Volume 10, Issue 1, January – 2025 *International Journal of Innovative Science and Research Technology (IJISRT)*
ISSN No:-2456-2165 *https://doi.org/10.5281/zenodo.14737940*
IJISRT25JAN429 *www.ijisrt.com*

The Identification of Constraining Factors Impacting Design Bid Build Project Delivery in Tanzania Construction Industry

Uswege Jacob Mwaipungu[1]; Dr. Kimata Malekela[2]; Dr. Rehema Monko[3]

[1]Master Degree of Project Management;
[2,3]Lecturer and Research Supervisor
Ardhi University, Tanzania

Publication Date: 2025/01/27

Abstract

The focus of this paper is to identify the constraining factors impacting Design-Bid-Build (DBB) project delivery in Tanzania's construction industry. Utilizing a cross-sectional case study design, the study adopts a concurrent mixed-methods approach to combine qualitative and quantitative insights. Four road infrastructure projects in Dar es Salaam were selected as a case study area based on criteria including project scale, recent completion, and funding source. Data collection involved a structured questionnaire survey with 124 valid responses and semi-structured interviews with 22 key stakeholders. The study identified and ranked 35 constraining factors impacting DBB delivery. Results reveal that changes in project requirements by clients at later stages, incomplete designs, Discrepancies Between Design Drawings, Specifications, and BOQ and Payment Delays to Contractors and Consultants are the most significant factors. The findings emphasize that client-related issues and design documentation related factors are the main constraints affecting DBB project delivery. These findings can serve as a basis for policymakers to inform and justify policy decisions. For consultants and contractors, this information can lead to smoother project execution, better management of stakeholder expectations, and a reduction in conflicts.

Keywords:- *Constraining factors, DBB, Project delivery, Design, Impact, Tanzania.*

I. INTRODUCTION

The Tanzanian construction industry, utilizing the Design-Bid-Build (DBB) approach, drives the delivery of construction projects such as buildings and civil engineering projects of different dimensions and complexities. These projects act as significant propellers of socio-economic development and growth accelerators for the nation, as they provide shelter and employment opportunities, and contribute to the GDP, which was 14.1 percent in 2022 compared to 14.0 percent in 2021 (NBS, 2023).

The United Nations (2020) states that many developing countries still lack basic infrastructures such as roads, hence the need for the ninth sustainable development goal "build resilient infrastructure, promote sustainable industrialization and foster innovation". In achieving this goal, businesses and projects, particularly those using the Design-Bid-Build (DBB) approach, need to meet the objectives set.

However, despite the advantages of the construction industry, it is still underperforming in meeting project and business objectives, although some improvements have been made (Habibi et al., 2019; Kortenko et al., 2020; Sayidganiev., et al 2022). While this under-performance is global, developing countries have worse outcomes, with countries such as the United Arab Emirates seeing half of the projects overrun time (Habibi et al., 2019; Kortenko et al., 2020b). Similar underperformance in construction projects is reported in Tanzania, Kenya, South Africa, Saudi Arabia, and Sri Lanka (Chileshe & Kikwasi, 2014; Mathonsi & Thwala, 2012; Alofi et al., 2015). It has been determined that building and civil engineering projects are poorly executed and delivered due to inappropriate procurement processes, time and cost overruns, low productivity, poor quality, high accident rates, an abundance of claims and disputes, and general stakeholder dissatisfaction (Yu and Shen, 2024; Odeyinka & Yusuf, 2011; Okereke et al., 2021). The procurement system used, which is predominantly the Design-Bid-Build (DBB) project delivery approach, has been generally held responsible for these circumstances (Ogunsanmi, 2013; Olanike et al., 2020).

Uswege Jacob Mwaipungu; Dr. Kimata Malekela; Dr. Rehema Monko., (2025), The Identification of Constraining Factors Impacting Design Bid Build Project Delivery in Tanzania Construction Industry.
International Journal of Innovative Science and Research Technology,
10(1), 919-933. https://doi.org/10.5281/zenodo.14737940

The traditional Design-Bid-Build (DBB) project delivery method involves three sequential phases: design, bid, and construction. In the design phase, a designer creates the project plans; during the bid phase, bid documents are prepared and the project is put out for bid, typically awarded to the lowest evaluated bidder (Yu & Shen, 2024); and in the construction phase, the project is built by the contractor. This process usually leads to a sealed bid, fixed-price contract, resulting in two separate agreements: one between the owner and consultant and the other between the owner and contractor (Phoya, 2014).

The execution and performance of the construction industry are not optimum due to some concerns associated with the procurement of construction contracts including the design-bid-build (DBB) (Owiti, 2022). Naoum and Egbu (2016) argue that the DBB is dominating the construction industry of nations all over the world such as the USA, UK, Germany, Malaysia, and Saudi Arabia. Mathonsi and Thwala (2012) found that the traditional procurement system is dominant in South Africa and a similar situation is reported in Nigeria by Oladirin et al. (2013).

Kortenko et al. (2020) examined the implications of the design-bid-build (DBB) procurement method and found that is still the most often employed, and it is likely to stay that way for a long time in many other nations. The DBB alone accounts for about 60% of usage in the construction industry globally (CMAA, 2012; Salla, 2020). A few other authors who have investigated the DBB procurement systems, include Heidemann and Gehbauer (2010); Shrestha et al. (2012) and Pishdad-Bozorgi and La Garza (2016) in the US; Clahorra-Jimenez (2020) in Chile; and Rahmani et al. (2017)) in Australia. Other researchers that looked at the elements impacting the development and path of procurement included Dada (2013), Jimoh et al. (2016), Kehinde and Atanda (2022) in Nigeria, and Buertey et al. (2016) and Buertey et al. (2018) in Ghana. In the UK, Kortenko et al. (2020), Malaysian scholars Jaafar and Mohd Radzi (2013), Suratkon et al. (2020), and Noor et al. (2022), Alofi et al. (2015), El Sawalhi and El Agha (2017) in Palestine, Mosley & Bubshait (2019) in Saudi Arabia, and Alofi et al. (2015) in Saudi Arabia all investigated the comparison, analysis, and selection criteria of DBB and DB procurement systems. However, there are situations in which using alternative procurement methods than DBB is not feasible due to financial, technological, behavioral, cultural, legal, and normative hurdles against the implementation of integrated project delivery (Dargham et al., 2019).

The literature suggests that the traditional project delivery method is the one that is most frequently applied in the global construction sector (Addy et al., 2018; Mesa et al., 2016; Nawi et al., 2014; Fish, 2011). This is consistent with data showing that more than 90% of construction projects in Ghana, especially those in the public sector, are completed utilizing this method (Ameyaw & Oteng-Seifah, 2010).

Ntiyakunze (2011) and Phoya (2014) found that the dominant procurement system used in Tanzania is the DBB procurement system. In this arrangement, design is separated from construction and the main project players are clients/employers, the consultant team consists of architects, Engineers (Structural, Civil, and Service), and Quantity Surveyor, Main contractors. These participants normally create a temporary form of cooperation to undertake a construction project for a specific period. The deliverance of construction projects in most cases follows the procurement processes. Although the DBB method of "first design then build," which accounts for more than 95% of all projects undertaken annually, is still the most prevalent one in Tanzania's construction industry (Valerian, 2014). The construction industry faces many problems, such as project cost overruns, time extensions, conflict among the parties, and quality not achieved. A significant number of projects have fallen short of their objectives as a result of the procurement method that was chosen. Despite the DBB approach frequently being criticized for its inadequate project performance in terms of time, cost, and quality standards (Julião, 2018; Okereke *et al.*, 2022; Shoar & Payan, 2021; Mesa et al., 2016). However, Rahmani (2021) singled out the separation of design responsibility from construction responsibility as the main source of poor construction industry performance.

This paper may serve as a useful reference document to the Government and its agencies, consultant firms and contractors on the matters pertaining to the constraining factors impacting DBB project delivery to enhance the performance of public construction projects in the country.

- The objective of this study is: To identify and rank the constraining factors impacting DBB project delivery in the Tanzanian construction industry.

II. LITERATURE REVIEW

A. General Overview of Design Bid Build

According to Hinton and Hamilton (2015), design-bid-build (DBB) is still the most often utilized procurement method, and many experts believe that this trend will continue for many years. Being commonly used in the construction industry in Tanzania, traditional contracts are design– bid – build contracts that involve the engagement of a design team to completely design the whole facility, prepare bills of quantities and tender them out for contractors to compete (Matto et al., 2021). Puri and Tiwari (2014) states that the client, guided by the design team, selects the contractor with the lowest bid that meets the owner's requirements, and the owner then signs a contract with the selected contractor to assemble the project's components. In essence, the client is bound by two contracts: one with the contractor and one with the design professional (Mathonsi & Thwala, 2012). The owner has a direct relationship with both the designer and contractor; however, there is no contractual relationship between consultant and contractor.

B. Theoretical Underpinning

Research on DBB project delivery is guided by various social science theories, depending on the specific focus and aims of the research. This study specifically draws upon the Theory of Constraints (TOC) and The Contingency Theory as foundational frameworks to explore these complexities.

The theory of constraints is a management philosophy that was first proposed by Eliyahu Goldratt in his 1984 novel, “The Goal.” The basic premise of the theory is that every process has at least one constraint or bottleneck that limits its output. The goal of any organization should be to identify and then address these constraints to improve overall performance

(Naor et al., 2012). Constraints are restrictions or limiting factors and every business has them. What is important is how to adapt and engineer projects around removing constraints, rather than neglecting to deal with the bottlenecks and allowing them to negatively affect flow.

The very first contingency theory was developed by Austrian psychologist Fred E. Fiedler in the 1960s. Contingency theory, also known as the contingency approach, is a management theory that applies to various industries, including construction. In the context of construction, contingency theory suggests that there is no one-size-fits-all approach to managing projects. Instead, the most effective management style and strategies depend on various factors or contingencies. Contingency theory recognizes that the management of construction projects must be tailored to suit the unique circumstances and contingencies of each project (Donaldson *et al.*, 2006). Flexibility, adaptability, and the ability to adjust management strategies based on changing circumstances are essential in effectively navigating the complexities of construction projects.

Practically speaking, DBB projects need to continually identify where bottlenecks are occurring and then take steps to correct them.

C. Empirical Review

Despite multi-party contractual agreements acknowledged by the lean construction community as enablers of better communication and performance, design-bid-build (DBB) still dominates the construction industry in Germany, UK and other countries. The design-bid-build (DBB) is still the most commonly used procurement system (Hinton & Hamilton, 2015) and it can be argued that it will remain prevalent in many countries for many years.

In the UK and many other countries, design-bid-build (DBB) is still the most common way to deliver construction services (Morledge & Smith, 2013). Low-bid procurement is the most common way to choose construction companies (Hanák et al., 2021; Lines et al., 2022; Reta & Alyew, 2022).

In Malaysia, the owner (client) of both the public and private sectors employed the DBB more frequently than other methods of procurement (Zainudin et al., 2022). In both the public and commercial sectors, DBB was identified as the primary procurement method, followed by DB and CM (Zuber et al., 2019).

The traditional system of procurement, design-bid-build (DBB) has been the dominant method of procurement for building contracts in Ghana since the inception of architectural practices (Buertey et al., 2021). Buertey et al. (2018) state that, the system dominates the Ghanaian construction industry largely because it is well established with wide applicability and simple procedures. This popularity in the Ghanaian construction sector makes it difficult to introduce new and contemporary procurement systems. In the Nigerian construction industry, more project delivery problems have been reported on the projects delivered through the traditional system than others. Delays are a significant problem in Nigerian building execution, according to Olanike et al. (2020). In a similar vein, Anana (2021) claims that among other things, construction projects in Nigeria frequently experience budget slippage, productivity losses, revenue shortfalls, conflicts and litigation, contract cancellation, and delivery delays. The majority of the problems associated with this DBB method, especially during the construction phase develop from unseen and hidden problems and inefficiencies at the design stages (Okereke et al., 2022).

The traditional system of procurement "remains mainly because most contractors and clients are familiar with it and so it often becomes a default approach," according to Walker and Rowlinson (2008), who support this viewpoint. This argument is thought to be valid in Tanzania, where traditional procurement methods are frequently employed. Several African researchers, including Valerian (2014); Mchopa et al. (2021); Kihamba (2021); Matto et al. (2021); Mchopa et al. (2024), and Maagi and Mwakalobo (2023), have criticized the construction industry in Africa for its "detachment" from the extensive use of the traditional procurement method, despite its association with substandard projects, delays in project completion, cost overruns, and poor value for money. Despite the traditional procurement approach's theoretical assumption that design work should be fully completed before the commencement of construction, Valerian (2014) revealed that, in practice, this is not often the case in East Africa, including Tanzania. The research highlighted that design work is generally incomplete at the time of contractor selection, leading to potential challenges and adjustments during the construction phase.

Incomplete designs are a common challenge in DBB projects, leading to delays, rework, and cost overruns. Defects as a result of incomplete design lead to rework. Construction projects suffer from rework, which happens often (Li & Taylor, 2014). Studies by Rwakarehe & Mfinanga (2014), Ramabodu and Verster (2013) emphasize the detrimental effects of incomplete designs on project scheduling, cost estimation, and overall project success. Dosumu and Aigbavboa (2018) examine the implications of financial difficulties faced by owners on project viability and execution from a DBB perspective. Arantes and Ferreira (2020) investigate the impact of financial constraints among contractors on project delivery and propose financial management measures. Financial challenges among contractors can disrupt project progress and jeopardize completion. Kamaruddeen et al. (2020) analyze the factors contributing to financial difficulties among contractors and suggest risk mitigation strategies.

Zweifel (2023) discusses how effective project management can maximize performance and reduce hazards. Shortages of skilled workers in DBB projects can significantly impact project schedules and productivity. Kamaruddeen et al. (2020) highlight the challenges posed by labor shortages and suggest strategies for optimizing labor utilization Evarist et al. (2023) address how labor shortages affect project timelines and offer workforce management strategies. The construction sector faces a shortage of workers. Apolot et al. (2013) investigate this issue and propose solutions to bridge the labor gap. According to Issa (2023), incomplete drawings, frequent design modifications, inadequate requirements, and a lack of time for estimates are the main causes of cost overruns in highway projects.

Kalan and Ozbek (2020) analyze the influence of client decision-making on project progress and suggest strategies to expedite decision-making processes. Delays in client decision-making can prolong project timelines and increase costs. Delays in processing payments from clients to designers and contractors can disrupt project cash flow and hinder progress. Research by Kikwasi and Escalante (2018) highlights the adverse effects of payment delays on project continuity and contractor motivation.

Table 1: Summary of Constraining Factors Impacting DBB Project Delivery

Constraining factors impacting DBB project delivery	**References**
Incomplete designs.	Malekela et al, 2017; Rwakarehe & Mfinanga,2014; Ramabodu and Verster, 2013; Alarcón and Mardones, 1998
Client's delay in processing designer's and contractor payments.	Jarkas, 2014; Abolnour, 1994; Kiwasi, 2013; Mahamid, 2016 Issa, 2023
Negligence of the Professional.	Sunday and Afolarin, 2013;
Inadequate and insufficient documentation.	Akampurira and Windapo, 2018; Sunday and Afolarin, 2013
Change in project requirements by the client at later stages.	Love et al., 2019, Hwang et al., 2018, Jarkas & Bitar, 2012
Incorrect drawings.	Sunday and Afolarin, 2013; Alarcón and Mardones, 1998
Lack of experience on similar projects	Abdalaziz, 2009; ICE, 1996
Shortage of materials, plants and equipment	Kamaruddeen et al, 2020; Evarist *et al*, 2023; Ameh et al, 2010;
Owner's financial difficulties.	Dosumu and Aigbavboa, 2018; Le, 2018
Inadequate or frequent breakdowns of construction plant and equipment	Ling et al, 2004; Kamaruddeen et al, 2020
Adversarial weather	Kamaruddeen et al, 2020; Evarist *et al*, 2023; Al-Momani, 2000
Changes to specifications	Sunday and Afolarin, 2013; Malekela, 2018.
Inadequate or ineffective use of new technology	Malinda, 2017; Li and Love,1998
Designer's failure to clearly understand the client's brief.	Malinda, 2017; Andi and Minato, 2003
Client slow decision making	Faridi & El-Sayegh, 2006; Marzouk & El-Rasas,2014.
Mistake during construction	Kamaruddeen et al, 2020
Inadequate and poor communication between client, consultants and contractor	Malinda, 2017; Sunday and Afolarin, 2013; Malekela, 2018
Contractors financial difficulties	Ling et al, 2004; Kamaruddeen et al, 2020; Mohammad Saiful Islam et al., 2015
Provision of wrong or Insufficient information by the client.	(Abdalaziz, 2009; Andi and
Poor site management	Ling et al, 2004; Mahamid, 2016; Kamaruddeen et al, 2020; Baloyi and Bekker, 2010; Dixit, 2020
Poor communication among design team members	Malinda, 2017; Jarkas, 2014 ; Slater and Radford, 2012; Andi and Minato, 2003; Malekela et al, 2017
Shortage of workforce	Kamaruddeen et al, 2020; Evarist *et al*, 2023; Apolot et all, 2013
Frequent design and construction changes by the client.	Jarkas, 2014; Darwish, 2007; Andi and Minato, 2003; Al-Momani, 2000; Kiwasi, 2013
Limited time available for checking and coordinating all design documentation	Abdalaziz, 2009;
Unexpected/Fluctuation in price of raw materials	Kamaruddeen et al, 2020; Ameh et al, 2010; Baloyi and Bekker, 2010; Azhar et al, 2008; Evarist *et al*, 2023; Mahamid, 2016
Disparities between BOQ drawings and specifications.	Philips-Ryder et al.,2013;Ramabodu and Vester, 2013;Dosumu and Aigbavboa, 2018
Re use of design documents and details from previous project without effective review by the designer	Malinda, 2017; Andi and Minato, 2003; Philips-Ryder et al.,2013;Ramabodu and Vester, 2013
Shortage of skilled and unskilled labours.	Kikwasi, 2011; Luvara and chileshe, 2022; Malinda, 2017; Kamaruddeen et al, 2020
Transfer of knowledge and experience between designers.	Dosumu et al., 2017
Late delivery of materials and equipments.	Kamaruddeen et al, 2020; Ameh et al, 2010; Baloyi and Bekker, 2010; Azhar et al, 2008; Evarist *et al*, 2023; Mahamid, 2016
Lack of continuous and effective communication between parties.	Philips-Ryder et al.,2013; Malinda, 2017

Disparities between BOQ drawings and specifications.	Philips-Ryder et al.,2013;Ramabodu and Vester, 2013;Dosumu and Aigbavboa, 2018
Re use of design documents and details from previous project without effective review by the designer	Malinda, 2017; Andi and Minato, 2003; Philips-Ryder et al.,2013;Ramabodu and Vester, 2013
Contractors design capability	Lappalainen et al, 2022;Plusquellec et al, 2017
Social and cultural impacts	Ameh et al, 2010; Kamaruddeen et al, 2020

Source: Authors Compilation (2023) as Reviewed from Literature

III. METHODOLOGY

A. Research Design, Approach

This paper used a cross section design, case study research design because it is concerned with in-depth investigation of a contemporary phenomenon within a real-life context (Mushumbushi, 2011). In view of that, a case study was applicable to facilitate in-depth investigation of constraining factors impacting DBB project. The study employed a concurrent mixed-methods approach to achieve its primary goal. To obtain various complementary data to address a single research question, a convergent parallel mixed-method approach was utilized. From the perspective of interaction levels, data were gathered and analyzed separately. As suggested by Luvara (2020), both quantitative and qualitative methods were given equal importance. In essence, different methods were employed to examine the same phenomenon, aiming for convergence and enhanced validity (*ibd*). This approach is similar to that used by Nguyen and Chileshe (2015) and Kavishe et al. (2018) and follows six steps: literature review, pilot survey, questionnaire survey, interviews, statistical analysis, and content analysis. Drawing on Nguyen and Chileshe's (2015) study, the rationale for adopting a mixed-methods approach is well-supported in the literature, providing an opportunity to increase research reliability (Easterbrook et al., 2008). It is also known to counterbalance the weaknesses of each method concerning sample characteristics, time, and data accuracy (Kothari, 2004). Furthermore, as noted by Jogulu and Pansiri (2011, p. 690), in concurrent mixed methods, qualitative and quantitative data collection techniques are conducted simultaneously. In our study, as recommended by Kavishe et al. (2018), both qualitative (semi-structured interviews) and quantitative (questionnaire survey) approaches were applied simultaneously with equal importance. Ultimately, this concurrent approach allowed the results from one method to confirm the findings of the other regarding a single phenomenon (Luvara, 2020).

In pursuit of that, a quantitative and qualitative research approach was used by this paper in collecting, analyzing and interpreting comprehensive narrative data to gain insights into the above subject matter from the perspectives of the respondents (Kavishe et al., 2018). A structured questionnaire survey and interview were used to identify the constraining factors impacting DBB project delivery.

B. Case Selection

This study selected 4 road infrastructure projects within the Dar es Salaam region in Tanzania. The research was conducted in Dar es Salaam, Tanzania, because it is a fast-growing city, having a diverse social, cultural, and economic environment. Also, it has many completed and ongoing road infrastructure projects, as evidenced by the Tanzania National Roads Agency (TANROADS) website. To select the projects with relevant and reliable data, the following selection criteria were used:

- Road projects varying in scale and complexity, ensuring a thorough understanding of challenges;
- Large projects executed by top-tier contractors with budgets of Tsh 70 billion and above;
- Projects completed within the last eight years (2015-2023) to obtain recent data;
- Projects funded by the government or donors; and
- Accessibility of information.

The list of road projects was sourced from the TANROADS website, which yielded 182 road infrastructure projects. The search was narrowed down to road projects based in Dar es Salaam, both completed and ongoing, from which 28 projects emerged. After applying the case study selection criteria, 5 projects were selected. Then, based on the above detailed 5 selection criteria, one project was disqualified; therefore, the total number of selected projects was 4 (bolded), as depicted in Table 2 below.

Table 2: Selected Case Studies

Cases	Project Name	Distance	Estimated Cost (Tsh)	Client	Project Status
Case 1	BRT Phase 2 lot 1	20km	198.4 billion	TANROADS	Completed (2023)
Case 2	Construction of Ubungo Interchange	5.95 km	177.2 billion	TANROADS	Completed (2022)
Case 3	Construction of New Salender Bridge nge	5.95 km	177.2 billion	TANROADS	Completed (2022)
Case 4	Improvement of Tazara Intersection	425m	80.47 billion	TANROADS	Completed (2018)
Case 5	Widening of New Bagamoyo road	4.3km	71.8 billion	TANROADS	Completed (2021)

C. Population

From the selected cases, data were collected to identify the constraining factors impacting DBB project delivery. The purposive sampling technique was used to select the key players in the selected projects including (i) project managers, (ii) Resident Engineers, (iii) engineers, (iv) quantity surveyors. In total 40 respondents were identified for qualitative research. The target population size studied for quantitative research is known, as established from the Contractor's Registration Board (2023) website by selecting civil contractors' class one "N" =75 and from the Engineers Registration Board (2023) website by selecting civil

consultant's "N" =100 located in Dar es Salaam Region. The entities were selected using Kothari, (2004) formula.

$$\frac{Z^2 P.q.N}{e^2.(N-1)+Z^2.P.q} \quad \text{..... Equation 1}$$

Where *N* = size of population; *n* = size of sample; *z* = standard variate at a given confidence level worked out from table under normal curve (1.96 at 95%); *e* = margin/sampling error or precision rate (5%); *p* = sample proportion (0.5) and *q* = 1-*p*, the formula also used by studies like (Luvara, 2020); (Malekela, 2018).

D. Questionnaire Survey Administration

The data were collected through questionnaires and semi structured interviews. The mixed- method approach was preferred because it maximizes the benefits of both approaches while minimizing their drawbacks (Kavishe, 2017). The questionnaires were distributed by hand as well as online using Google Forms between January 2024 and April 2024. The questionnaire comprised close-ended questions and was in 4 sections. Section 1 comprised preliminaries information, section 2 demographic information, section 3 awareness and practice of DBB, and section 4 constraining factors impacting DBB project delivery, using a 5-point Likert scale were applied to increase response rate and response quality along with reducing respondents' frustration level (Luvara & Benjamin,2023). Where by 1 = No impact, 2 = Low Impact, 3 = Moderate impact, 4 = High impact, and 5 = Very high impact. Out of the 156 questionnaires dispersed, only 124 questionnaires were returned, and 124 were deemed legitimate, representing a 75% response rate. A total of 29 questionnaire survey participants may seem like an insignificant sample size. Saunders and Townsend (2018) state that a sample size of at least 10% of the intended population is sufficient.

E. Interviews

Semi structured interviews were conducted with the respondents from the case studies selected, specifically top-ranking officials, including personnel from contractors, consultants and clients (TANROADS). The inter- views were conducted in Dar es Salaam, Tanzania, between January and April 2024.

Following Luvara, (2020), semi-structured interviews were opted for due to their ability to produce precise information and their flexibility in helping to explore new perspectives on issues that are not predetermined in the study. The respondents were purposively selected, and willingness to participate and easy reach were considered as well. The interview questions were designed to gather additional information that the open-ended structured questionnaire could not cover. The semi-structured interviews were divided into three sections: (1) general information that outlined the research objectives, among other things; (2) the interviewees' profile details; and (3) the main section focused on the key question, "What are the common constraining factors affecting DBB project delivery?"

In total, 22 interviews were conducted. The interview took approximately 20 to 30 min. According to Abdul-Azoiz (2008), which recommends 30 to 60 min as an acceptable time, the amount of time spent in the interview appears reasonable.

F. Data Analysis

Using the aid of IBM SPSS Statistics for Windows, Version 27.0 and Microsoft Excel software, the quantitative data acquired for this study were analysed using descriptive statistics from which measures of central tendency, specifically mean values and standard deviation. The mean scores were used to rank the constraining factors impacting DBB in ascending order. Meanwhile, the qualitative data was analysed using the content analysis technique, specifically the summative approach, which focuses on identifying key words and subject frequencies and recurrences. Moreover, this is a good approach when trying to find out the opinions, knowledge, and views of people from a set of variables, which is the case in this study. The data collected were coded, in the sense that the text or words from the interviewees were scrutinized to establish a single or a few words that represent the main point from the text. Then, frequencies were assigned based on the number of respondents to one point.

IV. FINDINGS AND DISCUSSION

A. Questionnaire Respondent's Profile

Table 3. provides an overview of the demographic characteristics of the study participants, shedding light on various aspects such as gender, experience, education level, profession, and firm type. The gender distribution shows a significant skew towards male participants, with 89 males (71.8%) compared to 35 females (28.2%). This suggests a male-dominated sample, which is reflective of broader industry trends in the construction sector. Experience levels among participants are varied, with the largest groups having 16-20 years (26.6%) and 11-15 years (23.4%) of experience. A considerable number of participants have over 20 years of experience (25.0%), indicating a seasoned workforce. In terms of education, the majority hold a Bachelor's degree (63.7%), followed by those with a Master's degree (26.6%). This indicates that most participants have substantial formal education, with a significant portion having advanced qualifications. Professional roles are diverse, with the largest groups being Engineers (45.2%), Quantity Surveyors (37.9%) and Project Managers (10.5%). Regarding the firm type, the participants are almost evenly split between those working in Contractor firms (46.0%) and Consultancy firms (44.4%). A smaller segment is from Client/Financier organizations (9.7%), suggesting a broad representation of different firm types in the construction industry. As noted in Babatunde, (2020), the respondents were determined to have the necessary experience, qualifications, and expertise to offer accurate and reliable data for this study based on their demographic attributes.

Table 3: Demographic Information of the Participants

Demographic Characteristics	Frequency	Percent
Gender		
Male	89	71.8%
Female	35	28.2%
Experience		
Less than 5 years	11	8.9%
5-10 years	20	16.1%
11-15 years	29	23.4%
16-20 years	33	26.6%
Over 20 years	31	25.0%
Education level		

Advance Diploma	9	7.3%
Bachelor's degree	79	63.7%
Master's degree	33	26.6%
PhD degree	3	2.4%
Professions		
Project manager	13	10.5%
Engineer	56	45.2%
Quantity surveyor	47	37.9%
Architect	3	2.4%
Procurement manager	2	1.6%
Others	3	2.4%
Firm		
Consultancy	57	46.0%
Contractor	57	43.5%
Client/Financier	13	10.5%

B. Awareness and Practice of Design-Bid-Build (DBB) Project Delivery in the Tanzanian Construction Industry

Table 4. provides insights into stakeholders' perceptions of the constraining factors impacting the Design-Bid-Build (DBB) project delivery method in the Tanzanian construction industry.

The familiarity with the DBB method varies significantly among stakeholders. Only 9.7% of respondents reported being very familiar with the DBB method, while a considerable 59.7% indicated that they were familiar. This indicates a general understanding of the DBB method among most stakeholders. When examining the frequency of utilizing the DBB method, only a small fraction rarely (2.4%) or never (3.2%) uses it. The majority use it occasionally (46.0%) or frequently (42.7%). This suggests that while the DBB method is known, it is the predominant project delivery method used in the Tanzanian construction industry. In terms of DBB project involvement, stakeholders' experience ranges widely. Those with experience in 11-15 projects represent 26.6%, while involvement in 15-20 projects accounts for 16.9%. A significant 23.4% have been involved in more than 20 DBB projects, indicating a subset of highly experienced stakeholders.

Satisfaction with the performance of the DBB method is mixed. The level of satisfaction differs as follows Only 3.2% of respondents are very satisfied, 38.7% of respondents expressed satisfaction, while a significant portion remained neutral (43.5%). Dissatisfaction is relatively low, with 14.5% being dissatisfied. These results indicate that while a portion of stakeholders is satisfied with the DBB method, a significant number remain neutral, and there is a notable percentage expressing dissatisfaction. This suggests that stakeholders see room for improvement in the DBB method's performance in the Tanzanian construction industry.

Table 4: Awareness and Practice of Design-Bid-Build (DBB) Project Delivery in the Tanzanian Construction Industry

	Frequency	**Percent**
Familiar with the Design-Bid-Build (DBB) project delivery method		
Very Familiar	12	9.70%
Familiar	74	59.70%
Somewhat Familiar	37	29.80%
Not very Familiar	1	0.80%
Not Familiar at all	0	0%
Frequent utilization of the DBB project delivery method		
Always	7	5.60%
Frequently	53	42.70%
Occasionally	57	46.00%
Rarely	3	2.40%
Never	4	3.20%
DBB Project construction involvement		
Less than 5	21	16.90%
5 to 10	19	15.30%
15-20	33	26.60%
15-20	21	16.90%
Over 20	29	23.40%
Satisfaction of Performance of the DBB project delivery method		
Very Satisfied	4	3.20%
Satisfied	48	38.70%
Neutral	54	43.50%
Dissatisfied	18	14.50%
Very Dissatisfied	0	0%

C. Interviewees' Profile

Table 5 shows the background information on participants giving an overview of their qualifications as construction professionals as well as their experience in the construction sector. This is important to collect data that is relevant and reliable to achieve the aim of this research. Master's degree graduates accounted for 14 representing 63.6%, and the remaining four representing 36.4% are 1st degree or BSc. Honours graduates. The years of experience of participants are very significant in this research since it is believed to influence their sense of reasoning and judgement. The highest number of years of participants' experience in the construction sector is 24 while the least is 12. However, the average years of experience in the construction sector for the 22 participants is 17.86. This is indicative that respondents have significant experience in the construction sector and hence had in-depth knowledge and provided relevant responses for this research. It was necessary to know whether

participants work within the private or the public sector in the construction industry. Three participants representing 13.6% work within the public sector while nineteen representing 86.4% work within the private sector. However, the private sector frequency is high compared to the public sector because mostly constraining factors affecting the private sectors. According to Patton (2002), the sample size required for interviews to achieve the saturation point is between 5 and 50. Therefore, the sample size (n = 22) and level of responsiveness are regarded as sufficient.

Table 5: Interviewee Profile

Participants	Position	Level of Education	Years of Experience	Section of Work	Outfit of Work
P1	Resident Engineer	Masters	23	Private	Consultancy
P2	Project Manager	Masters	17	Public	Government
P3	Quantity Surveyor	Masters	16	Public	Government
P4	Site Engineer	Bachelor's	18	Private	Contractor
P5	Quantity Surveyor	Bachelor's	14	Private	Contractor
P6	Resident Engineer	Bachelor's	21	Private	Consultancy
P7	Quantity Surveyor	Bachelor's	15	Private	Contractor
P8	Site Manager	Masters	21	Private	Contractor
P9	Project Manager	Masters	16	Private	Contractor
P10	Site Engineer	Bachelor's	18	Private	Contractor
P11	Project Manager	Masters	19	Private	Contractor
P12	Bridge Engineer	Masters	19	Private	Contractor
P13	Project Manager	Masters	20	Private	Contractor
P14	Resident Engineer	Masters	22	Private	Consultancy
P15	Quantity Surveyor	Bachelor's	23	Private	Contractor
P16	Road Engineer	Masters	12	Private	Contractor
P17	Bridge Engineer	Masters	18	Private	Contractor
P18	Engineer	Masters	24	Public	Government
P19	Resident Engineer	Masters	19	Private	Consultancy
P20	Road Engineer	Masters	12	Private	Contractor
P21	Road Engineer	Bachelor's	12	Private	Contractor
P22	Subcontractor Engineer	Bachelor's	14	Private	Contractor

D. The Constraining Factors Impacting DBB Project Delivery

Table 6 shows the summary of the results obtained from descriptive statistics on the 10 constraining factors impacting DBB project delivery. The results of the descriptive statistics, such as mean score are illustrated. The constraining factors were ranked in ascending order based on the mean scores which range between 4.35 and 4.54, with greater values signifying higher rankings and lower scores signifying lower rankings. Since a 5-point Likert scale was employed, where 1 = No impact, 2 = Low Impact, 3 = Moderate impact, 4 = High impact, and 5 = Very high impact, a mean score of "3.5" or more than average would indicate that a statement was more frequently applicable, and a score below "3.5" would indicate that it was less applicable, as noted in Ugwu and Haupt (2007).

Top ten constraining factors impacting the DBB project delivery in the construction industry in Tanzania.These findings are the main ten constraining factors impacting the DBB project delivery in the construction industry in Tanzania.

Table 6: Top Ten Constraining Factors Impacting the DBB Project Delivery in the Study Area

S/N	Constraining factors impact DBB	Grouping	MS	Ranking
1	Change in project requirements by the client at later stages.	Owner related factor	4.54	1
2	Incomplete designs.	Design documentation-related factor	4.53	2
3	Frequent design and construction changes by the client.	Owner related factor	4.52	3
4	Contractors financial difficulties.	Contractor related factor	4.52	4
5	Owner's financial difficulties.	Owner related factor	4.5	5
6	Client's delay in processing designer's and contractor payments.	Owner related factor	4.47	6
7	Provision of wrong or Insufficient information by the client.	Owner related factor	4.45	7
8	Designer's failure to clearly understand the client's brief.	Designer related factor	4.42	8
9	Disparities between bills of quantities, drawings and specification.	Design documentation related factor	4.38	9
10	Changes to specifications.	Design documentation related factor	4.35	10

Notes: MS=mean score

Source: Researcher Fieldwork, 2024

The outcome of the study showed that the values for the mean scores ranges from 4.35 -4.54 where change in project requirements by the client at later stages has the highest mean score. Each of the top ten factors is discussed below.

- *Change in Project Requirements by the Client at Later Stages*

The research results identified change in project requirements by the client at later stages as a major factor impacting DBB project delivery. As shown in Table 4.12, Change in project requirements by the client at later stages has been ranked by the entire project participant in the first position with mean scores equivalent to 4.54. These changes often lead to rework, increased costs, and extended timelines. This finding is similar to studies by (Love et al., 2019), (Hwang et al., 2018), (Jarkas & Bitar, 2012).

- *Incomplete Designs*

The incomplete design has been ranked by all the respondents in the 2nd position with mean scores equals to 4.53. These problems often arise due to various factors, including rushed design processes, inadequate initial planning, and insufficient stakeholder engagement. This finding aligns with that of Gamil et al. (2020) and Rwakatare and Mfinanga (2014).

- *Frequent Design and Construction Changes by the Client*

Frequent design and construction changes by the client have been ranked by all the respondents in the 3rd position with mean scores equals to 4.52 with a standard deviation of 0.791. The interference of the client during design and construction affects the performance of DBB project delivery. The findings of this manuscript are consistent with the results of previous studies in the literature. In research conducted by Ikediashi et al. (2014), Yap et al. (2020). on construction projects.

- *Contractors Financial Difficulties.*

The Contractors financial difficulties have been ranked as the 4th factor with mean scores equals to 4.52 with a standard deviation of 0.831. Contractors experiencing financial difficulties during construction projects can lead to significant issues affecting project completion, quality, and overall success. This finding is similar to a study by Bal et al. (2013); Loose more and Lim (2017); Hwang et al. (2015); Nguyen et al. (2015) on contractor's financial difficulties in the construction industry.

- *Owner's Financial Difficulties.*

This has been ranked by all the project participants in the 5th position with mean scores equals to 4.5. When an owner faces financial difficulties during a construction project, it can have serious repercussions on the project's progress, completion, and financial stability. Faridi and El-Sayegh (2006); Doloi et al. (2012); and Assaf & Al-Hejji (2006) agree with this result.

- *Client's Delay in Processing Designer's and Contractor Payments*

The delay in progress payment to consultants and contractors has been ranked by the entire project participant in the sixth position with mean scores equivalent to 4.47. As the most important constraining factor impacting DBB project delivery, it affects the stipulated time in which the project should be delivered. This finding is also consistent with other literature done by Mamman and Omozokpia (2014) as well as Gadisa and Zhou (2021).

- *Provision of Wrong or Insufficient Information by the Client*

Provision of wrong or Insufficient information by the client was ranked as the 7th factor out of the thirty-five factors with mean scores equivalent to 4.45. Provision of wrong or insufficient information by the client in construction projects can lead to significant issues, including project delays, cost overruns, rework, and quality concerns. This finding aligns with a study by Ismail et al. (2022) in their research paper "Factors Affecting Client's Involvement in Construction Projects," which reported that the client plays a significant role in influencing construction activities, ultimately determining the success or failure of a project.

- *The Designer's Failure to Clearly Understand the Client's Brief*

This factor has been ranked by all the project participants in the 8th position with mean scores equals to 4.42. The designer's failure to clearly understand the client's brief in the construction industry can lead to significant issues, including misaligned project goals, increased costs, delays, and compromised quality. Agbaxode et al. (2021b) agree with this result.

- *Disparities between Bills of Quantities, Drawings and Specification.*

Disparities between BOQ, drawings and specification were ranked by the respondents in the nineth position with mean scores equals to 4.38. These discrepancies can lead to confusion, disputes, increased costs, and project delays. A study by Yap and Skitmore (2018); Agbaxode *et al.* (2021b) agree with this result.

- *Changes to Specifications*

Changes to specifications have been ranked as the 10th factor impacting DBB project delivery with mean scores equals to 4.35. Changes to specifications can cause significant delays as new materials need to be sourced, additional approvals may be required, and construction activities might need to be rescheduled. This is consistent with the finding that there exist wrong and inadequate descriptions in design documentation especially the specifications (Dosumu and Aigbavboa, 2018) and design documentation lacks clarity and legibility (Dosumu *et al.*, 2017).

E. Interview Findings

To enhance the validity of the results and findings, the quantitative results and qualitative findings were merged/triangulated. The responses were coded, from which 12 constraining factors emerged from all case studies. The four case study areas were utilized to identify the factors that constrain DBB project delivery. It was crucial to pinpoint these constraining factors within Tanzania's construction industry. Interview participants were asked to identify the factors affecting DBB project delivery. The responses were summarized and presented in Table 4.5, which identifies a total of 12 constraining factors as highlighted by the interviewees.

Responses were recorded, with single-instance responses considered less significant, while those mentioned multiple times were deemed significant. According to Table 4.5, the findings reveal that among the 12 identified constraining factors, "Change in project requirements by the client at later stages" was cited 21 times (95%), making it the most frequent factor. This was followed by "Design changes," cited 19 times (86%). Two factors, "Fluctuations in construction material prices" and "Discrepancies between design drawings, specifications, and BOQ," were each cited 18 times (82%). "Inadequate communication between parties" and "Exceptionally adverse climatic conditions" were cited 17 times (77%). "Force majeure: COVID-19 Pandemic" was cited 15 times (68%), followed by "Contractor design capability," which was cited 14 times (64%). "Payment delays to contractors and consultants" were cited 12 times (55%).

- *Change in Project Requirements by the Client at Later Stages (21 responses, 95%):*

The majority (21 responses, 95 per cent) of the interviewees acknowledged the impact of change in project requirements by the client at a later stage role, as evidenced by these constraining factors being mentioned or cited the most (twenty-one times).

P12 and **P21** indicated that, *late-stage changes requested by clients are one of the most significant factors causing delays. These changes can require major adjustments in the project, leading to a cascade of issues, including redesign and renegotiation of contracts.*

- *Design Changes (19 responses, 86%):*

"Design changes" was jointly second ranked based on the frequency of responses by the case studies practitioners.

P4 and **P13** emphasized that, *frequent design changes, whether due to errors or changing client requirements, disrupt the workflow. Such changes often require reworking parts of the project, leading to delays and increased costs.*

- *Fluctuations in Construction Material Prices (18 responses, 82%):*

P9 and **P18** mentioned that, *unpredictable changes in material prices, such as for steel or cement, make budgeting challenging and can cause delays if the budget needs to be revised or if there are shortages of materials.*

- *Discrepancies Between Design Drawings, Specifications, and BOQ (18 responses, 82%):*

P7 and **P14** pointed out that, inconsistencies between design drawings, specifications, and the Bill of Quantities (BOQ) can lead to confusion and errors during construction, requiring corrections that delay the project.

- *Inadequate Communication Between Parties (17 responses, 77%):*

Interviewee P5 also lent support to Interviewee P16 mentioned that, poor communication between project stakeholders, including contractors, clients, and consultants, often results in misunderstandings and mistakes, which in turn cause delays and conflicts.

- *Exceptionally Adverse Climatic Condition (17 responses, 77%):*

P11 and **P15** discussed how extreme weather conditions, such as heavy rains or storms, can halt construction activities, leading to significant delays in project completion.

- *Force Majeure: COVID-19 Pandemic (15 responses, 68%):*

P1 and **P13** discussed how the COVID-19 pandemic, severely impacted project timelines due to restrictions, lockdowns, and supply chain disruptions, making it one of the significant factors affecting project delivery.

- *Contractor Design Capability (14 responses, 64%):*

P10 and **P20** pointed out that, the capability of contractors to handle design aspects can vary, with some contractors lacking the necessary skills or experience. This often results in poor-quality designs that need revisions, affecting the project timeline.

- *Payment Delays to Contractors and Consultants (12 responses, 55%):*

P8 and **P22** highlighted that, delays in payments can demotivate contractors and consultants, lead to reduced workforce or work stoppages, and ultimately delay the project's progress.

Table 7: Case Study Constraining Factors Impacting DBB Project Delivery (Interviewee Perspective)

	Interviewees																						
Case	1					2					3					4								
Factors	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20	P21	P22	Fr	P
Delay in procurement process																√	√	√	√	√	√	√	7	32%
Delay in Design completion	√	√		√	√		√	√	√	√													8	36%
Design changes	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√	√	√			19	86%
Contractor design capability		√		√	√		√	√	√	√		√	√	√	√			√	√	√			14	64%
Change in project requirements by the client at later stages	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√	21	95%
Fluctuations in construction material prices	√			√	√	√	√	√	√	√	√	√	√		√	√	√		√	√	√	√	18	82%
Quality control and tests		√	√																				2	9%
Exceptionally adverse climatic condition	√			√	√	√		√	√	√	√		√	√	√	√		√	√	√	√	√	17	77%
Descripancies between design drawings,specification and BOQ		√	√	√	√		√	√	√	√	√	√	√		√		√	√	√	√	√	√	18	82%
Inadequate communication between parties		√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√		√			17	77%
Force majeure:Covid-19 Pandemic	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√								15	68%
Payment delays to contractors and consultant	√			√	√	√	√		√	√	√	√	√	√	√								12	55%

- *Corroborate Findings between Quantitative and Qualitative Analysis*

Changes in project requirements by a client during the later stages of construction can significantly impact the project's scope, schedule, budget, and overall success. As evidenced by their ranking in the first position with a mean score of 4.54. Interviews with project managers, resident engineers, engineers, Quantity Surveyor, contractors, and clients were cited 21 times (95%), making it the most frequent factor in the interview. The alignment between the quantitative ranking (mean scores of 4.54) and qualitative insights (95%) from stakeholder experiences and case studies reinforces the conclusion that late-stage client requirement changes are a critical issue.

Incomplete designs in construction projects are indeed a significant issue that can lead to a range of adverse outcomes, such as delays, cost overruns, and disputes. The quantitative analysis ranking of incomplete designs as number 2, with a high mean scores of 4.53, highlights its critical impact. Interviews with project managers, engineers, contractors, and clients can reveal insights into how incomplete designs affect daily operations, communication, and project morale. "Design changes," cited 19 times (86%). The alignment between quantitative data (high mean score and ranking) and qualitative insights (stakeholder experiences and case study results) strengthens the validity of the conclusion that incomplete designs are a significant issue.

Client's delays in processing payments to designers and contractors can have significant adverse effects on construction projects. These delays can impact the project's financial health, timeline, and overall success. The quantitative analysis ranks no.6 payment delays based on their impact, with a specific mean score value 4.47 indicating their significance. Interviews on "Payment delays to contractors and consultants" were cited 12 times (55%) with project professionals can reveal the operational challenges and stress caused by delayed payments, such as cash flow problems, reduced workforce morale, project slowdowns, halted work, and disputes between parties. The alignment between the quantitative metrics (e.g., frequency and cost of delays) and qualitative insights from stakeholder experiences and case studies reinforces the critical nature of payment delays.

Disparities between bills of quantities, drawings, and specifications are common issues in construction projects that can lead to significant challenges such as cost overruns, delays, and disputes Quantitative analysis ranks no.9, with a specific mean score value of 4.38 indicating their significance. Interviews 18 times (82%) with project professionals can reveal the challenges faced when dealing with discrepancies, such as increased workload, confusion, and rework. The alignment between quantitative metrics (e.g., frequency and cost of discrepancies) and qualitative insights from stakeholder experiences and case studies reinforces the critical nature of these issues.

By converging the quantitative and qualitative analyses, it becomes clear that constraining factors impacting DBB are significant issue requiring focused attention and proactive management to mitigate their impact on project scope, schedule, budget, quality, and stakeholder relationships.

V. CONCLUSION AND RECOMMENDATION

The study confirms that various factors constrain the successful delivery of DBB projects in Tanzania. The top constraints identified include that changes in project requirements by clients at later stages, incomplete designs, discrepancies between design drawings, specifications, and BOQ and payment delays to contractors and consultants. These issues often lead to delays, cost overruns, and quality concerns, underscoring the need for improved project management practices and clearer communication among stakeholders. The alignment of quantitative data and qualitative insights enhances the strength of these results and findings, suggesting that addressing client-related and design documentation issues could substantially improve DBB project performance in Tanzania's construction sector.

This paper recommends that, to mitigate issues related to incomplete designs and discrepancies, stakeholders should prioritize comprehensive and accurate design documentation. Establishing clearer communication channels among clients,

consultants, and contractors can reduce misunderstandings and errors. Clients should be advised to minimize changes to project requirements during later stages. Addressing financial difficulties by ensuring timely payments and providing financial support where necessary can prevent delays and maintain project momentum. Providing ongoing training and capacity building for designers, contractors, and project managers can improve their ability to handle complex projects and adapt to changes efficiently.

REFERENCES

[1]. Abdul Aziz, A.-R. (2008). Patterns in strategic joint ventures of selected prominent cross-border contractors for 1999-2003. *Canadian Journal of Civil Engineering*.

[2]. AbouDargham, S., Bou Hatoum, M., Tohme, M., & Hamzeh, F. (2019). *Implementation of integrated project delivery in Lebanon: Overcoming the challenges.* Paper presented at the *Proceedings of the 27th Annual Conference of the International. Group for Lean Construction*, Dublin, Ireland.

[3]. Agbaxode, P.D.K., Saghatforoush, E. and Dlamini, S. (2020) 'Integrated Project Delivery (IPD): Projecting a Common Good to Key Participants and the Project', in *Proceedings of the 36th Annual ARCOM Conference, 7-8 September 2020*. *Association of Researchers in Construction Management*, UK: In: Scott, L and Neilson, C J (Eds), pp. 136–145.

[4]. Agbaxode, P., Dlamini, S., & Saghatforoush, E. (2021). *Design documentation quality influential variables in the construction sector.* Paper presented at the IOP Conference Series: Earth and Environmental Science.

[5]. Agbaxode, P.D.K., Dlamini, S. and Saghatforoush, E. (2021b) 'Quality of Design Documentation in the Construction Industry: A Review Using Meta-Synthesis Approach', *International Journal of Innovation and Technology Management*, p. 2130003.

[6]. Akampurira, E., & Windapo, A. (2018). Factors influencing the quality of design documentation on South African civil engineering projects. *Journal of the South African institution of civil engineering*, *60*(3), 41-48.

[7]. Alofi, A., Kashiwagi, J., Kashiwagi, D., & Sullivan, K. (2016). An Analysis of the Current Procurement System in Saudi Arabia. 52nd ASC *Annual International Conference Proceeding*, 2011.

[8]. Anana, W. G. (2021). *Ethical Practices and Contract Management in Ministry of Finance, Budget and National Planning (Nigeria).* Kampala International University.

[9]. Arantes, A., & Ferreira, L. M. D. (2020). Underlying causes and mitigation measures of delays in construction projects: An empirical study. *Journal of Financial Management of Property and Construction*, *25*(2), 165-181.

[10]. Assaf, S. A., & Al-Hejji, S. (2006). Causes of delay in large construction projects. *International Journal of Project Management*, 24(4), 349-357.

[11]. Baloyi, M. and Agumba, J.N. (2014) 'Causes of disputes in construction projects in South case of Gauteng province', in. University of the Witwatersrand, Johannesburg, South Africa: *Proceedings 8th Construction Industry Development Board (CIDB) Postgraduate* …, pp. 179–187.

[12]. Buamah, S. K. A. (2021). *Effects of delays in completion of health facilities for local communities: A case of the Ningo Prampram District.*

[13]. Buertey, J. T., Dadadzogbor, E., & Atsrim, F. (2021). Procurement path influencing factors in Ghana: managing the challenge of cultural shift. *International Journal of Construction Management*, *21*(1), 78-92.

[14]. Calahorra-Jimenez, M., Alarcón, L. F., Torres-Machi, C., Chamorro, A., & Molenaar, K. (2020). Improving cost performance in design-bid-build road projects by mapping the reasons for cost overruns into the project phases. *Revista de la construcción*, *19*(2), 334-345.

[15]. Chileshe, N., & John Kikwasi, G. (2014). Critical success factors for implementation of risk assessment and management practices within the Tanzanian construction industry. Engineering, *Construction and Architectural Management*, 21(3), 291-319.

[16]. CMAA (2012) 'An owner's guide to project delivery methods', *CMAA (Construction Management Association of America) McLean, VA* [Preprint], (Advancing Professional Construction and Program Management Worldwide).

[17]. Creswell, J.W. and Creswell, J.D. (2017) *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications. 88. *Marketing*, 77(4), pp. 1–16.

[18]. Dada, M.O. (2013) 'Client and Consultant Organisations' assessment of Design-Bid-Build Procurement Practice In Nigeria', *Journal of Building Performance*, 4(1).

[19]. Dargham, S. A., M. BouHatoum, M. Tohme,and F. Hamzeh. 2019. "Implementation of IntegratedProject Delivery in Lebanon: Overcoming the Challenges." In: *Proc., 27th Conf. of the Intern. Group for Lean Constr.*, 917-928. Dublin, Ireland: International Group for Lean Construction.

[20]. Doloi, H., Sawhney, A., & Iyer, K. C. (2012). Structural equation model for investigating factors affecting delay in Indian construction projects. *Construction Management and Economics*, 30(10), 869-884.

[21]. Donaldson, L. (2006). The contingency theory of organizational design: challenges and opportunities. Organization Design: The evolving state-of-the-art, 19-40.

[22]. Dosumu, O., & Aigbavboa, C. (2018). An assessment of the causes, cost effects and solutions to design-errorinduced variations on selected building projects in Nigeria. *Acta Structilia*, *25*(1), 40-70.

[23]. Dosumu, O., Idoro, G., & Onukwube, H. (2017). Causes of errors in construction contract documents in Southwestern, Nigeria. *Journal of Construction Business and Management*, 1(2), 11-23.

[24]. Easterbrook, S., Singer, J., Storey, M. A., & Damian, D. (2008). Selecting empirical methods for software engineering research. *Guide to advanced empirical software engineering*, 285-311.

[25]. Evarist, C., Luvara, V. G., & Chileshe, N. (2023). Perception on constraining factors impacting recruitment and selection practices of building contractors in Dar Es Salaam, Tanzania. *International Journal of Construction Management*, 23(12), 2012-2023.

[26]. Gadisa, B., & Zhou, H. (2021). Exploring influential factors leading to the poor performance of public construction project in Ethiopia using structural equation modelling. *Engineering, Construction and Architectural Management, 28*(6), 1683-1712.

[27]. Gamil, Y., & Abd Rahman, I. (2023). Studying the relationship between causes and effects of poor communication in construction projects using PLS-SEM approach. *Journal of* Habibi, M., Kermanshachi, S., & Rouhanizadeh, B. (2019). Identifying and measuring engineering, procurement, and construction (EPC) key performance indicators and management strategies. *Infrastructures*, *4*(2), 14.

[28]. Hanák, T., Drozdová, A., & Marović, I. (2021). Bidding strategy in construction public procurement: A contractor's perspective. *Buildings, 11*(2), 47.

[29]. Heidemann, A. & Gehbauer, F. 2010, "Cooperative Project Delivery in an Environment of Strict Design-Bid-Build Tender Regulations". In:, Walsh, K. & Alves, T., 18th *Annual Conf. of the International Group for Lean Const*. Haifa, Israel, pp 581-587.

[30]. Hinton, M. A., & Hamilton, R. T. (2015). Competitive tendering and individual behaviour in the construction industry: convenient immorality at work. *Construction management and economics, 33*(11-12), 880-889.

[31]. Hwang, B.-G., Shan, M., & Lye, J.-M. (2018). Adoption of sustainable construction for small contractors: major barriers and best solutions. *Clean Technologies and Environmental Policy, 20*, 2223-2237.

[32]. Ikediashi, D. I., Ogunlana, S. O., & Alotaibi, A. (2014). Analysis of project failure factors for infrastructure projects in Saudi Arabia: A multivariate approach. *Journal of Construction in Developing Countries*, 19(1).

[33]. Israel, B., Mchopa, A., Mwaiseje, S., & Mashene, A. (2021). Ethical procurement practices and performance of public procuring entities in Tanzania: empirical evidences from Moshi district council. *Journal of Co-operative and Business Studies (JCBS), 4*(2).

[34]. Issa, A.I. (2023). Exploring the causes of delay in road construction projects in Tanzania: An interpretive structural modeling approach. *Unpublished Master Dissertation, Ardhi University.*

[35]. Jaafar, M., & Radzi, N. M. (2013). Level of satisfaction and issues with procurement systems used in the Malaysian public sector. *Australasian Journal of Construction Economics and Building, The*, *13*(1), 50-65.

[36]. Jarkas, A. M. (2014). Factors impacting design documents quality of construction projects. *International Journal of Design Engineering, 5*(4), 323-343.

[37]. Jarkas, A. M., & Bitar, C. G. (2012). Factors affecting construction labor productivity in Kuwait. *Journal of Construction Engineering and Management, 138*(7), 811-820.

[38]. Julião, M. L. (2018). *Guidelines for scope of work in corporate office building design.* Universidade de São Paulo.

[39]. Kalan, D., & Ozbek, M. E. (2020). Development of a construction project bidding decision-making tool. *Practice Periodical on Structural Design and Construction, 25*(1), 04019032.

[40]. Kamar, M. and Anuar, K. (2011) 'Critical success factors to industrialised building system(IBS) contractor'.

[41]. Kamaruddeen, A. M., Sung, C. F., & Wahi, W. (2020). A study on factors causing cost overrun of construction projects in Sarawak, Malaysia. *Labour (human), 2*(7), 13.

[42]. Kavishe, N., & Chileshe, N. (2017, September). Joint venture housing projects in Dar Es Salaam City: An analysis of challenges and effectiveness. In *Proceeding of the 33rd Annual ARCOM Conference* (Vol. 4, p. 6).

[43]. Kavishe, N., Jefferson, I., & Chileshe, N. (2018). An analysis of the delivery challenges influencing public-private partnership in housing projects: The case of Tanzania. *Engineering, Construction and Architectural Management, 25*(2), 202-240.

[44]. Kavishe, N., & Chileshe, N. (2018). Identifying project management practices and principles for Public–Private partnerships in housing projects: The case of Tanzania. *Sustainability*, *10*(12), 4609.

[45]. Kavishe, N. (2018). Risks associated with public private partnership (PPP) housing projects delivery in Tanzania. *International Journal of Construction Engineering and Management, 7*(2), 81-87.

[46]. Kavishe, N., & Chileshe, N. (2019). Critical success factors in public-private partnerships (PPPs) on affordable housing schemes delivery in Tanzania: A qualitative study. *Journal of facilities management*, *17*(2), 188-207.

[47]. Kihamba, J. S. (2021). Public procurement reforms in Tanzania: dispersion of corruption and governance. *Public Procurement, Corruption and the Crisis of Governance in Africa*, 185-204.

[48]. Kikwasi, G. (2012). *Causes and effects of delays and disruptions in construction projects in Tanzania.* Paper presented at the Australasian Journal of Construction Economics and Building-Conference Series.

[49]. Kikwasi, G. J., & Escalante, C. (2018). *Role of the construction sector and key bottlenecks to supply response in Tanzania* (9292565737).

[50]. Kortenko, S., Koskela, L., Tzortzopoulos, P., & Haghsheno, S. (2020). *Negative effects of design-bid-build procurement on construction projects.* Paper presented at the Proc. 28th Annual Conference of the International Group for Lean Construction (IGLC28), Berkeley, California, USA, doi. org/10.24928/2020/0141.

[51]. Kothari, C. R. (2004). *Research methodology: Methods and techniques*: New Age International.

[52]. Kyalo, J. K., & Muturi, W. (2015). Factors Affecting Completion of Government Funded Projects, a Survey of Projects in the Ministry of Water and Environment. *Journal of Economics and Sustainable Development, 6*(8), 177184.

[53]. Lappalainen, E. *et al.* (2022) 'Improving Design Quality by Contractor Involvement: An Empirical Study on Effects', *Buildings*, 12(8), p. 1188.

[54]. Lines, B. C., Kakarapalli, R., & Nguyen, P. H. (2022). Does best value procurement cost more than low-bid? A total project cost perspective. *International Journal*

of Construction Education and Research, 18(1), 85-100.

[55]. Love, P. E., Sing, M. C., Ika, L. A., & Newton, S. (2019). The cost performance of transportation projects: The fallacy of the Planning Fallacy account. *Transportation Research Part A: Policy and Practice, 122*, 1-20.

[56]. Luvara, V. (2020). Development of social capital model for organization performance of building contractors in Tanzania. *Unpublished Ph. D. Thesis Ardhi University*.

[57]. Luvara, V. G. M., & Benjamin, M. (2024). Unveiling factors influencing the duration of arbitration practice in the Tanzania construction industry. *International Journal of Building Pathology and Adaptation*.

[58]. Maagi, B., & Mwakalobo, A. (2023). Users' perception regarding the effect of E-Procurement practice on customer satisfaction in public procurement in Tanzania. *Open Journal of Business and Management, 11*(2), 570-584.

[59]. Malekela, K. N. (2018). Risk Measures for Controlling Variations on Forecasted Construction Cash Flows of Building Projects. *Risk, 5*(05).

[60]. Malekela, K. N., Mohamed, J., Ntiyakunze, S. K., & Mgwatu, M. I. (2017). Risk factors causing variations on forecasted construction cash flows of building projects in Dar es Salaam, Tanzania. Int. J. Constr. Eng. Manag, 2, 46-55.

[61]. Malekela. (2019). *Development of a model for optimising the variations on the forecasted constructed construction cashflows: a case of building projects in Dar es salaam-Tanzania. Unpublished Ph. D. Thesis* University of Dar es Salaam.

[62]. Malinda, M. J. K. (2017). *Quality of project documentation as a major risk source in infrastructure projects in South Africa.* Stellenbosch: Stellenbosch University.

[63]. Matto, M. C., Ame, A. M., & Nsimbila, P. M. (2021). Influence of contract management on value for money procurement in Tanzania. *International Journal of Procurement Management, 14*(6), 724-741.

[64]. Mchopa, A. D., Changalima, I. A., Sulle, G. R., & Msofe, R. M. (2024). Public procurement trajectories in Tanzania: a review of reforms, practices, and compliance. *Cogent Business & Management, 11*(1), 2300498.

[65]. Mosley, J. C., & Bubshait, A. A. (2021). Investigative study of project procurement methods and project performance indicators in Saudi Arabia. *International journal of construction management, 21*(8), 845-857.

[66]. Mushumbusi, M. Z. (2011). *Formal and informal practices for affordable urban housing: case study: Dar es Salaam, Tanzania.* KTH Royal Institute of Technology, Naoum, S., & Egbu, C. (2015). Critical review of procurement method research in construction journals. Procedia Economics and Finance, 21, 6-13.

[67]. Nawi, M., Lee, A. and Nor, K. (2011) 'Barriers to implementation of the industrialised building system (IBS) in Malaysia', *The Built & Human Environment Review*, 4(1), pp. 22–35.

[68]. Nguyen, T. P., & Chileshe, N. (2015). Revisiting the construction project failure factors in Vietnam. *Built Environment Project and Asset Management*, 5(4), 398-416.

[69]. Noor, S. N. A. M., Tobi, S. U. M., & Fathi, M. S. Revolutionizing Quantity Surveyors: Unleashing Competency In Construction 4.0–A Pilot Study In Malaysia. *Malaysian Construction Research Journal (MCRJ)*, 210.

[70]. Ntiyakunze, S.K. (2011). Conflicts in Building Projects in Tanzania: Analysis of Causes and Management Approaches. Department of Real Estate and Construction Management, Royal Institute of Technology, Stockholm, Sweden.

[71]. Ofori, G. (2012) *Contemporary Issues in Construction in Developing Countries*. 2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN: Spon Press.

[72]. Ogunsanmi, O. (2013). Effects of procurement related factors on construction project performance in Nigeria. *Ethiopian Journal of Environmental Studies and Management*, 6(2), 215-222.

[73]. Okereke, R. A., Ihekweme, N. M., & Adegboyega, A. A. (2022). Impact of Traditional Procurement System on Construction Project Delivery. *Journal Of Project Management Practice (JPMP), 2*(2), 23-38.

[74]. Oladirin, O. T., Olatunji, S. O., & Hamza, B. T. (2013). Effect of selected procurement systems on building project performance in Nigeria. *International journal of sustainable construction engineering and technology*, *4*(1), 48-62.

[75]. Olanike, O. Y., Baba, M. M., & Ahmad, A. B. (2020). Assessing The Influence of Procurement Systems OnPerformance of Construction Projects in Nigeria. *FUW Trends in Science & Technology Journal, 5*(3), 796-801.

[76]. Owiti, J. O. (2022). Effectiveness of Construction Contract Procurement Processes In Public Projects In Kenya: A Survey Of County Government Projects (Doctoral dissertation, JKUAT-SABS).

[77]. Phoya, S. (2014). Multi-Stakeholders' Participation in Health and Safety Risk Management in Construction Project in Tanzania (Doctoral dissertation, Ardhi University).

[78]. Pishdad-Bozorgi P, Garza J. M D L, Austin RB. 2016. Readiness Assessment for Flash Tracking. J Constr Eng Manag. 142(12):06016005.

[79]. Puri, D., & Tiwari, S. (2014). Evaluating the criteria for contractors' selection and bid evaluation. *International journal of engineering science invention*, 3(7), 44-48.

[80]. Rahmani, F. (2021). Challenges and opportunities in adopting early contractor involvement (ECI): Client's perception. *Architectural engineering and design management, 17*(1-2), 67-76.

[81]. Rahmani, F., Maqsood, T., & Khalfan, M. (2017). An overview of construction procurement methods in Australia. *Engineering, construction and architectural management, 24*(4), 593-609.

[82]. Ramabodu, M. S., & Verster, J. J. (2013). Factors that influence cost overruns in South African public sector mega-projects. *International Journal of Project Organisation and Management 7, 5*(1-2), 48-56.

[83]. Rashid, K. A., Fauzi, P. N. F. N. M., & Hasan, S. F. (2017). *Shariah principles in the procurement of buildings and infrastructure works.* Paper presented at the 4th International Conference on Masjid, Zakat and Waqf Management.

[84]. Reta, A., & Alyew, A. (2022). Determining the effects of awarding lowest bid price system on the

construction projects of Ethiopian Southern Nation. *Journal of University of Shanghai for Science and Technology*, *24*(1), 253-260.

[85]. Rowlinson, S., Walker, D.H.T. and Cheung, F.Y.K. (2008), "Culture and its impact upon project procurement", in Walker, D.H.T. and Rowlinson, S. (Eds), Procurement Systems: A Cross Industry Project Management Perspective, Taylor and Francis, New York, NY

[86]. Rwakarehe, E. E., & Mfinanga, D. A. (2014). Effect of inadequate design on cost and time overrun of road construction projects in Tanzania. *Journal of Construction Engineering and Project Management*, *4*(1), 15-28.

[87]. Saunders, M. N., & Townsend, K. (2018). Choosing participants. *Sage handbook of qualitative business and management research methods*, 480-494.

[88]. Ugwu, O. O., & Haupt, T. C. (2007). Key performance indicators and assessment methods for infrastructure sustainability—a South African construction industry perspective. Building and environment, 42(2), 665-680.

[89]. Valerian, W. (2014). *Project procurement method and its relationship with disputes occurrence in tanzania construction industry*. *A Case of Construction Stakeholders in Dar es Salaam.* Mzumbe University.

[90]. Zuber, S. Z. S., Nawi, N. M., & Nifa, F. A. A. (2019). Construction procurement practice: A review study of integrated project delivery (IPD) in the Malaysian construction projects. *International Journal of Supply Chain Management, 8*(1), 777-783.