level roles to more responsible positions within the industry. Only 7.7% of the respondents have less than 2 years of experience in the construction industry. This small proportion indicates that the survey did not capture a significant number of entry-level professionals or recent graduates. Given that a large majority of respondents have considerable industry experience, the data and insights from this survey are likely reliable and reflective of long-term trends and issues in the construction sector.

4.1.5 Findings on the familiarity the respondents have on design and build factors in the Ugandan construction industry

Findings on the familiarity the respondents have with design and build factors in the Ugandan construction industry.

Table 4.5: Familiarity with design and build

How familiar are you with the design and build factors in the Ugandan construction industry	Frequency	Percentage
very familiar	31	91
Not very familiar	3	9
Total	34	100

Source: Primary Data

The majority, 31 (91%), of the respondents reported being very familiar with design and build factors. This overwhelming majority suggests that most professionals in the Ugandan construction industry have a strong understanding of these factors. A small fraction, three respondents (9%), indicated they were not very familiar with these factors. This minority highlights that some individuals may still require further education or training in design and build processes. The high level of familiarity among respondents implies that the industry professionals are well-equipped to handle design and build projects effectively. This can lead to better project outcomes, reduced errors, and increased efficiency in project execution. The significant percentage of professionals who are very familiar with design and build factors suggests that existing training programs, professional development courses, and industry standards are likely effective in disseminating essential knowledge and skills.

This was also further responded on during the interview when one of the respondents asserted that;

“Design and build factors are becoming popular due to its cost effectiveness and ability to enable the client get everything from one company something that saves time and enables the company in being more effective”

The high familiarity rate also indicates that the design and build approach is popular in Uganda. The 9% of respondents who are not very familiar with design and build factors represent an area where further training and support might be beneficial. Targeted training programs and workshops could help bridge this knowledge gap. The industry could benefit from continuous professional development initiatives to ensure that all professionals stay up-to-date with the latest trends, technologies, and best practices in design and build processes.

The data reflects a strong familiarity with design and build factors among Ugandan construction professionals, which is a positive indicator for the industry. Ensuring that the small percentages of less familiar individuals receive adequate training and resources can further strengthen the industry's overall competency. The high level of familiarity is likely to contribute positively to the successful execution of construction projects, improving quality, efficiency, and innovation within the sector.

4.2. Objective one: Findings on the factors that affect the performance of the Design and Build contract

This section describes the Findings on the factors that affect the performance of the Design and Build contract, as answered both in the interview guide and in the questionnaire by the respondents.

4.2.1 Findings on the factors that affect performance of Design and Build contract

In this section, the researcher used the (Scale: 1-5, with 1 being low complexity and 5 being high complexity).

Table 4.6: Factors that affect the performance of the Design and Build contract

Factors that affect the performance of Design and Build contract	N	Mean	Std. Deviation
Design intricacy	34	3.39	.834
Site conditions	34	3.92	.476
Project size	34	3.85	.665
Unique requirements	34	4.00	.682

Source: Primary Data 2024

The researcher analyzed factors that affect the performance of Design and Build (D&B) contracts and the study was conducted using a Likert scale ranging from 1 to 5, where 1 represents low complexity and 5 represents high complexity.

In the study results, design Intricacy had a mean value of 3.39 and a standard deviation of 0.834. Design intricacy is a factor in Design and Build contracts, affecting the overall project performance. With a mean score of 3.39, respondents generally rated this factor as moderately complex. The standard deviation of 0.834 suggests a moderate variability in responses, indicating differing perceptions among the respondents about the design intricacy. Projects with higher design intricacy often require more detailed planning and specialized skills, which can influence the time and cost aspects of the project.

During the interview, one of the respondents further asserted that;

“The design of the projects and its size are very influential in determining the project’s success of design and build, this is because there are many expert reviews to the project before it is actually implemented”

In the study, further, the Site conditions received a mean score of 3.92, indicating that respondents consider this factor to have a high complexity level in D&B contracts. The lower standard deviation of 0.476 implies relatively little variation in responses, suggesting consensus among respondents on the significant impact of site conditions on project performance. Site conditions can include soil quality, weather, and accessibility, all of which can significantly affect the execution and outcomes of a project.

The size of the project, particularly on cost, was rated with a mean score of 3.85, indicating that it is perceived as a highly complex factor in D&B contracts. The standard deviation of 0.665 indicates moderate variability in responses, reflecting differing opinions on how project size affects performance. Larger projects typically involve more resources, coordination, and risk, thereby increasing the complexity and potential for performance issues.

More to that, another respondents asserted that;

“Design and build are mainly affected by the complexity of the project, when the project is complex there is usually high chances of involving many consultants by the implementing company”.

Unique requirements received the highest mean score of 4.00, suggesting that respondents view this factor as highly complex. The standard deviation of 0.682 shows moderate variability in responses, indicating that while most respondents agree on the high complexity, there are varying degrees of perceived impact. Unique requirements can encompass specialized client needs, bespoke design elements, or non-standard materials and processes, which can all contribute to increased project complexity and affect performance.

These study results further indicate that among the factors considered, unique requirements have the highest perceived complexity, followed by site conditions, project size, and design intricacy. Each of these factors contributes significantly to the overall performance of D&B contracts, with varying degrees of impact as perceived by the respondents. Understanding these factors and their complexities can help in better planning and managing D&B projects to improve performance outcomes.

This finding was also further asserted that;

“When the project has unique requirements, it becomes complex in managing it and these further challenges the implementers something makes it difficult to execute the task at hand”

4.2.2 Findings on the factors that affect the performance of design and build project

In this section, the researcher used the Likert scale of Strongly Agree (SA), Agree(A), Neutral (N), Disagree(D), Strongly Disagree (SD), where strongly agree=5, Agree=4, Neautral=3, disagree=2 and Strongly Disagree = 1.

Table 4.7: Showing the factors that affect the performance of design and build project

Factors that affect the performance of design and build project	N	Mean	Std. Deviation
There is collaboration among stake holders when using design and build	34	4.39	.488
There is a budget put a side to cater for the unforeseen challenges in the construction	34	4.23	.801
The construction project is insured	34	4.39	.627
The contractors abide by the rules of the contract during construction	34	4.00	.963

The procurement used in selection of the contractors is usually a competitive one	34	4.30	.461
Procurement method chosen in the construction industry usually plays a big influence on the project performance	34	4.39	.488
Use of design and build has some advantages to the project	34	3.94	1.129
There are many challenges encountered when using design and build	34	2.70	1.065
Design and build has more challenges than other methods of construction	34	2.84	1.101
Procurement method used in design and build is usually competitive	34	3.85	.535

Source: Primary Data

A high mean score of 4.39 suggests that respondents generally agree or strongly agree that there is significant collaboration among stakeholders when using the design and build approach. The low standard deviation of 0.488 indicates a strong consensus among respondents, highlighting that stakeholder collaboration is a consistently recognized factor for project success.

During the interview, one of the respondents further asserted that;

“Collaboration among stake holders is imperative in ensuring that there is project success for example like electrical department communicating to plumbing and civil department is very crucial for project success”

With a mean score of 4.23, the findings suggest that respondents agree that allocating a budget for unforeseen challenges is crucial for the success of design and build projects. The higher standard deviation of 0.801 indicates some variability in responses, suggesting differing opinions on the adequacy or implementation of these budget allocations, a mean of 4.39 and a standard deviation of 0.627 indicate that respondents agree on the importance of insuring construction projects. This high agreement underscores the perceived necessity of insurance as a risk mitigation strategy in design and build projects.

In the interview another respondent asserted that;

“Design and build projects must set aside another budget to prepare for variations of the projects this is to guard the project against risks that may occur in the course of operation”.

The mean score of 4.00 shows that respondents generally agree that contractors abide by the rules of the contract during construction. However, the higher standard deviation of 0.963 suggests there is notable variability in experiences or perceptions regarding contractor compliance, a high mean score of 4.30 indicates a strong agreement that the procurement process for selecting contractors is competitive. The low standard deviation of 0.461 reflects a consensus among respondents, emphasizing the importance of competitive procurement in ensuring project performance.

The mean of 4.39, coupled with a standard deviation of 0.488, reveals strong agreement that the chosen procurement method significantly influences project performance. This consistency suggests that the procurement method is a factor in the success of design and build projects. A mean score of 3.94 indicates a general agreement that the design and build method offers advantages. However, the higher standard deviation of 1.129 shows that there is considerable variability in perceptions, indicating that while many see benefits, others may have reservations. With a mean score of 2.70, the responses are closer to neutral, suggesting a recognition of challenges in the design and build approach. The standard deviation of 1.065 indicates diverse opinions, highlighting that while some respondents see significant challenges, others may not. A mean score of 2.84 suggests that respondents are somewhat neutral about whether design and build present more challenges than other methods. The standard deviation of 1.101 indicates a wide range of views, pointing to mixed experiences and perceptions.

During the interview on the procurement type, one of the respondents further alluded to the fact that;

“The type of procurement the organization chooses is key in determining the how well the design and build project benefits will yield in terms of cost, quality and time of project completion”.

The mean score of 3.85 suggests agreement that the procurement process in design and build is competitive. The relatively low standard deviation of 0.535 reflects a moderate level of

consensus, supporting the idea that competitive procurement is a valued aspect of the design and build approach. The findings indicate that collaboration among stakeholders, competitive procurement processes, and adequate budgeting for unforeseen challenges are factors for the successful performance of design and build projects. Insurance and adherence to contract rules by contractors are also significant. While the design and build method is seen to offer advantages, it also presents challenges, with varying opinions on whether it is more challenging than other construction methods.

Table 4.8: Interview responses on the factors that affect the performance of DB contract

Theme	Sub-theme	Citation
Ability to make changes	Design and build makes it easy to make changes	<i>“It is possible to have a clear view of the entire project and then make the necessary changes therefore using design and build makes possible for the changes to be made” one of the contractors.</i>
Time saved	Time is saved using design and build because all the technical responsibilities are entrusted to one contract who can easily access other professionals necessary	<i>“Since design and build gives responsibilities to one contractor to handle all the responsibilities, I am able to make the necessary contacts like electrical engineers, plumbers, interior designers and civil engineers within a short time I am done, this is because as a contractor I am able to access different professionals with in a short time”.</i> Response from one of the elderly architects
Supervision is easy	Design a build makes it easy to supervisor the project since the contractor has a sole responsibility	<i>“Whenever I get a contractor for design and build it is very easy for me to supervise it since I am the one who has the responsibility for all the other workers like civil engineers, mechanics, steel benders, and electricians and many others”.</i> Response from one of the elderly architects.

Cost reduction	Design and build can reduce the cost of the construction project	<i>“whenever a client uses design and build they are able to reduce costs , since clients after giving you money they feel they need some discounts because in their hearts they feel the contractor has over charged them and they expect to be given a discount”</i> , Response from a young architect.
Collaboration	Using design and build enables the contractor to easily coordinate the different stake holders for better project delivery	<i>“Through design and build, I can easily access different professionals to deliver the project as per the specifications of the client”</i> response from one of the contractors.
Quality	By using design and build , quality can easily be achieved because if there is any defect the contractor and the client can easily follow up on one another	<i>“When the client uses design and build and there is any a normally or deviation from the contract, he can get to the contractor to rectify because he has only person to contact”</i> response from one of the contractors. Another respondent an architect further indicated, <i>“the client can easily follow up whenever there is any deviation”</i> .
Documentation	By using design and build documents which are being used to enforce compliance can easily be managed in one collection to enhance accountability	<i>“I find it east to manage documents for the design and build contracts and when the authority asks for any document I can easily present and this also saves the clients from having different documents from different stake holders”</i> . A response from one of the contractors
Financial guarantees	In design and build there is always a financial guarantee from the client	<i>“Normally in design and build the client provides a bank guarantee to the contractor through a reputable financial institution like a bank and the clients also executes the project by also offering a guarantee that he can finish</i>

		<i>the project</i> ”, response from one of the contractors.
Communication	Communication is effective among key stake holders	<i>“The contractor can easily communicate the changes to the client, whenever there is need for a design change”</i> . Response from one of the contractors.

4.2.3 Findings on the procurement method that was used in selecting the design and build contract

In this section, the researcher used the Likert scale of Strongly Agree (SA), Agree(A), Neutral (N), Disagree(D), Strongly Disagree (SD), where strongly agree=5, Agree=4, Neautral=3, disagree=2 and Strongly Disagree = 1.

Table 4.9: procurement method that was used in selecting design and build contract

Findings on the procurement method that was used in selecting design and build contract	N	Mean	Std. Deviation
Low-bid	34	2.15	.858
Best value	34	3.31	1.068
Qualifications-based	34	4.30	.461
Sole-source	34	2.99	1.300

Source: Primary Data

The low mean score of 2.15 indicates a general disagreement with the preference for the Low-bid procurement method among the respondents. The standard deviation of 0.858 suggests a moderate variation in responses, indicating that while there is some disagreement, opinions are relatively consistent. This finding suggests that the Low-bid method is not highly favored, possibly due to concerns about quality and performance risks associated with selecting the lowest bidder without considering other factors.

The mean score of 3.31 falls between Neutral and Agree, indicating moderate agreement with the Best Value procurement method. The higher standard deviation of 1.068 reflects a wider range of opinions, signifying that while some respondents see the merit in this method, others may have reservations. This variability could stem from different experiences or perceptions of the balance between cost and quality in the Best Value approach; the high mean score of 4.30 indicates strong agreement with the Qualifications-based procurement method. The low

standard deviation of 0.461 suggests that there is strong consensus among respondents. This method is favored likely due to its emphasis on selecting contractors based on their qualifications and experience, which can enhance project performance and reduce risks related to competency; the study further reveals that the mean score of 2.99 is close to Neutral, indicating mixed feelings about the Sole-source procurement method. The high standard deviation of 1.300 suggests significant variability in responses. This method may be viewed as suitable in specific scenarios where a single source is uniquely qualified or when time constraints are tight, but it also raises concerns about a lack of competition and potential cost implications.

The analysis of the procurement methods reveals distinct preferences and reservations among the respondents. The low preference for the Low-bid method underscores concerns about compromised quality and increased risk when the primary selection criterion is cost. Conversely, the strong preference for the Qualifications-based method highlights the importance placed on the contractor's expertise and track record, suggesting that quality and reliability are prioritized over cost savings.

The moderate agreement with the Best Value method reflects an appreciation for a balanced approach that considers both cost and qualitative factors. However, the variability in opinions indicates that its effectiveness may depend on specific project contexts and implementation practices. The mixed views on the Sole-source method reveal its situational applicability but also highlight concerns about reduced competition and potential inefficiencies.

These findings have significant implications for procurement practices in design and build contracts. Emphasizing qualifications and experience in the selection process can enhance project outcomes and mitigate risks associated with contractor performance. Procurement strategies should be tailored to the specific needs and constraints of each project, balancing cost considerations with the necessity for quality and expertise. The study underscores the varied perceptions of different procurement methods in design and build contracts. The strong preference for the Qualifications-based method suggests a shift towards prioritizing quality and competency in contractor selection. To optimize project performance, stakeholders should consider these insights and adapt their procurement strategies accordingly, ensuring that the chosen method aligns with the project's goals and requirements.

4.2.4 The findings on the major advantages of using design and build project delivery method

In this section, the researcher used the Likert scale of Strongly Agree (SA), Agree(A), Neutral (N), Disagree(D), Strongly Disagree (SD), where strongly agree=5, Agree=4, Neutral=3, disagree=2 and Strongly Disagree = 1.

Table 4.10: Major advantages of using designs and build project delivery method

Major advantages of using designs and build project delivery method	N	Mean	Std. Deviation
Faster project completion	34	3.76	1.253
Early cost certainty	34	4.00	.000
Single point of responsibility	34	3.61	.627
Improved project control	34	4.30	.461

Source: Primary Data

The mean score of 3.76 indicates that the respondents generally agree that the design and build method facilitates faster project completion. The standard deviation of 1.253 suggests a relatively wide range of responses, indicating that while the majority view is positive, there is some level of disagreement among respondents. This variation might be due to different experiences or project-specific factors that influence completion times. The faster project completion can be attributed to the integration of design and construction phases, which reduces delays typically associated with traditional methods where design and construction are sequential.

In the interview, one of the respondents asserted that;

“Using design and build saves a lot of time since the point of contact for the client is one and also the contract already has knowledge on other services to seek from others contractors in case it is needed”

The mean score of 4.00 indicates strong agreement among respondents that the design and build method provides early cost certainty. Notably, the standard deviation is 0.000, meaning that all respondents uniformly agreed on this advantage. This unanimity suggests a clear consensus that design and build projects allow for better budget predictability and control.

Early cost certainty can significantly benefit stakeholders by reducing financial risk and enabling better financial planning and resource allocation, with a mean score of 3.61. Respondents generally agree that the design and build method offers a single point of responsibility. The standard deviation of 0.627 indicates moderate agreement, with some variation in responses. This advantage is important as it simplifies communication and accountability, providing clients with a straightforward line of responsibility, which can lead to more efficient problem resolution and reduced administrative burden. The moderate standard deviation suggests that while most respondents see this as an advantage, some might have encountered challenges with this aspect in practice.

One of the respondents further asserted that;

“The contract is certain of the costs and therefore communicates to the client the accurate costs in time saving a lot of challenges for the client and enabling them to plan better”

The mean score of 4.30 signifies strong agreement that the design and build method improves project control. The standard deviation of 0.461, though relatively low, indicates that there is still some minor variance in responses, but overall, the respondents strongly support this advantage. Improved project control is possible due to the integrated nature of the design and build method, which allows for better coordination and management throughout the project's lifecycle, leading to enhanced efficiency and effectiveness in project execution. The findings indicate that the design and build project delivery method is perceived positively in terms of the major advantages it offers. The method is seen as particularly beneficial for early cost certainty and improved project control, with these aspects receiving the highest levels of agreement among respondents. While there is strong support for the method's ability to ensure faster project completion and provide a single point of responsibility, these advantages show more variation in responses, reflecting diverse experiences and perceptions, the findings therefore reveal that the design and build method is generally favored for its holistic and integrated approach, which aligns with the need for efficiency, cost management, and streamlined communication in modern project management.

4.2.5 Findings on how respondents rate the overall performance of DB contracts in comparison to other project delivery methods

This section presents how respondents rate the overall performance of DB contract

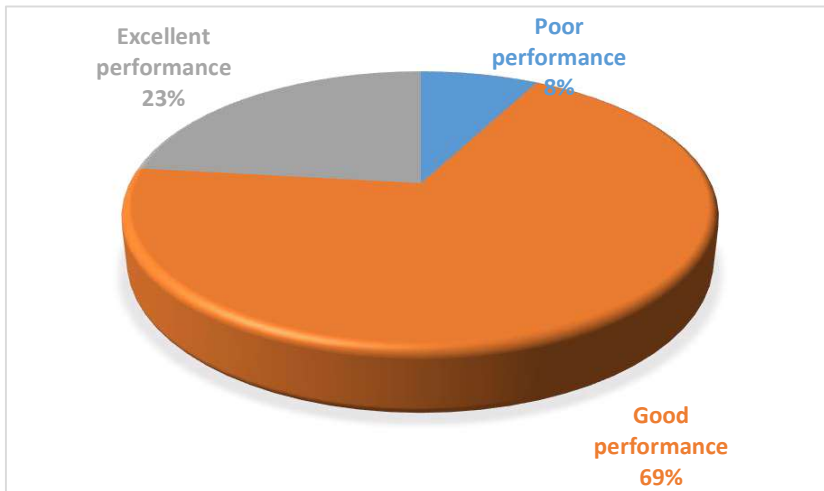


Figure 4.3 Overall performance of DB contracts in comparison to other project delivery methods

Source: Primary Data

The overwhelmingly positive response towards DB contracts suggests several key advantages perceived by industry professionals. DB contracts integrate the design and construction phases, fostering better collaboration and communication between stakeholders.

During the interview, one of the respondents asserted that;

“Adopting Design & Build often leads to more efficient and cohesive project execution, reducing the likelihood of conflicts and delays”.

By combining design and construction responsibilities under a single contract, owners can transfer significant risk to the DB contractor. This includes risks related to cost overruns, schedule delays, and design errors, which might explain the high satisfaction rates. The concurrent execution of design and construction phases can significantly shorten project timelines. The time saved through this streamlined process is an advantage, especially in projects with tight deadlines. The DB method can lead to cost efficiencies by minimizing change orders and reducing administrative overhead. The single point of responsibility helps in better cost control and predictability. The high ratings of DB contracts reflect their perceived advantages in delivering efficient, cost-effective, and timely project outcomes.

4.3 Objective two: Analyze how these factors apply in the Ugandan construction industry.

This section presents the Analysis of factors and application of design and build model in the construction industry in Uganda.

4.3.1 Analysis of factors and application of the design and build model in the construction industry in Uganda

Interview response on the construction industry in Uganda

Table 4.11: Showing the Interview response on the construction industry in Uganda

Theme	Sub-theme	Citation
Design factors	One of the design factors that affect the performance of the design and build is the alignment of the architectural aspects to the needs of the project	<i>“The architectural design must be correctly aligned to the needs of the clients and also in line to the project,”</i> narrated a contractor.
Professionalism	Professionals should be given space to do their professional work	<i>“Most times the clients want to implant their limited knowledge on professionals by trying to redirect them from their professional work,”</i> indicated by one of the contractors.
Mitigation of future risks	The contractor can easily mitigate the future risks	<i>“When design and build is applied the contractor can easily mitigate the future risks to ensure better project delivery”,</i> indicated by one of the architects who is a contractor
Marginalization of specific professionals	Some professional feel marginalized in design and build because they do not interact with the client	<i>“Under DB, it’s the main contractor who deals with the client, most people like plumbers, electricians and others don’t get chance to meet the client hence feel marginalized yet they feel something to share with the client”.</i>
Client involvement	A client has to be involved in the design stage	<i>“The involvement of the client enables the client to understand the project from its design stage to eradicate future conflicts”,</i> a response from the contractor.

In this section, the researcher used the Likert scale of Strongly Agree (SA), Agree(A), Neutral (N), Disagree(D), Strongly Disagree (SD), where strongly agree=5, Agree=4, Neutral=3, disagree=2 and Strongly Disagree = 1.

Table 4.12: Factors and application in the construction industry

Analyze how these factors apply in the Ugandan construction industry	N	Mean	Std. Deviation
In your opinion, are there certain key design-related factors that are particularly critical for the success of construction projects specifically in the Ugandan context,	34	4.00	1.042
The way a project is managed affects its performance	34	3.85	.953
Coordination, and control impact the overall performance of construction projects	34	3.92	.476
Low cost construction principles in the Ugandan construction industry are essential	34	4.08	.268
Do you believe design and build faces some challenges in Uganda's construction industry	34	3.15	1.102
Construction Design affects performance of the project	34	3.07	1.390
Work schedule affects performance of the construction project	34	2.92	1.272
Design and Build are enables construction projects in Uganda to be completed on schedule, within budget, and to stakeholders' satisfaction	34	4.08	.476
Projects are completed faster when design and build is used	34	4.00	.965

Source: Primary Data

One of the fundamental inquiries was whether there are key design factors that contribute to the success of construction projects in Uganda. The mean score for this statement was 4.00, with a standard deviation of 1.042. This high mean indicates a general agreement among the respondents that key design factors significantly affect the success of construction projects. The relatively high standard deviation suggests some variability in opinions, possibly due to differing experiences and perspectives on which specific design factors are most influential. The statement regarding the effect of project management on performance received a mean score of 3.85 and a standard deviation of 0.953. This result indicates that respondents generally

agree that effective project management is crucial for the performance of construction projects. The moderate standard deviation shows consistent agreement, reinforcing the importance of skilled project management in the industry.

The role of coordination and control in affecting overall performance was evaluated, yielding a mean score of 3.92 and a standard deviation of 0.476. The high mean score indicates strong agreement on the importance of these factors, while the low standard deviation underscores consensus among respondents. This underscores the need for robust coordination and control mechanisms to enhance project outcomes.

Coordination and control impact the overall performance of construction projects, with a mean score of 4.08 and a standard deviation of 0.268. The very high mean and low standard deviation suggest a strong and consistent agreement on the value of Coordination, and control impacts the overall performance of construction projects. This implies that adopting coordination and control in construction practices can lead to improved efficiency and performance in the industry.

Respondents acknowledged the existence of specific challenges related to design and build factors, as reflected by a mean score of 3.15 and a standard deviation of 1.102. This mean score indicates a neutral to slightly positive agreement, with a high standard deviation pointing to diverse opinions. The variability suggests that while some respondents recognize significant challenges, others may not perceive them as such, possibly due to varying project scopes and complexities. The statement about construction design affecting project performance had a mean score of 3.07 and a high standard deviation of 1.390. The neutral mean score, coupled with a high standard deviation, indicates mixed opinions among respondents. This variability may stem from differing experiences with how design elements influence project outcomes.

The impact of work schedules on project performance was analyzed, resulting in a mean score of 2.92 and a standard deviation of 1.272. The lower mean score suggests a tendency towards neutrality or slight disagreement, with a high standard deviation indicating diverse perspectives. This variation might reflect differing views on the rigidity or flexibility of work schedules in affecting project success.

The design and build approach was positively evaluated for its ability to enable projects to be completed on schedule, within budget, and to stakeholders' satisfaction. This statement received a mean score of 4.08 and a standard deviation of 0.476, indicating strong agreement

and consistent opinions among respondents. Similarly, the statement about projects being completed faster when using the design and build approach had a mean score of 4.00 and a standard deviation of 0.965, further supporting the perceived benefits of this method. The analysis of these factors reveals several key insights into the Ugandan construction industry. There is a strong consensus on the importance of effective project management, coordination, control, and lean construction principles. While there are recognized challenges related to design and build factors, the overall perception is that the design and build approach positively impacts project performance. The mixed opinions on the influence of work schedules and construction design highlight areas where further research and tailored strategies might be needed to address specific project requirements and contexts.

4.4 Objective three: Reveal the challenges faced by DB contracts in Uganda.

This section will include; Reveal the challenges faced by DB contracts in Uganda.

4.4.1. Findings on the challenges faced by design and build contracts in Uganda

This section was presented both with a questionnaire and with an interview

4.4.2. Interview responses on challenges faced by design and build contracts in Uganda

Table 4.13: Interview responses on challenges faced by design and build contracts in Uganda

Theme	Sub-theme	Citation
Clients feel cheated	The clients feel the contractor is cheating them since the contractor takes the money for all the activities.	<i>“When the client gives you all the money for different parts of the project they feel you have cheated them”</i> . Indicated by one of civil engineers and also contractor
unprofessionalism	Clients may encourage unprofessionalism as a result of being so close to the professional engineers.	<i>Sometimes contractors even those who are professional engineers do shoddy work and use their profession , to defend their work</i>
Fluctuation on the cost of building materials	The prices of the building materials keep on fluctuating; this affects the design and building aspects.	<i>“The prices of construction materials keep on changing sometimes within a period of 6 months sometimes hardware products have increased and if the projects take longer than 2 years it may be difficult to explain the cost of the products”</i> . Replied a contractor

In this section, the researcher used the Likert scale of Strongly Agree (SA), Agree(A), Neutral (N), Disagree(D), Strongly Disagree (SD), where strongly agree=5, Agree=4, Neutral=3, disagree=2 and Strongly Disagree = 1.

Table 4.14: Challenges faced by design and build contracts in Uganda

Challenges faced by design and build contracts in Uganda	N	Mean	Std. Deviation
The construction materials in Uganda for design-build projects are affordable.	34	2.54	.846
There is available skilled professionals proficient in both design and construction aspects in Uganda	34	3.85	.535
The regulations do not favour design and build systems	34	2.92	1.210
There is limited skilled manpower for the design build to be implemented	34	2.08	.921
There are challenges that stakeholders face in complying with building codes, regulations, and industry standards	34	3.00	1.112
fluctuations in material prices affected the feasibility and sustainability of design-build projects in Uganda	34	3.47	1.009
Design and build cost is high and its more applicable is a big contract	34	2.69	.910

Source: Primary Data

The affordability of construction materials is a factor for the success of design-build projects. With a mean score of 2.54 (Std. Deviation = 0.846), the survey results indicate that respondents generally disagree with the statement that construction materials for design-build projects are affordable in Uganda. This suggests that the high cost of materials is a significant barrier, limiting the feasibility and attractiveness of design-build contracts in the region. High material costs can strain budgets and make it difficult for contractors to deliver projects within the agreed-upon price. The availability of skilled professionals proficient in both design and construction is crucial for the successful implementation of design-build contracts. The mean score of 3.85 (Std. Deviation = 0.535) shows a high level of agreement among respondents that there are skilled professionals available in Uganda. This indicates that the human resource

aspect is less of a challenge, providing a solid foundation for the adoption and execution of design-build projects.

The regulatory environment can significantly affect the success of design-build projects. With a mean score of 2.92 (Std. Deviation = 1.210), respondents were neutral about whether the regulatory environment in Uganda prevents design-build systems. This neutrality could indicate variability in experiences with regulations, suggesting that while some may find the environment manageable, others encounter significant regulatory hurdles. Regulatory challenges can cause delays, increase costs, and reduce the efficiency of the design-build approach.

A limited skilled workforce is a notable challenge, with a mean score of 2.08 (Std. Deviation = 0.921), indicating disagreement with the statement that there is an adequate skilled workforce for design-build implementation. This lack of skilled work force is an issue, as it can lead to delays, increased costs, and subpar project outcomes. The contractors may be required to invest in training to build a robust workforce. Challenges in complying with building codes, regulations, and industry standards were highlighted with a mean score of 3.00 (Std. Deviation = 1.112), indicating a neutral stance. This neutrality suggests that while some stakeholders may find compliance manageable, others face significant difficulties. Compliance issues can lead to legal complications, project delays, and increased costs, undermining the benefits of the design-build approach.

This finding was also further in line with the response from one of the respondents who asserted that;

“Though design & build is a good idea few companies have the capacity to implement it since there is need for an organization to have a variety of skilled personnel to make it a success for example the company must have an electrical engineer, civil, architect, quantity surveyor among other personnel”.

Material price fluctuations are a significant concern, with a mean score of 3.47 (Std. Deviation = 1.009), indicating that respondents agree that such fluctuations affect the feasibility and sustainability of design-build projects. Price volatility can disrupt budgets and timelines, making it challenging to maintain project viability and deliver value to clients.

In the interview one of the respondents further asserted that;

“The price fluctuation of the material prices negatively affects the ability of an organization to be in position to deliver on design and build”.

The cost to implement design and build is perceived as high, with a mean score of 2.69 (Std. Deviation = 0.910). This suggests that respondents generally disagree that the implementation costs are low, highlighting financial barriers as a significant challenge. High implementation costs can deter clients from opting for design-build contracts, preferring more traditional contracting methods that they perceive as less risky and more cost-effective. The findings indicate that while there is a solid foundation of skilled professionals in Uganda to support design-build contracts, significant challenges remain. These include the high cost of materials, regulatory hurdles, a limited skilled workforce, compliance issues, material price fluctuations, and high implementation costs. Addressing these challenges requires a multi-faceted approach, including regulatory reform, investment in workforce development, and measures to stabilize material prices. By tackling these issues, Uganda can better leverage the benefits of design-build contracts, enhancing project efficiency, cost-effectiveness, and overall construction quality.

4.5. Objective four: Proposed changes to DB contracts in Uganda

This section presents a discussion on proposed changes to DB contracts in Uganda

4.5.1. Findings on the proposed changes to DB contracts in Uganda

A finding on the response to your experience, how crucial is early cost planning for effective cost control in design-build projects?

Table 4.15: How crucial is early cost planning for effective cost control in design-build projects

In your experience, how crucial is early cost planning for effective cost control in design-build projects?	Frequency	Percentage
Extremely crucial	31	92.7
Moderately crucial	3	7.3
Total	34	100

Source: Primary Data

The findings of this study reveal a consensus among professionals on the importance of early cost planning in the context of design-build projects. A significant 92.7% of respondents

indicated that early cost planning is "extremely crucial" for effective cost control, while 7.3% deemed it "moderately crucial." This overwhelming agreement underscores several aspects of early cost planning in the successful execution of design-build projects.

According to the findings in the table, early cost planning allows for the development of more accurate budgets. This precision is essential in design-build projects, where the integration of design and construction phases can lead to fluid and dynamic project scopes. Early cost planning helps in identifying potential cost drivers and estimating expenses more accurately, thereby reducing the likelihood of budget overruns. Identifying and mitigating risks early in the project lifecycle is a pivotal aspect of cost control. Early cost planning enables project managers to anticipate potential financial risks and develop strategies to manage them effectively.

This finding was also further indicated by one of the respondents during the interview who asserted that;

“When the design and build team make an early cost planning, they are able to reduce unnecessary cost that could make them spend on things that are not necessary”

Involving stakeholders early in the cost planning process ensures that their expectations and requirements are understood and integrated into the project plan. This alignment is for maintaining control over costs, as it minimizes the risk of scope changes and project delays, which can lead to increased expenses. Early cost planning fosters transparency and builds trust among stakeholders, contributing to smoother project execution. Early cost planning provides the foundation for effective value engineering, as it allows project teams to explore alternative design solutions and construction methods that can achieve the desired outcomes at a lower cost. This practice not only controls costs but also enhances the overall value of the project. Resource allocation is a component of cost control in design-build projects. Early cost planning helps in identifying the required resources, including materials, labor, and equipment, at the outset. This foresight ensures that resources are allocated efficiently and that any potential shortages or surpluses are addressed before they affect the project timeline and budget. The study's findings highlight the near-universal agreement among professionals on the crucial role of early cost planning in effective cost control for design-build projects. By enhancing budget accuracy, improving risk management, aligning stakeholder expectations, facilitating value

engineering, and supporting efficient resource allocation, early cost planning lays the groundwork for successful project execution.

4.5.2 Findings on the projects’ ability to adhere to budgetary constraints

Table showing Findings on the projects’ ability to adhere to budgetary constraints

Table 4.16: Findings on the projects’ ability to adhere to budgetary constraints

Do you agree with the statement that projects incorporating thorough cost planning are better positioned to adhere to budgetary constraints?	Frequency	Percentage
Strongly agree	26	78
Somewhat agree	7	22
Total	34	100.0

Source; Primary Data

The overwhelming majority of respondents (100%) either strongly or somewhat agree with the statement, indicating a consensus on the importance of thorough cost planning in maintaining budgetary control. This strong agreement suggests that practitioners and stakeholders in project management recognize the value of detailed financial planning as a factor in successful project execution.

4.5.3 How do you perceive the amalgamation of design and construction in facilitating improved risk identification and mitigation?

Table showing the perception of the amalgamation of design and construction in facilitating improved risk identification and mitigation.

Table 4.17: perceive the amalgamation of design and construction in facilitating improved risk identification and mitigation

How do you perceive the amalgamation of design and construction in facilitating improved risk identification and mitigation?	Frequency	Percentage
Highly effective	26	76.8
Moderately effective	8	23.2
Total	34	100

Source: Primary Data

The amalgamation of design and construction phases in a project is perceived as highly effective in facilitating improved risk identification and mitigation. This integrated approach allows for a more comprehensive and cohesive understanding of potential risks, as stakeholders from both phases can collaborate closely and share insights. By involving construction expertise during the design phase, potential construction-related risks can be identified early, allowing for proactive planning and mitigation strategies. In a study of stakeholders' perceptions, a significant majority (76.8%) found this amalgamation to be highly effective. This suggests that integrating design and construction not only improves communication and collaboration but also enhances the overall ability to anticipate, identify, and address risks before they escalate into major issues. A smaller, yet notable, proportion (23.2%) viewed this approach as moderately effective, indicating that while the majority recognize substantial benefits, there is still room for improvement in how these phases are integrated to optimize risk management.

4.5.4 Have you encountered challenges related to inaccurate cost estimation due to the dynamic nature of design development in construction projects?

Table showing challenges related to inaccurate cost estimation due to the dynamic nature of design development in construction projects

Table 4.18: Challenges related to inaccurate cost estimation due to the dynamic nature of design development in construction projects

Have you encountered challenges related to inaccurate cost estimation due to the dynamic nature of design development in construction projects?	Frequency	Percentage
Yes, frequently	26	76.8
No, really	8	23.2
Total	34	100

Source: Primary Data

The data indicates that a significant majority of respondents have encountered challenges related to inaccurate cost estimation due to the dynamic nature of design development in construction projects. Specifically, 76.8% (26 out of 34 respondents) reported facing these challenges frequently. On the other hand, 23.2% (8 respondents) indicated that they rarely or never face such issues. This high frequency suggests that the dynamic changes in design

development significantly affect cost estimation accuracy in construction projects, highlighting the need for improved methods or tools to manage and predict costs more effectively amidst changing designs.

During the interview one of the respondents asserted that;

“When there is proper cost estimation the project is able to be executed correctly since the project procurement department will meet the expectations of the technical team”

4.5.5 Findings on the measures respondents think can be implemented to enhance communication between design and construction teams and reduce miscommunication instances

Table 4.19: Measures respondents think can be implemented to enhance communication between design and construction teams and reduce miscommunication instances

What measures do you think can be implemented to enhance communication between design and construction teams and reduce miscommunication instances	Frequency	Percentage
Regular meetings and updates	31	92
Improved documentation and reporting systems	3	8
Total	34	100

Source: Primary Data

Supported by 92.3% of respondents, this measure involves scheduled, consistent interactions between design and construction teams. These meetings ensure that all parties are aligned, potential issues are addressed promptly, and progress is monitored continuously, with 7.7% of respondents favoring this measure, it highlights the importance of clear, accurate, and accessible documentation. Enhanced reporting systems ensure that all team members have access to the necessary information, reducing the likelihood of misunderstandings, Centralized Information Systems: Implement centralized digital platforms where all project-related documents are stored and easily accessible to both teams. Provide training sessions focused on improving communication skills, particularly in areas such as technical writing and verbal communication. Ensure that both teams are proficient in using any digital tools and platforms implemented for documentation and communication.

This response was also further supplemented with the response from the interview were one of the respondents asserted that;

“Constant communication and alignment is very crucial since the client and the contractor must be in communication to discuss the progress so that both parties are fully aware of their responsibilities”

4.5.6 Findings on how familiar respondents are with performance-based budgeting in construction projects.

The graph below shows the familiarity that the respondents have with performance based budgeting

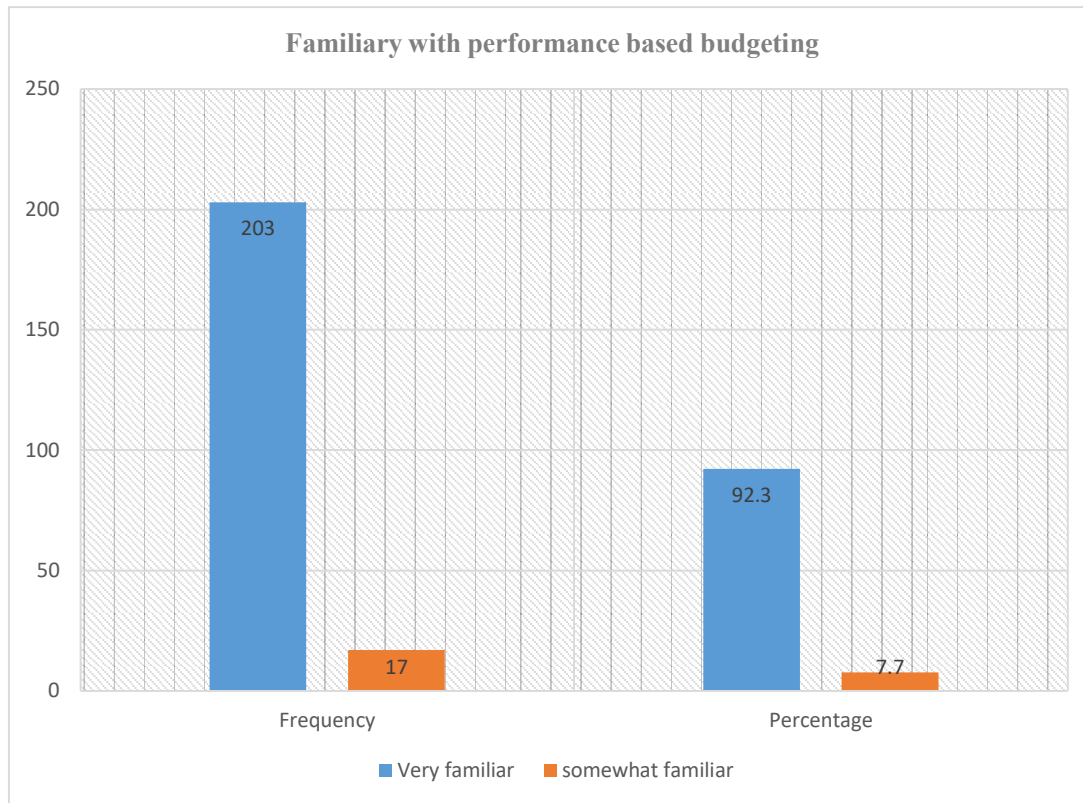


Figure 4. 4: How familiar are respondents with performance-based budgeting in construction projects

Source: Primary Data

The findings of this study reveal a significant level of familiarity with performance-based budgeting (PBB) among professionals in the construction industry. Out of the total respondents, a substantial majority of 92.3% indicated that they are "very familiar" with PBB,

while a smaller segment of 7.7% reported being "somewhat familiar" with the concept. This data suggests a strong awareness and understanding of PBB practices within the industry, the high percentage of respondents who are very familiar with PBB can be attributed to several factors, the construction industry has increasingly adopted PBB as a tool for enhancing project performance and accountability. This widespread implementation likely contributes to the high familiarity rates observed in this study, the construction sector has placed a significant emphasis on training and educating its workforce on advanced budgeting techniques, including PBB. Professional development programs, workshops, and seminars have likely played a role in raising awareness and understanding of PBB. Modern construction projects are often complex and require robust budgeting practices to ensure successful completion. PBB, with its focus on linking budgetary allocations to performance outcomes, provides a strategic advantage in managing these complexities and enhancing accountability.

4.5.7 What ongoing monitoring mechanisms do you think can be implemented to assess budget performance effectively in design-build projects?

The graph below shows ongoing monitoring mechanisms do you think can be implemented to assess budget performance effectively in design-build projects

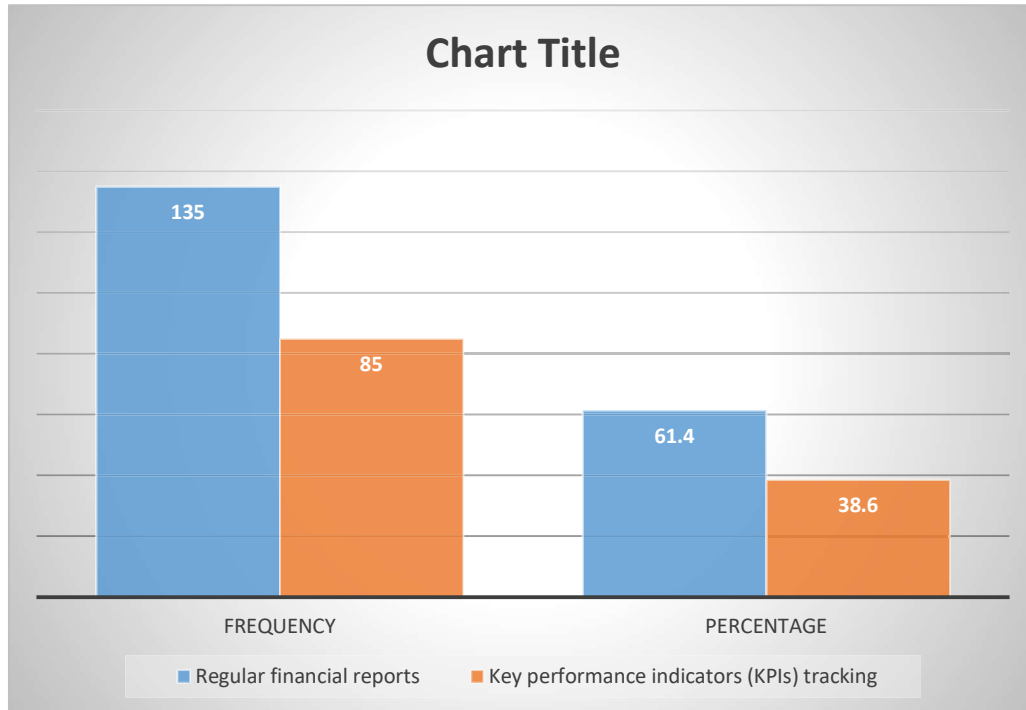


Figure 4.5: Ongoing monitoring mechanisms needed in assessing budget performance effectively in design-build projects:

Source: Primary Data 2024

In design-build projects, effective budget performance can be assessed through the implementation of ongoing monitoring mechanisms. The most commonly used methods are regular financial reports, utilized by 61.4% of respondents, and key performance indicators (KPIs) tracking, employed by 38.6%. This suggests that while regular financial reports are the predominant approach for budget monitoring, KPIs are also an essential tool for tracking and evaluating financial performance in these projects.

4.5.8. Findings on the proposed changes to Ugandan- construction industry

Table 4.20: Findings on the proposed changes to Ugandan construction industry

Theme	Sub-theme	Citation
Early cost planning	Having early cost planning is in construction enables eliminating many challenges that could come up as a result of not aligning the proper human resource	<i>“When I do early cost planning I am able to eliminate many errors that would come during the construction program”.</i>
Risk identification	The liquidity of the funder can easily be identified in the process of design and build	<i>“The funders’ liquidity is established through bank guarantees this secures the contractor to know that after work payment is ready”.</i> Response from the contractor
Under quoting	Under quoting is one of the causes of in accurate cost estimation	<i>“During the quotation process the contractor may under quote the cost of the construction”</i> response from a contractor.
Inaccurate costing	Inaccurate costing is managed by quoting and putting an extra ten percent on the contract, this is to cater for inflation	<i>“During the quotation process I make sure that I adjust the contract cost by 10%”.</i> Response from one of the contractors.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

This chapter comprises of, discussion of findings.

5.1 Discussion

The section presents the discussion of findings, conclusions and recommendation.

5.1.1 Discussion of findings

This section presents the discussion of the study in line with study objectives;

5.1.2 To review factors that affects the performance of DB contract.

The results from the study show that stakeholder collaboration is important, as indicated by a high mean value and a low standard deviation, indicating a strong consensus on its role in contract success. Similarly, the necessity of competitive procurement processes and the allocation of budgets for unforeseen challenges is highlighted as high, reflecting a broad agreement among respondents. This finding was also in line with (Shrestha, 2023), the number of change orders, a major source of project delays, is less likely due to the improved communication between the design team and design-builder. Project cost is also more certain with DB than with some other methods, as the DB contract is usually awarded on a lump-sum basis during the early stages of projects, which provides the owner with an early estimate of project cost. Moreover, as the DB method allows design-builders to have total control over design, scope, and budget, it is more likely that DB projects will be completed on schedule and within budget.

The results also further shows that there is a role of insurance as a risk mitigation strategy is also emphasized, with a high mean score, reinforcing its perceived importance in safeguarding project outcomes and also there is general agreement that contractors typically adhere to contract rules tis view was also in line with, Bilgin, & Acun, (2024), the cost performance of construction projects is a success criterion for project sponsors, especially given the common occurrence of projects exceeding their budget estimates. Inaccuracies in projected cost estimates under uncertain conditions, often resulting in cost overruns, are a major concern for clients, project managers, contractors, and other stakeholders in the construction industry.

The design and build method is recognized for offering advantages, although there is considerable variability in perceptions regarding its challenges, as reflected in the average mean scores recognizing challenges compared to other methods. This variability highlights that while the design and build approach is advantageous, it also presents significant challenges that may not be uniformly recognized (Nguyen et al., 2018), the successful performance of design and build projects hinges on effective stakeholder collaboration, competitive procurement processes, and adequate budgeting for unforeseen challenges. Insurance and contractor compliance with contract rules are also crucial.

5.1.3 Analyze how these factors apply in the Ugandan construction industry.

The study findings indicate that the significance of various factors in the performance of design and build (D&B) contracts, with unique requirements being perceived as the most as high value, this view was also shared by Girth, & Lopez, (2019) who asserts that design and build contracts, a prevalent procurement method in the construction industry, Design & Build is known for its efficiency in project delivery by combining design and construction responsibilities under a single contractor. However, the integration of unique requirements those that deviate from standard practices often introduces significant complexity into these contracts. Unique requirements in design and build contracts can include bespoke designs, non-standard materials, innovative construction methods, or specific client needs that are not typically addressed in conventional projects. These requirements are often driven by the desire for architectural distinction, sustainability goals, or functional customization.

The inclusion of unique requirements necessitates greater collaboration between the client, designer, and contractor, which can complicate the traditional dynamics of design and build contracts. The integration of these requirements requires careful management to ensure that the final product meets the client's expectations while staying within budget and time constraints. This view was also shared by Habib et al., (2022), who assert that Design and build contracts offer a unified approach where the contractor is responsible for both the design and construction of the project. This model contrasts with traditional procurement methods, where design and construction are separate contracts often leading to fragmented responsibilities, this was also shared by Lupton, & Stellakis, (2025) who indicates that D&B contracts can enhance efficiency, reduce conflicts, and shorten project timelines by fostering early contractor involvement (ECI) and allowing for concurrent design and construction activities, However, when unique requirements are introduced, the conventional roles and responsibilities can blur,

demanding more intensive collaboration and communication among stakeholders, the perception of complexity in design and build contracts with unique requirements is influenced by several factors, including the level of detail in the design brief, the contractor's experience with similar projects, and the extent of client involvement during the project, complexity in construction projects can be categorized into two dimensions: organizational complexity, which relates to the number of stakeholders and the interactions between them, and technological complexity, which pertains to the intricacy of the construction methods and materials used.

The results indicate that unique requirements, with the highest mean are seen as particularly challenging, likely due to their demand for specialized client needs and bespoke solutions, this view was also shared by Larsson et al., (2022), who asserts that the implementation of bespoke solutions in design and build projects requires a high degree of collaboration between architects, engineers, contractors, and clients, the integration of multidisciplinary teams is to developing innovative solutions that address specialized client needs. Additionally, the use of modular construction techniques and prefabrication can enhance the efficiency of bespoke solutions, allowing for greater customization while controlling costs and timelines, while bespoke solutions offer numerous benefits; they also present challenges and risks. Customization can lead to increased project complexity, requiring specialized skills and expertise that may not be readily available. The findings from the study indicate that site conditions also emerge, as this reflects that the respondents agreed to the findings. Project size and design intricacy are also important but show more variability in respondent perceptions. These findings highlight the need for detailed planning, specialized skills, and a comprehensive understanding of these factors to enhance the performance of D&B projects. Effective management of these complexities is essential for achieving successful project outcomes.

Unique requirements tend to amplify both dimensions of complexity, and Gransberg and Molenaar (2019) argue that when a project involves innovative or untested methods, it can lead to increased uncertainty and the need for more intensive management processes. The uniqueness of requirements often results in a higher degree of design uncertainty, which, in turn, may lead to design changes, scope creep, and challenges in quality control.

5.1.4 Reveal the challenges faced by DB contracts in Uganda.

The study results indicate that respondents generally disagree with the statement that construction materials for design-build projects are affordable; this suggests that high material costs are a significant barrier in Uganda, limiting the feasibility and attractiveness of design-build contracts. The high cost of materials can strain project budgets, making it difficult for contractors to deliver projects within the agreed-upon price. In a design-build system, where the contractor assumes greater responsibility for both design and construction, cost overruns due to expensive materials can undermine the benefits of this approach, making it less appealing to clients, this view was also further shared by Shrestha, & Fathi, (2019), who asserts that affordability and Access to Resources, the cost of construction materials, particularly robust and durable ones like reinforced concrete, poses a significant challenge in Uganda. High material costs relative to income levels make it difficult for both contractors and clients to afford materials necessary for design-build projects, hindering project feasibility and sustainability.

On a positive note, the availability of skilled professionals proficient in both design and construction appears to be less of a challenge, with a high mean. This indicates that there is a solid foundation of human resources in Uganda capable of supporting the adoption and execution of design-build projects. The presence of skilled professionals can enhance the efficiency and quality of projects, ensuring that they meet client expectations and are completed on time. This is a crucial factor in the success of design-build projects, as the integration of design and construction requires expertise across both domains, this positive view further supported by Zhang, Liu, Gao, & Ma, (2019) who asserts that Construction is a vital sector for economic development in Uganda, with infrastructure projects driving growth and employment opportunities. However, one of the significant challenges faced by the construction industry is the skilled manpower to carry out specific designs and Uganda, as a developing country, does not have the specific skills necessary for some tasks.

The study results further show that the availability of professionals skilled in design and construction has a perceived shortage of skilled manpower for design-build implementation, with a mean score of 2.08. This lack of adequate skilled manpower is an issue, as it can lead to delays, increased costs, and subpar project outcomes. Addressing this challenge requires significant investment in training and development to build a robust workforce capable of

supporting design-build projects. Without a sufficient number of skilled workers, even the well-designed projects may falter during the construction phase.

Material price fluctuations are a significant concern, with a mean score of 3.47. Respondents agree that such fluctuations affect the feasibility and sustainability of design-build projects. Price volatility can disrupt project budgets and timelines, making it challenging to maintain project viability and deliver value to clients. Stabilizing material prices or implementing strategies to mitigate the impact of price fluctuations could enhance the predictability and success of design-build contracts, this view was also in line with Flammer, Hong, & Minor, (2019) who indicate that Limited domestic production capacities for certain materials, coupled with import dependencies, contribute to supply chain challenges, leading to price volatility. Uganda's economy is susceptible to exchange rate fluctuations due to its dependence on imports for construction materials. Changes in exchange rates, particularly fluctuations in the value of the Ugandan shilling against major currencies like the US dollar, directly influence the cost of imported materials. Inadequate transportation infrastructure and logistical challenges contribute to higher transportation costs for construction materials, especially in remote areas. Poor road networks and inefficient transport systems increase the overall cost of materials.

The cost of implementing design-build projects is perceived as high, with a mean score of 2.69, this suggests that respondents generally disagree that the implementation costs are low, highlighting financial barriers as a significant challenge. High implementation costs can deter clients from opting for design-build contracts, preferring more traditional contracting methods that they perceive as less risky and more cost-effective. To encourage the adoption of design-build projects, it is crucial to find ways to reduce these costs, perhaps through financial incentives, improved project management practices, or economies of scale, this view was also in line with Lam, Chan, & Chan, (2018), who asserts that Design-build projects have become increasingly prevalent in the construction industry, offering a streamlined and integrated approach that brings together design and construction teams under a single entity. The success of these projects hinges not only on the technical expertise but also on effective collaboration and communication among team members. This literature review explores the pivotal role that collaboration and communication play in determining the success of design-build projects.

The findings of the survey indicate that while there is a strong base of skilled professionals in Uganda to support design-build projects, several significant challenges remain. These include the high cost of materials, regulatory hurdles, limited skilled work force, compliance issues,

material price fluctuations, and high implementation costs. Addressing these challenges requires a multi-faceted approach, including regulatory reform, investment in workforce development, and measures to stabilize material prices. By tackling these issues, Uganda can better leverage the benefits of design-build contracts, enhancing project efficiency, cost-effectiveness, and overall construction quality, this view was also further in line with Mancini et al. (2021) highlights the positive impact of collaboration on the quality and innovation of design-build projects, resulting in enhanced project outcomes. Collaboration and communication are integral components of the success of design-build projects. Understanding the challenges and leveraging the benefits associated with effective collaboration and communication are imperative for stakeholders engaged in design-build projects. Future research should continue to explore evolving strategies and technologies that enhance collaboration and communication in the dynamic landscape of design-build projects.

5.1.5 Changes that are needed in DB contracts in Uganda

The discussion highlights the significance of consistent collaboration and effective communication in ensuring successful project execution in the construction industry. The findings suggest a strong preference for scheduled, consistent interactions between design and construction teams, majority respondents supporting this measure. These interactions play a crucial role in aligning all parties, promptly addressing potential issues, and continuously monitoring progress, thereby minimizing delays and improving overall project performance, this aspect is nonetheless for reducing misunderstandings and ensuring that all team members have access to the necessary information. Enhanced reporting systems and centralized information systems can further support this by providing a digital platform where all project-related documents are stored and easily accessible. Moreover, training sessions focused on improving communication skills, particularly in technical writing and verbal communication, are essential for ensuring that both teams are proficient in using the digital tools and platforms implemented for documentation and communication, this findings were also in line with Osei-Kyei, Narbaev, & Ampratwum, (2022) who asserts that Commencing with early cost planning in the design phase is crucial for achieving effective cost control in design-build projects. Studies indicate that projects incorporating thorough cost planning are better positioned to adhere to budgetary constraints. The amalgamation of design and construction facilitates improved identification and mitigation of risks. A diligently executed risk mitigation strategy plays a pivotal role in cost control, averting budget overruns.

In the broader context of budgeting practices in the construction industry, the study reveals a significant level of familiarity with performance-based budgeting (PBB). An overwhelming majority of respondents reported being "very familiar" with PBB, this high familiarity likely stems from the construction industry's increasing adoption of PBB as a tool for enhancing project performance and accountability. The widespread implementation of PBB, combined with the sector's emphasis on training and education, has likely contributed to the strong awareness observed; this view was also in line with Smith, Merna, & Jobling, (2014), who asserted that construction project is a series of tasks performed to construct a structure or building. It may also be referred to as a 'project' and comprises many small projects from different disciplines. Most of the construction project's lifecycle can be divided into – conception, design, construction, commissioning and closure. In a construction project, there is generally no opportunity to build a prototype. It often requires integration of different disciplines from structural, civil, electrical, mechanical, geotechnical etc. Construction projects are goal oriented with a clearly defined scope and mostly operate in a matrix environment. There may be varied goals and solutions. The contract is a binding document or the bible that must be followed throughout the project. There is a high penalty associated with the late completion of a construction project.

However, despite this familiarity, the study also reveals a unanimous consensus among respondents aligning budget allocations with project performance indicators that does not lead to efficient resource allocation. This skepticism suggests that there may be a disconnection between the theoretical benefits of PBB and its practical application in the construction industry. The respondents' experiences may reflect challenges in effectively linking budget allocations to performance outcomes, which can result in inefficiencies and a lack of confidence in this budgeting approach, this view was also in line with Shayan, Pyung Kim, & Tam, (2022) who asserted that in design-build projects there is the importance of incorporating performance-based budgeting. Efficient resource allocation is ensured by aligning budget allocations with project performance indicators. Successful design-build initiatives implement ongoing monitoring mechanisms to assess budget performance. The ability to flexibly adjust the budget in response to project developments is essential for achieving successful outcomes.

In design-build projects, the effectiveness of budget performance is primarily assessed through ongoing monitoring mechanisms. Regular financial reports, utilized by majority of respondents, and key performance indicators (KPIs) tracking, employed, are the most commonly used methods. This data indicates that while regular financial reports are the

predominant approach, KPIs are also considered an essential tool for tracking and evaluating financial performance. The integration of these monitoring mechanisms is crucial for ensuring that budgetary practices align with project goals, ultimately contributing to the successful completion of complex construction projects, this view were also in line with Thaheem, (2022) who asserted that the dynamic nature of design development poses challenges to accurate cost estimation. Research indicates that design changes and uncertainties can significantly affect project budgets. Effective communication between design and construction teams is imperative. Instances of miscommunication can lead to misunderstandings, delays, and cost overruns.

The findings underscore the importance of consistent communication and collaboration, supported by effective documentation and monitoring practices, in managing the complexities of modern construction projects, while performance-based budgeting is widely recognized and implemented, its practical effectiveness in resource allocation remains a point of contention, highlighting the need for further refinement and adaptation of budgeting practices in the industry, this view was also in line with Adu Gyamfi, Aigbavboa, & Thwala, (2022) who assert that projects that effectively manage costs and budgets are more likely to be completed on schedule. Timely completion is a success criterion for design-build projects. Early cost planning, risk management, performance-based budgeting, and the adoption of technological interventions emerge as components in achieving successful project outcomes.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATION

6.0 Introduction

This section presents the study conclusions and recommendations

6.1 Conclusion of the study

The following are the conclusions from the study;

Respondents highlighted that the DB approach facilitates flexibility in making changes for the constructor, since the contractor is fully responsible for the entire construction the design and build system therefore enables the contractor to be in position to have the ability to change the key specifics earlier so as to enable the success of the entire project, in the study it was further revealed that during the construction the contractors is able to prepare for other key construction requirements like electrical wiring, plumbing and interior designing.

Since the contractor holds comprehensive responsibility for both design and execution, This consolidation of roles not only streamlines communication between the contractor and client but also enables quicker decision-making and adaptation during the project's early stages, for example in the construction of Mbuya housing estate the contractor easily Communicated to NSSF about the challenges that they face and they were able to be in position mitigate future challenges.

The findings from the study indicated that the contractor was able to efficiently use the Ghent chart to schedule efficiently for the different phases of the project. Time efficiency emerged as another advantage of DB contracts. The ability of a single contractor to manage all technical responsibilities, including coordinating with various professionals such as electrical engineers and interior designers, results in significant time savings.

Supervision of the work performed by design contract method has been found to be easier since the point of reference is only for all activities for example NSSF has been able to monitor Mbuya housing estate this in addition to that enabled NSSF to be in position to monitor the progress of its housing estate. This model, therefore, also simplifies supervision, as the contractor, being solely responsible, can easily oversee the work of all other professionals

involved, ensuring seamless project progression. Cost reduction was noted as a key benefit, with DB contracts allowing clients to potentially save money, often through negotiated discounts.

Using design and build the client is able to monitor the quality since there is a single point of responsibility (there is one contractor entrusted with the job and the client consults him for contract accountability) for example in Mbuya housing estate NSSF has been able to monitor the construction of the estate and also to ensure that the housing estate meets the specification in the contract documents, this further gives NSSF an easy way of monitoring the progress and determine accurately the time of completion of the project.

There is some ability to enhance the quality of the product the DB model enhances accountability. Since the contractor is the sole point of contact, any defects or deviations can be promptly addressed, ensuring that the contractor maintains high standards. The quality of the construction can easily be investigated and improved since the contractor has utmost responsibility for the project delivery he is able to control the entire process of construction, this is also further in line with Li et al., (2025) who asserts that In the design and build like in Mbuya housing Estate the contractor places financial guarantee and this is secured by reputable financial institutions something which shows that the company is able to complete for example in NSSF construction of Mbuya housing estate, there was a financial guarantee by China National Aero-Technology International Engineering Corporation to enable the NSSF be secure that in case of failure by the contractor to complete their contractor they can easily be compensated.

Before the execution of the design and build the contractor presents the architectural design to the client, this enables the client to examine if the architectural design matches with the needs to the organization before the contractor is signed this enables the organization to be in position to tract their contractor at infant stage to reduce risks, for example China National Aero-Technology International Engineering Corporation was able to present its architectural design for the Mbuya housing estate before it could move forward.

Early cost planning is essential in mitigating challenges that may arise from misalignment of human resources and unforeseen errors during the construction phase, more to that the importance of risk identification is highlighted, particularly concerning the liquidity of the funder. Establishing the funder's liquidity through mechanisms such as bank guarantees ensures

that contractors have confidence in the payment process, which is crucial for maintaining project momentum and contractor engagement. Under quoting leads to inaccurate cost estimations, potentially compromising the financial viability of a project. Contractors acknowledge this risk, emphasizing the need for accurate and realistic quoting to avoid financial shortfalls.

6.2 Recommendations

The study made the following recommendations;

The contractors should be empowered; the empowerment can include early payments to make early-stage adjustments to designs and plans. This includes areas like making adjustments in areas of plumbing, electrical installation, environmental setup and size of the rooms, based on this, this can help anticipate potential project challenges and implement effective solutions before they escalate. By having full design and construction responsibility, the contractor can tailor the project to client needs and environmental constraints better.

There is need for Clear, direct communication channels between the contractor and client. The DB model, which consolidates responsibility within the contractor, enables efficient and transparent communication about project developments, challenges, and adjustments. Regular check-ins and progress updates, as seen in the Mbuya housing project, allow the client to stay informed and engaged with the project's progression, fostering proactive problem solving.

The study recommends that, for the Mbuya Housing Estate (and similar design-build projects in Uganda), contractors mandatorily adopt and fully integrate professional scheduling tools, such as Gantt charts (or equivalent software like Microsoft Project or Primavera P6), from the inception phase. These tools should be used to map all project phases, milestones, critical paths, and resource-loaded activities with realistic durations and logical dependencies. Regular updates and weekly progress tracking against the baseline schedule must be enforced through contractual clauses, with shared access provided to the client (NSSF), supervising consultant, and key subcontractors. This structured approach will significantly enhance time efficiency, facilitate seamless coordination among multidisciplinary teams (architects, structural engineers, MEP specialists, quantity surveyors, and subcontractors), minimize delays arising from poor activity sequencing, and ensure that project deadlines are met while optimizing the utilization of labour, equipment, and materials.

A single point of responsibility under the DB model simplifies supervision, as it streamlines oversight and quality control. The client, in this case NSSF, can maintain high quality standards

by holding the contractor accountable for all project aspects. Encourage regular site inspections and milestone assessments to ensure that each phase aligns with contractual quality specifications.

The DB approach enables cost savings through potential negotiated discounts and streamlined management. This cost-efficient approach can allow clients to allocate resources toward enhancing other project areas without compromising overall quality, encourage accurate initial budgeting and detailed cost planning, reducing risks associated with cost overruns and financial mismanagement.

It is strongly recommended that all design-build contracts in Uganda, irrespective of project size, client type, or contractor nationality, mandatorily require the contractor to furnish unconditional on-demand financial guarantees (performance bonds and advance payment guarantees) issued by reputable Tier-1 commercial banks or internationally recognised financial institutions. Equivalent to at least 20 % of the contract sum for performance security and 100 % of any advance payment. These guarantees must remain valid until practical completion plus the full defects liability period. The current practice observed in the Mbuya Housing Estate project, where China National Aero-Technology International Engineering Corporation provided robust bank-backed guarantees that significantly reassured the client (NSSF) of project completion, should be elevated from “best practice” to mandatory regulatory requirement under the PPDA Act, the National Construction Industry Policy, and the proposed updated FIDIC-based standard bidding documents for design-build contracts. This measure will substantially mitigate the pervasive risk of contractor default or abandonment that has plagued numerous Ugandan projects, enhance client confidence, improve the bankability of DB projects for both public and private developers, and ultimately contribute to higher on-time and on-budget delivery rates across the sector. The Uganda National Bureau of Standards (UNBS) and the National Building Review Board are urged to incorporate this requirement into the forthcoming revision of national construction standards and procurement templates.

The DB model benefits from presenting architectural designs early, allowing clients to assess alignment with their needs and make modifications. Early design approval enables risk reduction and project alignment, ensuring that client expectations are met from the outset. It should also encourage contractors to engage clients in design discussions to promote transparency and build trust.

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APPENDICES

Appendix I: Questionnaire

QUESTIONNAIRE

I am a student of MAKERERE UNIVERSITY pursuing a Master's degree in ARCHITECTURE. I am conducting a study on “**a review of success factors for design-build contracts in Uganda**”. This questionnaire has been designed purposely for data collection. You have been carefully identified as a potential person who can provide useful and reliable data that will help policy makers and implementers to improve on “**Construction**”, the information generated will be handled with utmost confidentiality and will be used for academic purposes.

Thank you in advance for your co-operation by giving your valuable time and effort to fill the questionnaire.

Yours faithfully,

Nyarenga Innocent.

SECTION A

Project Information

1. What is your profession?

Contractor

Architect

Engineer

Project Manager

Other (please specify):

2. Do you often use design and build?

Yes

No

3. If yes in 2 above, what is the nature of the DB project you are currently involved in?

Commercial

Residential

Infrastructure

Industrial

Other (please specify)

4. What is the estimated project duration from start to completion?

Less than 6 months

6 months to 1 year

1 year to 2 years

More than 2 years

5. What is the estimated cost of this project?

.....

How long have you been in the construction industry?

Less than 2 years

3-4 years

5years and above

6. How familiar are you with the design and build factors in the Ugandan construction industry?

a. Very familiar

b. Somewhat familiar

c. Not very familiar

d. Not familiar at all

Section B: The factors that affect the performance of DB contracts

1. How would you rate the complexity of your DB project based on the following factors?
 (Scale: 1-5, with 1 being low complexity and 5 being high complexity)

Response	Very Low complexity	Low complexity	Neutral	High complexity	Very high complexity
Design intricacy					
Site conditions					
Project size					
Unique requirements					

2. In these questions, please tick one as appropriate. Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly Disagree (SD).

Response	SD	D	N	A	SA
There is collaboration among stake holders when using design and build					
There is a budget put aside to cater for the unforeseen challenges in the construction					
The construction project is insured					
The contractors abide by the rules of the contract during construction					
The procurement used in selection of the contractors is usually a competitive one					
Procurement method chosen in the construction industry usually plays a big influence on the project performance					
Use of design and build has some advantages to the project					
There are many challenges encountered when using design and build					
Design and build has more challenges than other methods of construction					
Procurement method used in design and build is usually competitive					

Other (please specify);

3. What procurement method was used to select the DB contractor for your project?

Response	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Low-bid					
Best value					
Qualifications-based					
Sole-source					

Other (Please Specify)

4. What are the major advantages you have observed in using the DB project delivery method?

Response	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Faster project completion					
Early cost certainty					
Single point of responsibility					
Improved project control					

Other (please specify);

5. Have you encountered any challenges or drawbacks specific to the DB project delivery method?

YES

NO

6. How would you rate the overall performance of DB contracts in comparison to other project delivery methods?

Response	Please tick one
Poor Performance	
Good Performance	
Excellent Performance	

Section C: Analyze how these factors apply in the Ugandan construction industry

Please tick one appropriate; strongly agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD).

Response	SD	D	N	A	SA
In your opinion, are there some key design factors that contribute to the success of construction projects in Uganda?					
The way a project is managed affects its performance					
Coordination, and control impact the overall performance of construction projects					
Lean construction principles in the Ugandan construction industry are essential					
There are many specific challenges related to design and build factors in the Ugandan construction industry					
Construction Design affects performance of the project					
Work schedule affects performance of the construction project					
Design and Build enables construction projects in Uganda to be completed on schedule, within budget, and to stakeholders' satisfaction					
Projects are completed faster when design and build is used					

Section D: Reveal the challenges faced by DB contracts in Uganda.

Please tick one appropriate; strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), Strongly Disagree (SD).

Challenges	SD	D	NS	A	SA
The construction materials in Uganda for design-build projects are affordable?					
There is available skilled professionals proficient in both design and construction aspects in Uganda					
The regulatory environment in Uganda on construction prevents design and build systems					
There is limited skilled manpower for the design build to be implemented					
There are challenges that stakeholders face in complying with building codes, regulations, and industry standards					
Fluctuations in material prices affect the feasibility and sustainability of design-build projects in Uganda					
The cost to implement design and build is high					

Section E: Propose changes in DB contracts in Uganda.

1. In your experience, how crucial is early cost planning for effective cost control in design-build projects?

Extremely crucial

Moderately crucial

Not crucial

2. Do you agree with the statement that projects incorporating thorough cost planning are better positioned to adhere to budgetary constraints?

Strongly agree

Somewhat agree

Disagree

3. How do you perceive the amalgamation of design and construction in facilitating improved risk identification and mitigation?

Highly effective

Moderately effective

Not effective

4. Have you encountered challenges related to inaccurate cost estimation due to the dynamic nature of design development in construction projects?

Yes, frequently

Occasionally

No, rarely

5. What measures do you think can be implemented to enhance communication between design and construction teams to reduce miscommunication instances?

Regular meetings and updates

Improved documentation and reporting systems

Training programs for team members

Other (please specify);

6. How familiar are you with performance-based budgeting in construction projects?

Very familiar

Somewhat familiar

Not familiar at all

7. Do you believe that aligning budget allocations with project performance indicators leads to efficient resource allocation?

Strongly believe

Somewhat believe

Do not believe

8. What ongoing monitoring mechanisms do you think can be implemented to assess budget performance effectively in design-build projects?

Regular financial reports

Key performance indicators (KPIs) tracking

Budget variance analysis

Other (please specify)

.....
.....

Appendix II: Interview Guide

INTERVIEW GUIDE

INTERVIEW GUIDE FOR ARCHITECTS, SURVEYORS, ENGINEERS, CLIENTS AND PROJECT MANAGERS

Section A: The factors that affect the performance of DB contract

1. In your opinion, how does project complexity affect the performance of DB contracts in terms of cost, schedule adherence, and quality?
2. How would you rate the level of collaboration among project stakeholders in your DB project?
3. What communication channels and tools are used to foster collaboration among project stakeholders?
4. Have poor communication and collaboration ever led to misunderstandings, delays, or conflicts in your DB project?

Section B: Analyze how these factors apply in the Ugandan construction industry

1. In your opinion, what are the key design factors that contribute to the success of construction projects in Uganda?
2. How do you think design and build factors such as project management, coordination, and control impact the overall performance of construction projects in Uganda?
3. Have you observed any specific challenges related to design and build factors in the Ugandan construction industry? If yes, please describe.

Section C: Reveal the challenges faced by DB contracts in Uganda.

1. What is your opinion about the cost of construction materials in Uganda?
2. What challenges do contractors and clients face in accessing resources like reinforced concrete due to high costs?
3. Have fluctuations in material prices affected the feasibility and sustainability of design-build projects in Uganda?
4. How do limited domestic production capacities and import dependencies affect the supply chain for construction materials?

Section D: Propose changes to DB contracts in Uganda.

1. In your experience, how crucial is early cost planning for effective cost control in design-build projects?
2. Do you agree with the statement that projects incorporating thorough cost planning are better positioned to adhere to budgetary constraints?
3. How do you perceive the amalgamation of design and construction in facilitating improved risk identification and mitigation?
4. Have you encountered challenges related to inaccurate cost estimation due to the dynamic nature of design development in construction projects?

THE END