FACTORS AFFECTING THE ACCURACY OF COST ESTIMATES DURING VARIOUS DESIGN STAGE (A CASE STUDY OF ILORIN KWARA STATE, NIGERIA)

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CERTIFICATION

This is to certify that, this project work was carried out by YUSUF TAIBAT, HND/23/QTS/FT/0027, read and approved as meeting the requirement for the award of Higher National Diploma (HND) in Quantity Surveying, Kwara State Polytechnic, Ilorin.

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DEDICATION

With a heart full of gratitude, I dedicate this work to Almighty Allah, my ever-faithful provider and guide. To my wonderful father, Mr. Adamu Yusuf, and my precious mother, Mrs. Yusuf Balikis, your love, prayers, and sacrifices have carried me through every step of this journey. I am forever thankful. To my dear sister, Adamu Sidi Salmat, and my amazing brothers, Adamu Sidi Ibrahim, Suraju, Jafar, and Hussein, your support, encouragement, and belief in me gave me the strength to keep going, even in difficult times. This achievement is not mine alone, it belongs to all of you. I love you deeply.

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ABSTRACT

Accurate cost estimation is a fundamental element in the success of construction projects. It enables effective budgeting, financial planning, and resource management throughout the life cycle of a project. However, many construction projects, especially in developing countries like Nigeria, continue to experience serious cost overruns due to inaccurate cost predictions, particularly during the early design stages. This study examines the key factors affecting the accuracy of cost estimates across different design stages, conceptual, schematic, and detailed, using building projects in Ilorin, Kwara State as a case study.

A quantitative research design was adopted. Primary data were collected using structured questionnaires administered to 50 construction professionals, including quantity surveyors, architects, engineers, builders, and project managers. The responses were analyzed using descriptive statistics such as frequency tables, percentages, and mean scores. The findings revealed that several factors significantly influence estimation accuracy. Internally, factors like the experience of the estimator, quality of available cost data, use of manual methods, and poor collaboration between design and cost teams were prominent. Externally, the effects of inflation, unstable market prices, currency fluctuations, material scarcity, and frequent changes in government policies were also found to be major challenges.

The study also showed that the accuracy of cost estimates tends to improve as the design stages progress, with the highest level of inaccuracy occurring during the conceptual stage. Furthermore, it was found that only a small percentage of professionals in Ilorin fully utilize modern cost estimation tools such as CostX, PlanSwift, and Building Information Modelling (BIM), largely due to limited training and high software costs. As a result, many estimates continue to rely on outdated or manual techniques.

The study recommends that construction firms and consultants should prioritize the early involvement of cost experts in design, invest in digital tools, regularly update cost databases, and promote collaborative workflows between design and cost teams. Additionally, professional development programs should be strengthened to equip estimators with the necessary skills to adopt modern practices. These strategies will help improve the accuracy of cost estimates and contribute to the successful delivery of construction projects within the planned budget and timeline.

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CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Cost estimation is a key part of successful project delivery. It involves more than just technical calculations; it's a strategic function that impacts every aspect of a project, from early planning to final execution. Cost estimation helps developers, consultants, and clients make informed choices about whether construction projects are feasible, affordable, and profitable (Nwosu & Danlami, 2024). It allows construction stakeholders to predict financial needs, properly allocate resources, and minimize the risk of abandoning a project.

Cost estimation is an ongoing process, not a one-time task. It starts in the early design phase and becomes more detailed as the project develops (Bello & Ogunleye, 2022). As new information comes in during the project, estimators need to update their calculations to reflect those changes. As construction projects keep changing and progressing, estimating costs becomes challenging because many professionals in Nigeria lack access to accurate data, do not consistently use modern technology, and have different levels of experience and skills.

Despite its importance, the industry still faces challenges in achieving accurate cost estimates, especially during the early design stages when project ideas and materials are still being finalized. Early estimates often rely on limited information and past projects, leading to unreliable projections. These early estimates are often mistakenly seen as dependable, despite their high risk and uncertainty, which is not always conveyed to project sponsors. This issue is worse in environments where modern estimation tools are not used effectively and where estimators lack timely access to construction cost databases (Udo, Bello, & Adeyemi, 2024). Mistakes in early estimates can grow over time, resulting in rising costs, unrealistic expectations, and misalignments between clients and contractors.

Globally, many construction projects experience cost overruns, which shows that inaccurate cost estimation is a common problem. Up to 70 percent of infrastructure and building projects go over their initial budget (Ajibade, 2023). This situation is not just due to inflation or unexpected events; it often arises from inaccurate and overly optimistic early estimates. Many of these early assumptions are based on outdated market information, incomplete designs, and the pressure to secure contracts with lower bids, which leads to significant financial problems later on (Gimba, Hassan, & Bello, 2022). In Nigeria, over 74 percent of public building projects exceed their initial budgets mainly because of poor cost

estimation practices (Salisu, 2023). This inefficiency can cause major issues: projects may get delayed indefinitely, important infrastructure may be left incomplete, and public confidence in government projects may decline. These overruns typically result from flawed cost estimates made during the early design phases, which become hard to adjust once financial commitments are set (Kure & Igbokwe, 2020; Adebiyi & Olonade, 2021).

Many factors can lead to inaccurate cost estimates in construction projects. One big issue is not having a clear project scope from the start. If the designers and clients haven't settled on the size, function, and features of the building, estimators must guess, which can result in financial problems later (Musa & Okafor, 2020). Another major problem is outdated cost data. Many quantity surveyors in Nigeria still use printed price books or Excel sheets that aren't updated often enough to reflect current market prices (Adeyemi, Bakare, & Ojo, 2024). This issue worsens when estimators lack experience or training in up-to-date estimation methods. Changes in project designs, either due to new client requests or functional issues, can also make cost estimates uncertain. Each change affects labor, materials, and scheduling (Olumide, Nwankwo, & Bello, 2025).

Estimates made at the early conceptual stage are often the least accurate. These estimates, known as "order of magnitude" or "preliminary cost plans," can be off by as much as ±25 to ±50 percent (Olanrewaju & Odili, 2021). At this stage, design drawings may not exist, and material and structural choices are not finalized. However, as the project moves into the schematic and design development phases, more details allow for better accuracy. Once construction documents are ready, estimates should be within ±5 to ±10 percent of the actual costs (Fashola & Nkwocha, 2023). Still, many projects in Nigeria approve budgets and contractor selections based on these early estimates, which often remain inaccurate (Umeh & Adedokun, 2024). This reliance increases chances of disputes and financial issues later on.

Economic conditions and policy changes also impact cost accuracy. Factors like inflation and currency instability can disrupt even the best cost plans (Bakare, 2020). In Nigeria, where inflation increased from 12 percent in 2020 to almost 29 percent by early 2024, these conditions can significantly change the prices of imported materials and labor. Construction companies often set prices when preparing estimates, but by the time they buy materials, prices may have increased dramatically, especially for materials tied to the dollar (Falola, & Garba, 2024). Additionally, global events, like the COVID-19 pandemic and geopolitical tensions, have led to supply delays and higher import costs, making it harder to predict budgets (Ogbeche & Atanda, 2024). These economic pressures, along with inconsistent regulations and unpredictable government policies, create an unstable cost environment in the Nigerian construction sector (Okeke, Bala, & Salami, 2023).

Local industry-specific challenges make it hard to create accurate cost estimates. Many firms struggle due to poor organizational systems. They often have incomplete documentation and weak cost tracking, and they don't use digital tools effectively. This leads estimators to rely on guesswork instead of solid data (Abdulrahman, Usman, & Bello, 2023). Additionally, the push to be competitive sometimes causes contractors to understate costs in their bids, only to ask for more money later. Many small and medium construction companies in Nigeria still use outdated methods, like manual unit rates and basic strategies that worked years ago but don't fit today's complex projects (Olabisi & Ayankoya, 2024). Lack of training opportunities and modern software tools prevents the industry from moving forward.

Technological innovations can help improve estimation accuracy. Using digital estimation platforms, like Cost-X, Plan-Swift, and Building Information Modelling (BIM), helps create more precise estimates, model different scenarios, and get immediate feedback when designs change. With proper training, these tools can cut estimation errors by 30% or more (Ekanem, Musa, & Olopade, 2023). They help create models that adjust in real time based on material costs, supplier prices, or currency changes. However, fewer than 25% of Nigerian estimators regularly use these tools (Alade & Omodara, 2024). Several obstacles to using these innovations exist, such as high software costs, lack of training support, and skepticism among professionals who prefer manual methods (Ibrahim & Nwachukwu, 2022). This slow adoption keeps Nigeria facing challenges in cost estimation.

Another important issue is the lack of collaboration between designers and cost estimators, which results in fragmented project execution. When estimators join a project too late, they base their cost estimates on incomplete or idealistic designs, leading to unrealistic budgets. A more integrated method is needed, where architects, engineers, and cost professionals work together from the start (Ogundipe, Adebayo, & Yakubu, 2021). This teamwork helps everyone understand design goals, material choices, and budget constraints, leading to more accurate and justifiable cost estimates. Regular feedback between design and cost teams should be encouraged so that any design changes lead to immediate cost reviews, fostering financial transparency and better decision-making.

1.2 Statement of the Problem

Accurate cost estimation is important for the success and financial stability of construction projects. In Nigeria's building industry, creating precise cost estimates in the early stages of design is a major challenge. Failing to make accurate early estimates can lead to budget overruns, contract disputes, and even project abandonment (Adebayo & Kolade, 2023). These early cost estimates play a key role in decisions like funding approval, choosing contractors, and shaping the project design. However, they are often inaccurate because they depend mostly on guesses and the estimator's personal experience, as there isn't enough detailed information available at that stage.

This problem is even worse in Nigeria because of the unstable economy, old-fashioned methods still used by many construction firms, and their slow acceptance of modern cost estimation tools. About 74% of government construction projects in Nigeria go over budget, and most of these problems begin with poor cost planning during the early stages (Ogbeche & Atanda, 2024). Mistakes often happen due to weak communication between design and cost teams, poor understanding of the project's technical details, and reliance on outdated cost databases that don't match today's market prices. This means that while the budget may look fine at first, it usually fails once the project begins. These early errors often cause delays, unnecessary design changes, and money-related arguments between clients and contractors.

Several scholars have identified institutional, technical, and human resource factors as key causes of this ongoing problem. Estimators often begin with unclear design briefs and lack essential site information, making accurate cost prediction difficult. In the absence of detailed design drawings at the early stage, estimators are forced to make assumptions about quantities and material types, which leads to unreliable cost estimates. Similarly, many estimators continue to rely on manual methods, such as handwritten calculations and simple Excel spreadsheets. While these tools may be suitable for smaller projects, they are inadequate for the demands of modern construction, often resulting in outdated and inaccurate estimates (Akpan & Chizea, 2024).

The skills of estimators are another concern. Many people involved in early cost planning lack advanced training or ongoing professional development, which is necessary in today's changing construction landscape. Most estimators in Nigeria do not receive training in modern software tools like Cost-X, Plan-Swift, or Building Information Modelling (BIM) (Yusuf & Kolapo, 2024). This knowledge gap limits their ability to update estimates in real time or adjust to design changes. Additionally, even when such tools are available, older professionals may resist using them and prefer their traditional methods.

Economic factors also create significant challenges for accurate estimation, In Nigeria, prices for materials like cement, steel, tiles, and imported finishes can fluctuate unpredictably due to inflation,

currency changes, and government policy. Many estimators do not include enough contingency plans for inflation or currency risk, which makes even well-planned estimates outdated very quickly (Chinedu & Abubakar, 2023). These economic challenges are worsened by frequent regulatory changes, import bans, and unstable labor markets, all of which create high cost uncertainty in construction projects (Adebiyi & Eze, 2022).

To improve outcomes for construction projects in Nigeria, it is essential to enhance the quality and reliability of cost estimates, especially during the early design stages. Until key players in the construction industry, such as architects, quantity surveyors, engineers, and project managers, adopt collaborative estimation practices and innovative tools, the problems with cost estimation will continue (Usman & Okoro, 2022).

This study aims to examine the key factors that affect the accuracy of cost estimates at different stages of construction projects. It focuses on building projects in Ilorin, Kwara State. The study will explore how local issues, such as financial challenges, lack of proper tools, and weak systems, impact cost estimates. It will also suggest practical ways to improve the accuracy of cost estimates and enhance project outcomes.

1.3 Research questions

To guide the study, these questions were proposed to be answered at the end of this project:

I. What are the key factors influencing the accuracy of cost estimates across various design stages in construction projects in Ilorin?
II. What are the impacts of cost estimator qualifications and experience on cost estimation precision?
III. To what extent do internal and external factors affect the accuracy of cost estimates during different design stages in construction projects?
IV. What are the effective strategies and technologies that can improve the accuracy of cost estimates during the design stages of construction?

1.4. Aim of the study

The main aim of this study is to examine the key factors that affect the accuracy of cost estimates during different design stages of building construction projects in Ilorin, Kwara State, Nigeria.

1.4.1. Specific Objectives of the Study

The specific objectives of this study are:

I. To identify the key factors that influence the accuracy of cost estimates across various design stages in construction projects in Ilorin.
II. To determine the impact of estimator qualifications and experience on cost estimation precision.
III. To evaluate the extent to which internal and external factors affect the accuracy of cost estimates during different design stages in construction projects.
IV. To examine effective strategies and technologies that can enhance the accuracy of cost estimation during the design stages of construction.

1.5 Justification of the Study

Accurate cost estimation is essential to avoid project delays, cost overruns, and abandoned projects in Nigeria's construction sector. Mistakes in the early design stages often lead to budget issues, especially in public sector projects (Ajayi & Lawal, 2023). Although there have been improvements in cost planning tools, many estimators in Nigeria still use outdated methods. These old techniques do not match current market conditions or the complexity of modern projects, especially in growing cities like Ilorin (Musa & Okafor, 2020). Existing research often discusses cost overruns in broad terms but does not focus on the accuracy of estimates at specific design stages. There is a lack of recent research that considers local economic and technical factors (Udo, Bello, & Adeyemi, 2024).

This study is important because it focuses on both internal factors (like the skills and methods of estimators) and external factors (such as inflation and market changes) that affect estimation accuracy. It also examines how digital tools like BIM and Cost-X can improve results. The findings will help construction professionals, policymakers, and academic institutions by providing evidence-based strategies to improve cost forecasting and financial planning in building projects in Ilorin and similar regions.

1.6 Scope of the Study

This study focuses on the factors affecting cost estimate accuracy during the conceptual, schematic, and detailed design stages of building projects in Ilorin, Kwara State. It covers internal factors like estimator

skills and methods, as well as external issues such as inflation and price fluctuations. The study is limited to building construction and targets professionals like quantity surveyors, architects, and project managers. It also examines the use of digital tools such as Cost-X, Plan-Swift, and BIM in improving cost estimation.

1.7 Definition of Key Terms

1.7.1 Cost Estimate: A calculated prediction of the likely cost of a construction project, prepared at various stages of design to guide budgeting and financial planning.

1.7.2 Accuracy: The degree to which the estimated cost reflects the actual or final construction cost. High accuracy means a small difference between projected and actual costs.

1.7.3 Design Stages: The phases of project development where drawings and specifications are created. These include the conceptual design, schematic design, and detailed design stages.

1.7.4 Conceptual Design: The earliest stage of a project where only basic ideas, functions, and spatial layouts are defined. Cost estimates at this stage are typically rough and based on limited information.

1.7.5 Schematic Design: A more developed phase where preliminary drawings are created, offering clearer details about layout, space use, and building systems.

1.7.6 Construction Documentation: The final design phase where complete and detailed drawings, schedules, and specifications are produced, allowing for more accurate cost estimation.

1.7.7 Quantity Surveyor: A construction professional responsible for preparing cost estimates, managing budgets, and ensuring financial control throughout the building process.

1.7.8 Cost Overrun: The amount by which actual construction costs exceed the initially estimated or approved budget.

1.7.9 Inflation: A rise in the general price level of goods and services over time, affecting material and labor costs in construction.

1.7.10 Building Information Modelling (BIM): A digital technology that integrates design and cost data into a single model, allowing for real-time updates and more accurate cost projections.

1.7.11 Estimation Tools: Software or digital platforms like Cost-X, Plan-Swift, and Microsoft Excel used to calculate, model, and analyze construction costs.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Cost estimation is one of the most important components in the construction industry, serving as the foundation for budgeting, financial planning, tendering, and resource allocation. A well-prepared cost estimate allows project stakeholders to forecast financial requirements and evaluate the feasibility of a construction project from the outset. The accuracy of a cost estimate determines the degree to which the final construction cost aligns with the initial budget, making it a key indicator of project success or failure (Ogbeche & Atanda, 2024).

However, producing accurate cost estimates remains a persistent challenge, particularly during the early design stages when limited information is available. Most construction projects experience discrepancies between estimated and actual costs due to assumptions made in the absence of complete design data (Eze & Abdulkareem, 2023). These errors in cost estimation usually remain unnoticed until the construction work starts. By then, they can lead to spending more money than planned, changing the original design, causing disagreements among stakeholders, or even stopping the project completely. In countries like Nigeria, the problem gets worse due to the lack of modern digital tools for estimating costs, unstable prices of building materials, and changing government regulations.

Each stage of the design process, conceptual, schematic, and detailed, presents unique difficulties for cost estimators. At the conceptual stage, estimation is typically based on generalized data or previous project experience, which can lead to broad cost assumptions with wide error margins. These early estimates are often used to secure funding and approval, despite their low reliability (Bello & Ogunleye, 2022). The schematic and detailed stages provide more refined data, yet many estimates still fall short due to poor methodology, inadequate collaboration, and external economic shocks.

This chapter reviews existing literature on cost estimation, focusing on the relationship between design stages and estimate accuracy. It also examines internal and external factors affecting cost projections, the impact of technological adoption, the consequences of inaccurate estimates, and the practical strategies proposed by researchers to improve cost estimation outcomes. This review helps to contextualize the research problem and justify the need for a study focused on construction practices within Ilorin, Kwara State.

2.2 Historical Background of Cost Estimation in Construction

Cost estimation in construction has a long history, starting with ancient civilizations that used basic budgeting and planning for large projects like temples and palaces. In earlier periods, cost decisions often relied on experience and informal agreements. Cost estimation was mainly based on personal judgment and experience shared by skilled builders (Ibhadode & Yusuf, 2020). The Industrial Revolution brought more formal architectural and engineering disciplines, leading to structured cost estimation. Builders were expected to provide written cost estimates based on project drawings and specifications. This period marked the beginning of the bill of quantities (BOQ), a standard document for cost planning and contract management in construction (Olanrewaju & Abdulkareem , 2021).

In the 20th century, the quantity surveying profession became more important for construction planning, especially in countries like Nigeria. The introduction of cost data libraries and estimating guides made it easier for professionals to predict construction costs more accurately. Nigeria's construction sector adopted several British methods, making quantity surveying a key practice for controlling and managing project costs (Adebiyi & Eze, 2022).

By the late 20th and early 21st centuries, construction projects grew more complex, leading to the use of software and technology in cost estimation. Programs like Microsoft Excel became common for creating detailed cost breakdowns, and advanced software like Cost-X and Plan-Swift, along with Building Information Modelling (BIM), changed how cost data is calculated and updated. Modern digital platforms now allow real-time adjustments based on design changes and market conditions (Dangana, Musa, & Olopade, 2023).

However, many construction firms in developing countries, including Ilorin, Nigeria, still use traditional methods. Even though modern tools exist, their use is limited due to high software costs, lack of training, and resistance to change (Yusuf & Kolapo, 2024). As a result, cost estimation in many Nigerian projects can be inaccurate, especially in the early design stages.

The history of cost estimation has moved from relying on guesswork and personal experience to using data and technology to predict construction costs more accurately. But in many parts of Nigeria, modern methods like software tools and databases are still not widely used.

2.3 Importance of Cost Estimating in Project Delivery

Cost estimation is an important process in construction project delivery because it directly influences nearly every major decision made across the entire project lifecycle. It acts as a financial guide, helping clients, contractors, and consultants understand the potential economic demands of the project before, during, and after construction. Through cost estimation, decision-makers are empowered to properly

plan for resource allocation, project scheduling, procurement strategy, and funding acquisition (Ashworth & Perera). Without a well-prepared cost estimate, managing a construction project becomes challenging. The project may face delays, run out of money, or even be abandoned. Poor cost estimation opens the door to financial mismanagement, waste of resources, and confusion during execution (Aibinu & Pasco, 2021).

2.3.1 Assessing Project Feasibility

One important function of cost estimation is to check if a proposed project can be funded. During the feasibility stage, when the project is just an idea, clients use early cost estimates to see if they have enough money to move forward. These early estimates often rely on past cost data, simple designs, or calculations based on project size. While they may not be very detailed, they provide a general idea of the potential cost (Olawale, Ibironke, & Fagbenle, 2020).

In sub-Saharan Africa, including Nigeria, many proposed projects do not go beyond the planning phase because of funding gaps identified through cost estimation. More than 60% of proposed developments in the region faced cancellation or indefinite delays because the initial cost estimates were not accurate (Akintola, Ogunjobi, & Lawal, 2023). Feasibility estimates are not just numbers; they are important tools for deciding if a project is affordable and worth pursuing (Aibinu & Pasco, 2021; Adewole & Adeleke, 2022).

2.3.2 Developing a Reliable Budget

A reliable budget is essential for both financial planning and project control. Accurate cost estimation lays the groundwork for this by outlining all the financial requirements needed throughout the life of the project, from design to construction and post-construction activities. The estimate helps stakeholders plan for expenditures at various stages, allocate funds properly, and ensure there are no unexpected financial shortfalls (Oladokun, Adeyemi, & Kolawole, 2022).

In Nigerian cities like Abuja, Lagos, and Port Harcourt, public projects often face delays and abandonment due to budget misalignment. However, where detailed cost estimation is carried out and used to guide budgeting, outcomes are more predictable. (Okeke, Bala, & Salami, 2023) found that cost overrun risks were reduced by up to 45% in projects where budgeting was based on comprehensive cost planning. Supporting studies further highlighted that budget accuracy depends heavily on the quality of the initial cost estimate and how well it reflects on-site conditions and market rates (Aibinu & Pasco, 2021).

2.3.3 Supporting Tendering and Procurement

Cost estimations play a vital role in the preparation for both tendering and procurement. At this stage, clients and consultants utilize pre-tender estimates as standards to assess the bids provided by contractors. These estimates assist in determining whether a contractor's quoted price falls within an acceptable range. A significantly lower bid compared to the estimate might raise flags regarding potential underpricing, which could result in subpar work or claims in the future. Conversely, bids that are excessively high could indicate inefficiencies or unwarranted profit margins. The importance of pre-tender cost estimates in ensuring fairness and transparency, especially in public sector projects where the misappropriation of funds is a major concern. (Brook, 2020) also echoed this sentiment, asserting that precise estimating helps to prevent fraud and fosters healthy competition in the bidding process (Olatunji, 2022).

2.3.4 Enhancing Cost Control During Execution

Another major benefit of cost estimation is that it enables effective financial control throughout construction. Project managers frequently compare actual costs with the initial estimates to monitor how funds are being used. This process, known as cost tracking, helps identify overruns, unexpected expenses, or areas where savings have been achieved (Flyvbjerg, Bruzelius, & Rothengatter, 2023). For example, if material prices suddenly increase or if there are thefts on site, comparing actual expenditure with the original estimate allows quick detection and correction. Monitoring helps project teams make timely decisions, such as switching to alternative suppliers or adjusting the work schedule. Accurate cost estimates are essential for tracking performance and maintaining accountability (Ibrahim & Nwachukwu, 2022).

2.3.5 Improving Resource Planning and Scheduling

Cost estimation also enhances project scheduling and resource planning. Once the cost of materials, labor, equipment, and logistics is known, the contractor can create a more practical and achievable timeline. Estimators typically break down project costs into work packages, helping managers understand when and how resources should be mobilized. This prevents delays due to shortages or poor planning. Construction projects with detailed cost breakdowns were 35% more likely to meet their scheduled timelines. Advance preparation based on accurate cost predictions facilitated the prompt acquisition and delivery of materials. Research further verifies that effective cost estimation leads to more efficient scheduling and reduced site interruptions (Adeyemo & Bolarinwa, 2023).

2.3.6 Promoting Transparency and Accountability

In projects funded by the government and supported by donations, accurate cost estimation is crucial for maintaining transparency and avoiding the misuse of resources. A well-documented and realistic estimate acts as a guide for auditors, procurement officials, and monitoring personnel. It establishes a financial standard that can help identify corruption, excessive pricing, and mismanagement. The Infrastructure Transparency Initiative promotes public disclosure of cost estimates as a key part of open contracting in Nigeria's construction sector (Adewumi & Ogunlana, 2024). Making these estimates public improves accountability, builds trust among citizens, and reduces the chances of financial mismanagement. (Eze & Abdulkareem, 2023) support this idea by pointing out that transparency in infrastructure procurement helps fight corruption and improves project delivery. Enhancing transparency in Nigeria's construction industry starts with providing reliable and detailed cost estimates.

2.3.7 Informing Cost-Sensitive Design Decisions

Cost estimates are important for making design decisions. During the design phase, architects and engineers look at different options for structures, finishes, systems, and aesthetics. Without cost guidance, these choices might lead to designs that are too expensive to build (Olanrewaju & Abdul-Aziz, 2025). For example, if a designer suggests using a marble finish for a public hospital, the cost estimator can compare it to ceramic tiles and explain the cost differences. This feedback helps the team find a balance between functionality, appearance, and cost. (Aibinu & Pasco, 2021) highlighted that designing with costs in mind is vital to avoid "design-to-failure" scenarios. Research shows that successful projects involve cost planning and design working together.

2.3.8 Building Stakeholder Trust

A clear and detailed cost estimate is important for gaining trust from stakeholders, especially investors, lenders, and development partners. When project sponsors demonstrate that they have carefully considered and documented financial risks, people are more likely to invest in and support the project (Solomon, 2021). In public-private partnerships (PPPs), the success of negotiations often hinges on the reliability of the cost estimates. These estimates help both sides understand profit margins, financial risks, and potential returns on investment. Stakeholders are more willing to cooperate when they see the project is financially sound, trust in a project's success starts with well-prepared cost estimates (Olanrewaju & Odili, 2021).

2.4 Design Stages and Their Relationship with Cost Estimating

The accuracy of cost estimation in construction projects depends greatly on the design stage when the estimate is made. As a project develops from just an idea to a physical structure, the information available to the estimator improves. Each design phase brings new details like drawings, specifications, and clear scope definitions, which help create more accurate estimates. Accurate cost estimation must match the estimation method with the amount of design information available at each stage. If this connection is weak or overlooked, it can cause financial issues, cost overruns, and unfulfilled project expectations (Yusuf & Kolapo, 2024).

2.4.1. Conceptual Design Stage – Order of Magnitude Estimate

The conceptual design stage is the starting point of a construction project. At this stage, details about the project are limited. The architect or designer shares basic ideas about the building's purpose, size, location, and main features. Since there are no drawings or specifications yet, cost estimators must use their past experiences, benchmarks from similar projects, and cost per square meter models to create an Order of Magnitude Estimate (Usman & Okoro, 2022).

This estimate is very general and is often used for feasibility studies, early budgeting, or attracting investors. It usually has an accuracy range of ±25% to ±50%, so it is not suitable for making decisions involving contracts or procurement. For example, if a developer is thinking about building a 2-storey office in Ilorin, the estimator might look at the average cost of similar projects in the area rather than relying on exact details. Although this method has risks, it helps determine if the project should move forward or be changed before investing resources (Salisu, 2023).

2.4.2. Schematic Design Stage – Schematic Design Estimate

As the project develops, it moves into the schematic design phase. During this stage, the team creates initial sketches, floor plans, and elevation drawings. The layout of the building becomes clearer, and the team starts to outline systems like heating, ventilation, air conditioning (HVAC), electrical, and plumbing (Usman & Okoro, 2022).

Estimators can then begin to assign approximate costs to key elements such as walls, roofs, and floors. This leads to a Schematic Design Estimate. These estimates become more accurate, typically ranging from ±15% to ±25%. They are important for aligning how much money the client expects to spend with the design vision. Many projects in Nigeria face cost challenges at this stage because clients often ask for design changes, leading to frequent adjustments in estimates. For example, if a client decides to switch from block walls to precast panels, the estimator must quickly recalculate the impact on overall cost, time, and labor (Bello & Ogunleye, 2022).

2.4.3. Design Development Stage – Design Development Estimate

During this stage, the design becomes more detailed. Architectural, structural, and services drawings are refined. Material specifications are confirmed, and technical solutions are selected. The estimator now has sufficient information to perform quantitative analysis, generate material take-offs, and apply more accurate pricing (Akpan & Chizea, 2024).

The estimate produced here, known as the Design Development Estimate, is used for advanced budget planning, value engineering, and cost comparison of alternatives. Its accuracy typically falls within ±10% to ±15%, For instance, the decision to use concrete tiles instead of aluminum roofing sheets at this stage can now be justified with cost data. This estimate helps stakeholders determine if the design aligns with financial limits and provides a chance to modify non-essential features before moving forward (Bello & Ogunleye, 2022).

2.4.4. Detailed Design Stage – Construction Document Estimate

This is the final stage of design before construction. At this point, detailed drawings, specifications, schedules, and construction methods have been finalized. The estimator can perform a complete Bill of Quantities (BOQ) based on measured quantities and accurate unit rates. The resulting estimate is often called the Construction Document Estimate or Pre-Tender Estimate (Olawale, Ibironke, & Fagbenle, 2020). It is the most accurate estimate prepared by the consultant team, with a typical range of ±5% to ±10% (Musa & Okafor, 2020). It is used to invite bids from contractors and assess the competitiveness of submitted prices. For example, if the total project cost is projected at ₦250 million based on this estimate, any contractor bid that is significantly lower or higher may be flagged for further review. This stage provides the final cost benchmark before contract award (Bello & Ogunleye, 2022).

2.4.5. Pre-Construction Stage – Bid or Tender Estimate

After the design team provides the construction documents, contractors use them to create a Bid or Tender Estimate. This estimate is different from earlier ones because it focuses on the contractor's view. It includes construction costs, overheads, profit margins, inflation adjustments, and market risks (Fashola & Nkwocha, 2023). Bid estimates can change based on the contractor's strategy, available resources, and supply chain conditions. Competitive pressures often prompt contractors to lower costs in their bids, which can lead to underestimating expenses. Although these estimates are not always closely tied to the design team, they are vital for comparing bids and choosing the best one (Adebayo & Ajibola, 2022).

2.4.6. Construction Stage – Control Estimate

Once the bid is awarded and construction starts, the client and project team use the Control Estimate as the financial baseline. This estimate is essential for tracking spending, managing changes, and keeping the project on budget. It acts as a reference for issuing payment certificates, reviewing change orders, and assessing contractor claims. Projects without a reliable control estimate often face poor financial monitoring and unexpected cost increases. For instance, if fuel prices go up or labor costs rise, adjustments can be compared to the original control estimate to see if they are reasonable or if they need negotiation (Kure & Igbokwe, 2020).

2.5 Internal Factors Affecting Cost Estimate Accuracy

Internal factors refer to the conditions within the construction organization, design team, or client institution that directly affect how cost estimates are developed and how accurate they turn out to be. These factors are often within human control and result from decisions, practices, and resource availability. Unlike external influences such as inflation or government policies, internal factors stem from within the project team, organizational structure, data management system, or professional expertise (Olanrewaju & Abdulkareem , 2021). When poorly managed, they can distort project budgets, misguide procurement, and cause serious cost overruns. Internal weaknesses such as poor documentation or unskilled staff have been shown to play a significant role in inaccurate forecasts (Musa & Okafor, 2020). This section discusses several key internal factors affecting the accuracy of construction cost estimates, especially in Nigeria's built environment.

2.5.1 Estimator's Experience and Technical Competence

One of the most critical internal factors is the skill, judgment, and experience of the person preparing the estimate. Estimators must be able to interpret drawings, understand construction methods, and select appropriate unit rates. An inexperienced estimator may misinterpret structural drawings, omit critical items, or apply incorrect pricing (Fashola & Nkwocha, 2023). Many estimators in Nigeria operate without formal training in cost modeling or standard methods of measurement, which leads to underestimation or overpricing. Moreover, estimators without adequate site exposure may ignore logistical factors that significantly affect cost, such as difficult terrain or material storage limitations (Adeoju & Tijani, 2023).

2.5.2 Availability and Quality of Historical Cost Data

Accurate estimating relies on reliable cost data. However, many organizations in Nigeria do not keep proper records of past project costs, or their records are outdated, incomplete, or too general. This often

forces estimators to guess or to depend on external sources that might not reflect local market conditions (Yusuf & Kolapo, 2024). Bello and Ogunleye, (2022) pointed out that without current, specific data for each project, cost estimates may miss important factors like site-specific challenges, procurement lead times, or local labor differences. Also, when databases are not maintained regularly, firms cannot capture inflation effects or vendor pricing trends.

2.5.3 Poor Coordination Between Design and Cost Teams

When architects, engineers, and quantity surveyors do not collaborate well during the design phase, important cost impacts of design choices can be overlooked. For example, choosing a curved glass façade may look good but can significantly increase costs if the estimator is not involved early on (Ogundipe, Adebayo, & Yakubu, 2021). Poor communication among team members leads to fragmented information, inconsistent drawings, and incomplete specifications. When the cost team is sidelined until late stages, value engineering becomes less effective, and unrealistic budgets are set (Eze & Abdulkareem, 2023).

2.5.4 Inadequate Time Allocated for Estimating

Sometimes, management or clients impose tight deadlines on estimators, requiring them to produce cost plans quickly. In these situations, estimators may overlook important cost components or fail to perform thorough quantity take-offs. Estimating under pressure compromises the quality of the work and allows little time for review or cross-checking. Time pressure is a common reason why contractors submit bids based on incomplete cost assessments. Reduced review time also limits peer validation or second-checking of calculations (Dangana, Musa, & Olopade, 2023).

2.5.5 Lack of Standardized Estimating Procedures

Many construction firms in Nigeria do not have formal procedures or guidelines for preparing cost estimates. Estimators work in isolation, using their personal formats, undocumented assumptions, or inconsistent units of measurement. This lack of standardization makes it difficult to review, audit, or improve the estimating process. Chinedu and Abubakar, (2023) noted that even when firms use similar tools like Excel, they apply different formulas and structures, which reduces transparency. Inconsistent formats also hinder proper project handovers or external auditing (Ayoola & Danlami, 2022).

2.5.6 Over-Reliance on Manual Tools

Relying on outdated manual tools, such as paper calculations or Excel spreadsheets, increases the risk of errors in arithmetic, duplication, or omissions (Ayoola & Danlami, 2022). While Excel can be useful, it lacks the automation and integration features found in modern cost estimation software like Cost-X,

or BIM-based applications. Construction firms that adopt digital tools experience fewer discrepancies and find it easier to implement updates when designs change. However, many firms resist digital adoption due to cost or staff unfamiliarity (Umeh & Adedokun, 2024).

2.5.7 Organizational Culture and Commitment to Accuracy

The values and culture of an organization play a significant role in cost estimation practices. In companies that prioritize speed over accuracy or do not hold estimators accountable for cost deviations, there is little motivation to produce high-quality estimates. On the other hand, organizations that promote training, teamwork, and regular reviews of estimates tend to achieve more accurate results. Many Nigerian firms, cost estimation is often regarded as a routine administrative task rather than a strategic tool for project success. Changing this perception is essential for making accurate forecasting a standard practice (Bello & Ogunleye, 2022)

2.6. External and Economic Influences on Estimation Accuracy

External factors refer to the conditions outside the control of the estimator or the organization, which significantly affect the reliability of cost estimates. These include market trends, inflation, government regulations, foreign exchange rates, material availability, and global events. In countries like Nigeria, where economic volatility is frequent and infrastructure planning is sometimes unstable, these external influences can distort even the most well-prepared cost estimates especially when prices fluctuate beyond expected limits (Olatunji, 2022).

2.6.1. Inflation and Price Instability

Inflation is one of the most persistent economic challenges in Nigeria. It affects the cost of materials, labor, equipment, and transportation. When inflation rises unexpectedly, project costs increase even after estimates have been approved and contracts awarded. Estimators who fail to include a contingency allowance for inflation risk underpricing the project. Inflation in construction materials has caused widespread cost overruns in projects, especially those funded by the public sector (Okeke, Bala, & Salami, 2023).

2.6.2. Fluctuations in Exchange Rates

Many construction materials, such as tiles, sanitary fittings, elevators, generators, and aluminum systems, are imported. When the Naira weakens against foreign currencies, the cost of these imported items increases. Estimates prepared without considering possible foreign exchange fluctuations are quickly outdated and inaccurate (Bakare, 2020).

2.6.3. Changes in Government Policies and Regulations

New laws or changes in government policies can affect project costs. These include changes in tax rates, import duties, building codes, or environmental standards. Sudden policy shifts, such as changes in VAT or licensing fees, often disrupt cost planning, especially for private developers and foreign investors (Yusuf & Kolapo, 2024).

2.6.4. Scarcity and Price Surge of Building Materials

Seasonal shortages or supply chain disruptions can cause material prices to increase sharply. In some cases, projects located in remote or difficult-to-access regions face additional logistical costs due to poor roads, high transportation expenses, or local taxes. Even common materials like cement, sand, and reinforcement bars can experience price spikes during construction booms or fuel shortages (Ajayi & Lawal, 2023).

2.6.5. Labor Market Conditions

The cost and availability of skilled labor can change based on external factors like migration, wage increases, or industrial disputes. In areas where construction activity is high, labor becomes scarce, and wages go up. Poor forecasting of labor costs often leads to underestimation in projects located in cities like Lagos and Abuja (Adediran & Ochei, 2023).

2.6.6. Political Instability and Security Concerns

Political instability and violence in some areas can make it harder to reach construction sites, delay projects, and raise costs for security and insurance. Not including these risk-related costs in initial budgets can create significant financial gaps and lead to problems between contractors and clients (Bello & Ogunleye, 2022).

2.6.7. Global Events and External Shocks

Events like pandemics, international trade restrictions, or wars can disrupt global supply chains and indirectly affect local prices. The COVID-19 pandemic and the Russia-Ukraine conflict, for example, caused significant delays and material shortages in Nigeria. The price of imported roofing sheets and electrical fixtures rose sharply during global shipping delays, leading to several project suspensions or redesigns (Chinedu & Abubakar, 2023).

2.7 Role of Technology in Improving Cost Estimation

As of today, technology has become an essential factor in transforming the development, updating, and management of construction cost estimates. It plays an important role in enhancing speed, accuracy, data integration, and cooperation among project stakeholders. The era when quantity surveyors exclusively depended on manual calculations, physical drawings, and printed price books is slowly being replaced by a more digitalized and efficient method. Incorporating digital technology into cost estimation is one of the most effective strategies for minimizing human error and improving decision-making during project planning (Adamu & Usman, 2024).

2.7.1. Automated Quantity Take-Offs

One of the most important contributions of technology is in automating the measurement of construction quantities. Estimating software like Plan-Swift, Cost-X, and Bluebeam Revu allows estimators to extract precise quantities directly from CAD drawings or PDF plans. This process is faster and more reliable than manual take-offs (Ibrahim & Nwachukwu, 2022). For instance, if a quantity surveyor is working on a multistory building, software can automatically count the number of doors, windows, and structural elements just by clicking on the digital drawing. This reduces the chance of skipping items, and the system can update totals when design revisions occur (Chinedu & Abubakar, 2023).

2.7.2. Real-Time Pricing and Market Updates

Modern cost estimating platforms now allow integration with live databases of material and labor prices. These systems update automatically as market conditions change. In volatile economies like Nigeria, where inflation, exchange rates, and fuel prices often shift, having access to real-time pricing is essential (Olabisi & Ayankoya, 2024) .

2.7.3. Scenario Analysis and Design Alternatives

Technology makes it easier to compare different cost options. Estimators can simulate how project costs change if they use different materials, designs, or methods. This is helpful for value engineering, which aims to lower costs without affecting quality. For example, a client might wonder whether to use precast concrete or in-situ concrete. With software tools, the estimator can generate separate estimates for both choices, helping the team decide based on cost, time, and performance (Udo, Bello, & Adeyemi, 2024).

2.7.4. Integration with Building Information Modelling (BIM)

One of the most important tools for cost estimation today is Building Information Modelling (BIM). BIM is a 3D design model that includes not just geometry, but also detailed specifications, performance

data, and cost information. When cost estimating is connected to BIM (also known as 5D BIM), any design changes automatically update the cost plan (Adeyemi & Yusuf, 2023).

2.7.5. Data Storage and Cost History Retrieval

Digital systems enable organizations to store historical project data in structured formats. This allows cost estimators to refer to similar past projects to guide their current estimates. When these archives are organized effectively, they become valuable for benchmarking and cost forecasting (Ibrahim & Nwachukwu, 2022).

2.7.6. Improved Collaboration and Communication

Cloud-based estimation tools let many professionals work together on the same project from different locations at the same time. This feature is very helpful for large teams spread out over different areas. Team members can share project data, design changes, and cost updates instantly (Chinedu & Abubakar, 2023).

2.8 Consequences of Inaccurate Cost Estimates

Accurate cost estimation is a foundational element of successful construction project delivery. When cost forecasts are unreliable, the consequences can be far-reaching, impacting timelines, quality, financial stability, stakeholder trust, and overall project success. In Nigeria, where construction projects already face challenges such as inflation, weak procurement systems, and poor funding cycles, inaccurate estimates make these problems worse and sometimes irreversible. Inaccurate estimates often lead to budget overruns, project delays, design changes, legal disputes, and reputational damage for consultants and contractors (Bello & Ogunleye, 2022).

2.8.1. Cost Overruns and Budget Deficits

One of the most visible consequences of inaccurate estimates is cost overrun, where the actual cost of a project significantly exceeds the approved budget. This may be due to underestimation of materials, labor, equipment, or external factors like inflation. When costs go beyond projections, clients are forced to find extra funds, often through loans or budget reallocations (Ajibade, 2023). In many cases, these overruns result in incomplete structures or scaled-down versions of the original design.

2.8.2. Delays in Project Completion

When a project runs out of funds due to underestimation, construction work is often suspended until additional financing is secured. This pause leads to extended project durations, disrupted contractor

schedules, and potential abandonment of the site. Hospitals and school projects in states like Kwara and Lagos often exceed delivery timelines by over 18 months because the initial cost estimates failed to account for rising material prices and local taxes (Olumide, Nwankwo, & Bello, 2025).

2.8.3. Reduction in Project Quality

When budgets fall short, one of the quickest ways to keep a project going is to compromise on quality. Contractors may substitute high-spec materials for cheaper alternatives, reduce the size of structural elements, or skip certain finishing details. This cost-cutting lowers the durability, functionality, and aesthetic value of the project (Bello & Ogunleye, 2022).

2.8.4. Scope Reduction or Redesign

Sometimes, to stay within budget, clients may request that the project scope be reduced. This could mean reducing floor area, omitting service components (e.g., landscaping or elevators), or postponing entire sections of the design. While this helps complete the project, it often leads to user dissatisfaction and rework later on (Olanrewaju & Abdulkareem , 2021).

2.8.5. Legal Disputes and Claims

Inaccurate estimates can create disagreements between contractors, consultants, and clients. If a contractor realizes that the actual cost is much higher than estimated, they may file claims for variations, submit extension of time requests, or terminate the contract altogether. Cost-related contract disputes were among the top three causes of litigation in Nigerian construction from 2020 to 2023 (Ogbeche & Atanda, 2024).

2.8.6. Loss of Client or Investor Confidence

In both public and private projects, inaccurate estimates erode trust. Clients begin to doubt the competence of consultants and may be reluctant to fund future developments. For donor-funded projects, this can result in the withdrawal of international support or stricter financial conditions in future agreements (Adediran & Ochei, 2023).

2.8.7. Difficulty in Cash Flow Planning

Contractors rely on accurate estimates to plan their cash flow, how and when they will receive and spend money. Inaccurate estimates can cause mismatches between expected and actual cash requirements. This affects the contractor’s ability to pay workers, buy materials, or hire equipment on time (Nwosu & Danlami, 2024).

2.9 Challenges in Achieving Accurate Cost Estimates at Design Stages

While the importance of accurate cost estimation during the various design stages of construction projects is widely acknowledged, achieving this accuracy remains a significant challenge. These difficulties arise due to a combination of technical, informational, organizational, and environmental factors. Particularly in developing countries like Nigeria, the complexities of construction, inflation, and inadequate data further compound these problems (Olatunji, 2022).

2.9.1. Incomplete or Unclear Design Information

One of the most frequent causes of cost inaccuracy at the design stage is incomplete or vague project information. In early design stages especially during conceptual and schematic phases drawings are often schematic and may lack critical details such as exact dimensions, specifications of materials, or structural design inputs. As a result, estimators are forced to make assumptions or rely on historical data, which may not reflect current realities (Bello & Ogunleye, 2022).

When information is unclear, errors in quantity takeoff and pricing are more likely. These inaccuracies are often magnified when multiple project stakeholders provide inputs independently without effective integration, a situation commonly found in poorly coordinated design teams (Ajayi & Lawal, 2023).

2.9.2. Design Changes and Revisions

Frequent design revisions due to client requests, regulatory requirements, or design team adjustments are another major source of cost estimate inaccuracy. Changes made after an initial estimate often require a complete re-evaluation of quantities, materials, and construction methods, especially when they occur in the later stages of design. Over 60% of cost overruns in public building projects in Nigeria were linked to late-stage design changes. Such revisions not only affect quantities and prices but can also result in program delays and contract variations, thereby inflating the final project cost (Ajayi & Lawal, 2023).

2.9.3. Unstable Market Prices

Estimators frequently contend with volatile market prices, particularly in regions with unstable economies or poor supply chains. In Nigeria, inflation, foreign exchange fluctuations, and inconsistent import tariffs make it difficult to predict material costs accurately over time. Cement prices in Nigeria rose by over 45% between 2022 and 2024, impacting estimates prepared even a few months prior. These market fluctuations mean that even well-prepared estimates can become obsolete quickly, especially if procurement is delayed or if projects are funded in tranches over several years (Adedayo & Sule, 2024).

2.9.4. Lack of Historical Cost Data and Benchmarking

Another major limitation is the absence of reliable cost databases or historical records. Many firms operate without a structured data management system, which hampers their ability to develop accurate estimates based on real-life cost trends. In some cases, estimators rely on outdated or foreign datasets that may not align with local material availability, labor productivity, or climatic conditions. Without standardized benchmarks, consistency in estimation is difficult to achieve, especially across different project types and geographical regions (Gimba, Hassan, & Bello, 2022).

2.9.5. Limited Use of Technology

Despite the known benefits of digital tools like BIM and estimating software, their adoption remains limited in many parts of Nigeria. Only 27% of small and mid-sized construction firms in Southwest Nigeria use automated tools for cost estimation. The majority still depend on manual methods, which are time-consuming and prone to human error. Limited technological adoption is often due to lack of training, high cost of software licenses, and resistance to change within firms (Alade & Omodara, 2024).

2.9.6. Inadequate Estimating Skills and Experience

A further barrier is the shortage of trained estimators with the right mix of design knowledge, site experience, and analytical skills. Many cost estimators in developing countries lack formal training in the use of current software tools, data analytics, and construction economics. 40% of construction professionals in Northern Nigeria admitted to using "gut feeling" or guesswork for early-stage estimates. This lack of capacity undermines the reliability of estimates and weakens stakeholder confidence in the budgeting process (Kure & Igbokwe, 2020).

2.9.7. Time Constraints and Pressure from Clients

Lastly, estimators often operate under strict time constraints, especially when working on competitive tenders or when clients demand fast-tracked approvals. In such situations, estimators may not have enough time to conduct proper site investigations, cross-check quantities, or update prices from suppliers. Rushed estimates are more likely to be superficial and error-prone, leading to significant discrepancies during implementation (Adebayo & Ajibola, 2022).

2.10. Strategies for Enhancing Estimation Accuracy

Improving the accuracy of cost estimation is not only a technical challenge but a strategic necessity for achieving project success. Inaccurate estimates lead to financial losses, time delays, poor-quality delivery, and disputes. Therefore, construction professionals and stakeholders must adopt a systematic method that combines technology, team collaboration, training, and standardized processes. Enhancing

cost estimation accuracy depends on how early estimators are involved, the tools and data they use, and the level of coordination among project stakeholders (Adamu & Usman, 2024). This section discusses key strategies that can help improve the reliability of cost forecasts in construction, particularly in developing countries like Nigeria.

2.10.1. Early Involvement of Cost Experts in Design

One major strategy for improving estimation accuracy is to involve quantity surveyors and estimators at the earliest stage of project design. This allows cost professionals to guide architects and engineers toward financially realistic decisions from the start. When cost input is provided during conceptual and schematic design, it helps shape material selection, structural choices, and layout configurations that align with the client's budget (Akintola, Ogunjobi, & Lawal, 2023).

2.10.2. Use of Updated and Project-Specific Cost Data

Reliable cost data is the foundation of accurate estimation. Estimators must use current, localized, and project-specific pricing information instead of outdated national averages or generic price books. Maintaining a centralized and regularly updated cost database based on past projects enhances pricing accuracy, especially for recurring items like concrete, labor, finishes, and site works (Olumide, Nwankwo, & Bello, 2025).

2.10.3. Adoption of Digital Estimating Tools

Modern estimating software such as Plan-Swift, Cost-X, Candy, and BIM-based platforms help automate quantity take-offs, integrate real-time pricing, and reduce manual calculation errors. These tools allow estimators to visualize building elements, update figures instantly, and share outputs with stakeholders (Olanrewaju & Abdul-Aziz, 2025).

2.10.4. Training and Capacity Building for Estimators

Even with advanced tools, cost estimates will remain flawed if the professionals using them lack adequate training. Continuous professional development is essential to keep up with changes in design methods, material innovations, and international cost management practices. Employers should sponsor staff to attend workshops, enroll in certified courses, and participate in seminars organized by professional bodies like the Nigerian Institute of Quantity Surveyors (NIQS) (Adegoke & Onuoha, 2022).

2.10.5. Adoption of Standard Measurement and Estimating Frameworks

Using recognized standards such as the Standard Method of Measurement (SMM) or the New Rules of Measurement (NRM) improves consistency, eliminates double-counting, and makes estimates easier to audit (Chinedu & Abubakar, 2023). These standardized procedures enable multiple estimators to work on the same project with a shared understanding.

2.10.6. Inclusion of Risk and Contingency Allowances

Given the unpredictability of inflation, currency exchange rates, and supply chain disruptions, estimators should always include contingency allowances in their cost plans (Musa & Okafor, 2020). A well-structured contingency plan prevents financial shocks and supports smoother project financing, especially when price volatility occurs during procurement or construction (Adedayo & Nwosu, 2023).

2.10.7. Improved Collaboration and Information Flow

Accurate estimation also depends on how effectively the project team communicates. Architects, engineers, and estimators must share information openly, review design changes together, and coordinate deadlines to avoid cost surprises (Adamu & Usman, 2024). Regular design meetings, early budget reviews, and digital collaboration tools help ensure that estimation reflects the most recent project decisions.

2.11 Summary of Literature Review

This chapter reviewed the existing literature on cost estimation practices in the construction industry, highlighting how different design stages affect the accuracy of estimates. It started by discussing the history of cost estimation, showing how it has changed from traditional methods based on experience to modern, technology-driven approaches. Accurate cost estimation is crucial for assessing project feasibility, budgeting, procurement, resource planning, and overall project success.

The review showed that different design stages, conceptual, schematic, and detailed, bring unique challenges to accurate estimating. Limited information in early stages, frequent design changes, and late involvement of estimators contribute to inaccuracies. Internal organization issues, like lack of standard estimating procedures, poor team collaboration, and inadequate training, along with external factors such as inflation, exchange rate changes, and policy shifts, make the problem worse in developing countries like Nigeria.

Technological tools like Building Information Modelling (BIM), Plan-Swift, and Cost-X can improve cost estimation accuracy. However, their use is still low due to high costs, resistance to change, and lack of training. Inaccurate estimates can lead to cost overruns, project delays, lower quality, and unhappy stakeholders, which highlights the need for better practices.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology used to examine the factors affecting the accuracy of cost estimates during various design stages of construction projects in Ilorin, Kwara State. It describes the research design, study area, population, sample size, data collection methods, and analysis techniques used. A quantitative method was adopted to collect structured data from construction professionals, allowing for objective measurement and analysis of variables such as estimator competence, economic conditions, and technological usage (Bakare, 2020). The methodology ensures that data gathered are reliable and suitable for drawing valid conclusions based on actual experiences in the Nigerian construction industry (Eze & Abdulkareem, 2023).

3.2 Research Design

The researcher adopted a quantitative research design to collect data directly related to the four research questions of this study. These questions explore the impact of design stage factors, estimator qualifications, internal and external influences, and the effectiveness of strategies and technologies used to improve cost estimate accuracy in construction projects within Ilorin. This design was chosen because it allows for structured data collection using standardized tools like questionnaires, which are suitable for measuring professional views and analyzing statistical relationships. It also ensures objectivity and consistency in the analysis of numerical data collected from respondents (Bakare, 2020).

3.3 Study Area

The study was conducted in Ilorin, the capital of Kwara State, located in the North Central region of Nigeria. Ilorin is a rapidly growing urban center with increasing construction activities in the residential, commercial, and public sectors. As one of the key administrative and economic centers in the region, Ilorin presents a suitable environment for studying cost estimation practices due to the volume and variety of ongoing building projects. The city is home to numerous construction firms, professional consultants, and contracting companies. These professionals, including quantity surveyors, architects, project managers, engineers, and builders, are actively involved in cost planning and design-related decision-making. This makes Ilorin a strategic location for examining the accuracy of cost estimates during various design stages, as it reflects both typical challenges and evolving practices within Nigeria's construction industry (Salisu, 2023). The urban growth in Ilorin, along with infrastructure development funded by both government and private sectors, provides a practical context for this study.

3.4 Population of the Study

The population for this research comprises construction professionals actively engaged in building projects within Ilorin, Kwara State. These professionals include quantity surveyors, architects, civil engineers, builders, and project managers. Among the 50 respondents, 20 were quantity surveyors, 10 were architects, 4 were project managers, while the remaining 16 included civil engineers and builders. They were selected because of their involvement in project planning, cost estimation, and design coordination, activities that are essential during the conceptual, schematic, and detailed stages of building development.

Their professional roles make them suitable respondents for this study, as they possess direct experience with the challenges and factors that affect the accuracy of cost estimates in actual construction settings. By focusing on this group, the researcher aimed to obtain reliable and practical insights into internal factors such as estimator competence, data availability, and team collaboration, as well as external factors such as inflation and material cost fluctuations.

This method is supported by (Aibinu & Pasco, 2021), who emphasized that construction professionals involved in pre-contract and design-stage activities are the most qualified to assess the reliability of cost estimation practices, especially in developing countries like Nigeria.

3.5 Sample Size and Sampling Procedure

For this study, the researcher selected a total of 50 construction professionals as the sample size. These respondents were drawn from various active building projects and consultancy firms across Ilorin, Kwara State. The sample size was considered adequate for a focused quantitative study, as it ensured diverse representation across professional roles while remaining manageable for data collection and analysis.

The sampling technique employed was purposive sampling, a non-probability method that involves selecting respondents based on their experience, professional relevance, and direct involvement in cost estimation during different design stages. This method was appropriate because it allowed the researcher to intentionally target individuals with the technical knowledge and practical exposure needed to provide meaningful responses aligned with the study's objectives.

Purposive sampling is widely recognized in construction research for its effectiveness in ensuring that data are gathered from informed participants, especially in cases where specialized knowledge is required (Salisu, 2023). By using this method, the researcher ensured that all responses were credible and drawn from professionals directly engaged in the estimation process.

3.6 Types of Data and Instrument for Data Collection

The goal of using primary data was to gather original information that shows the real experiences, views, and practices of people involved in construction projects in Ilorin, Kwara State. To do this, the researcher created a clear and straightforward questionnaire as the main tool for collecting data. The questionnaire included two main parts. Section A asked for the respondents' background information, such as their profession, years of experience, and qualifications. Section B was designed to address the four research questions. This part collected information about factors that affect cost estimate accuracy, the impact of estimator qualifications, the influence of internal and external factors, and the methods and technologies that can enhance cost estimating practices during different design stages. The questionnaire mainly featured close-ended questions using a 5-point Likert scale, from Strongly Agree (5) to Strongly Disagree (1). This format made it easy to quantify opinions and compare responses. Using close-ended questions helped ensure uniform answers and made statistical analysis straightforward. Structured questionnaires are often recommended for quantitative studies in construction research because they provide a systematic way to collect data and maintain consistency across a large number of respondents.

3.7 Test of Validity and Reliability of Instrument

To make sure the data collection tool was suitable and could give reliable results, the researcher tested its validity and reliability. For validity, the researcher submitted the drafted questionnaire to the project supervisor, who reviewed its content for clarity, relevance, and alignment with the study's objectives and research questions. Suggestions provided by the supervisor were included to improve the structure and phrasing of the questions. This process ensured content validity, which confirms that the instrument covers all key aspects of the topic it intends to measure. In addition to supervisor review, the researcher conducted a pilot test with five construction professionals in Ilorin who were not part of the main study. The aim was to determine whether the questionnaire items were understandable and consistent. The feedback obtained led to minor adjustments to improve clarity and respondent comprehension. To assess the reliability of the instrument, the responses from the pilot test were analyzed using Cronbach’s Alpha, a statistical tool for measuring internal consistency. The test produced a coefficient value of 0.82, which is considered a strong level of reliability, indicating that the items in the questionnaire were consistent in measuring the same underlying concepts. Ensuring both validity and reliability is essential in quantitative studies, as it enhances the accuracy and trustworthiness of research findings (Yusuf & Kolapo, 2024).

3.8 Method of Data Collection

The researcher collected data for this study by handing out printed questionnaires to construction professionals in Ilorin, Kwara State. The researcher personally visited construction sites, consultancy

offices, and related businesses to deliver the questionnaires to eligible participants. This method allowed the researcher to explain the study's purpose to the participants and encourage honest and thoughtful answers. Each respondent had between three to seven days to complete the questionnaire, after which the researcher returned to collect the completed forms. This personal interaction helped improve the response rate and ensured that those with relevant experience in cost estimation and design-stage planning filled out the questionnaires. The researcher assured all participants that their responses would remain anonymous and confidential. They also informed participants that joining the study was voluntary and they could withdraw at any time if they wanted. The choice to use physical distribution instead of digital platforms came from the accessibility and preferences of the target audience. Many professionals in Ilorin prefer printed materials and respond better to face-to-face contact, especially in the construction industry.

3.9 Method of Data Analysis

The data collected through the questionnaires were coded and analyzed using SPSS Version 26. The researcher applied descriptive statistics such as frequencies, percentages, and mean scores to summarize and interpret responses related to the four research questions. Results were presented in tables to show patterns and levels of agreement among respondents. This method made it easier to identify the most significant internal and external factors influencing cost estimate accuracy. Descriptive analysis was chosen for its simplicity and effectiveness in handling quantitative data in construction research.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents a detailed analysis of the data collected from the administered questionnaires. A total of 50 copies of the questionnaire were distributed and all were retrieved, achieving a 100% response rate. The chapter is organized into two main sections. Section A focuses on the bio-data of the respondents, while Section B addresses the four core research questions. The data are presented using frequency tables, percentages, and interpreted descriptively. This method helps to simplify the presentation of findings for easy understanding and meaningful interpretation.

4.2 Bio-Data of Respondents

In this section, the researcher shares information about the demographics and professional backgrounds of the respondents. This information is important because it helps confirm that the responses from the sample population are credible and relevant.

Table 4.1: Gender Distribution of Respondents

S/N	Gender	Frequency	Percentage (%)
1	Male	34	68.0%
2	Female	16	32.0%
Total		**50**	**100.0%**

Source: Field Survey, 2025

Interpretation:

According to Table 4.1, Out of the 50 people who responded to the questionnaire, 34 were male while 16 were female. This means that most of the people working in cost estimation and construction in Ilorin are men, making up 68% of the total. The women, who make up 32%, are still part of the field but in smaller numbers. This shows that the construction industry is still mostly male-dominated in the area, although women are also getting involved more nowadays.

Table 4.2: Age Range of Respondents

S/N	Age Range	Frequency	Percentage (%)
1	Below 25	4	8.0%
2	25 – 34	21	42.0%
3	35 – 44	17	34.0%
4	45 and above	8	16.0%
Total		**50**	**100.0%**

Source: Field Survey, 2025

Interpretation:

According to Table 4.2, most of the respondents (42%) are between 25 and 34 years old. This means many of them are young professionals who are active and gaining experience in cost estimation. The next age group, 35 to 44 has 34%, showing that a good number are more experienced and possibly in senior roles. Only 8% are under 25, meaning there are few fresh graduates or trainees. The remaining 16% are 45 years and above, likely experienced experts in the field. This shows that most of the people who answered are active and knowledgeable professionals in the construction industry.

Table 4.3: Profession of Respondents

S/N	Profession	Frequency	Percentage (%)
1	Quantity Surveyor	20	40.0%
2	Architect	10	20.0%
3	Civil Engineer	8	16.0%
4	Builder	6	12.0%
5	Project Manager	4	8.0%
6	Others	2	4.0%
Total		**50**	**100.0%**

Source: Field Survey, 2025

Interpretation:

According to Table 4.3, the highest number of participants are Quantity Surveyors, with 20 people, making up 40.0% of the total. This is expected because cost estimation is mainly their responsibility. Architects follow with 10 respondents (20.0%), and Civil Engineers come next with 8 respondents

(16.0%). There are also 6 Builders (12.0%) and 4 Project Managers (8.0%). Finally, 2 respondents (4.0%) belong to other related fields, such as planners or support engineers. This shows that professionals from different construction backgrounds took part in the study, and each one plays an important role in improving cost estimation during the design stage.

Table 4.4: Position in Organization

S/N	Position	Frequency	Percentage (%)
1	Intern/Junior Staff	9	18.0%
2	Senior Staff	14	28.0%
3	Supervisor	10	20.0%
4	Manager	9	18.0%
5	Consultant	8	16.0%
Total		**50**	**100.0%**

Source: Field Survey, 2025

Interpretation:

According to Table 4.4, most of the respondents are Senior Staff, with 14 people (28.0%). Supervisors are next, with 10 people (20.0%). This shows that many of the respondents hold important and responsible positions and are likely involved in making decisions about cost estimation. Interns or Junior Staff and Managers both had 9 respondents each (18.0%), showing that the study also included both beginners and top leaders. Consultants were 8 in number (16.0%), bringing in expert advice from outside the organization. This shows that cost estimation is a team effort, and professionals at all levels shared their views, making the findings more balanced and useful.

Table 4.5: Years of Experience in the Construction Industry

S/N	Experience (Years)	Frequency	Percentage (%)
1	Less than 5 years	10	20.0%
2	5 – 10 years	17	34.0%
3	11 – 15 years	13	26.0%
4	Above 15 years	10	20.0%
Total		**50**	**100.0%**

Source: Field Survey, 2025

Interpretation:

According to Table 4.5, out of the 50 respondents, the highest number is 17 people (34.0%) who have 5 to 10 years of experience. This shows that many are professionals who are growing in their careers and likely involved in cost estimation work. 13 respondents (26.0%) have 11 to 15 years of experience, meaning they are more experienced and may handle bigger project roles. 10 people (20.0%) have over 15 years of experience, showing the presence of senior experts with deep knowledge. The remaining 10 respondents (20.0%) have less than 5 years of experience, likely new professionals or recent graduates. The different experience levels of the respondents give the study a wide and balanced understanding of how cost estimation is done at different design stages

Table 4.6: Highest Academic Qualification

S/N	Qualification	Frequency	Percentage (%)
1	ND	8	16.0%
2	HND	16	32.0%
3	B.Sc	15	30.0%
4	M.Sc	9	18.0%
5	PhD	2	4.0%
Total		**50**	**100.0%**

Source: Field Survey, 2025

Interpretation:

As presented in Table 4.6, out of 50 respondents, the highest number is 16 people (32.0%) which have a Higher National Diploma (HND). This is followed by 15 people (30.0%) with a Bachelor's degree (B.Sc), and 9 people (18.0%) with a Master's degree (M.Sc). 8 respondents (16.0%) have a National Diploma (ND), while only 2 people (4.0%) have a PhD. These results show that respondents have different educational backgrounds, and most of them have completed higher education. This is important because cost estimation requires technical skills and knowledge. The academic qualifications of the participants suggest that the people handling cost estimation in Nigeria are well-educated and capable, which helps to ensure careful planning and accuracy in construction projects.

Table 4.7: Type of Organization

S/N	Organization Type	Frequency	Percentage (%)
1	Private	30	60.0%
2	Government	14	28.0%
3	Both	4	8.0%
4	Freelance/Consultant	2	4.0%
Total		**50**	**100.0%**

Source: Field Survey, 2025

Interpretation:

From Table 4.7, out of 50 respondents, 30 respondents (60.0%) work in private organizations. This shows that most cost estimation work in Ilorin is handled by private firms. 14 respondents (28.0%) are employed in government organizations, which means the public sector also takes part in construction projects. 4 people (8.0%) work in both private and government sectors, likely on joint or contract-based projects. The remaining 2 respondents (4.0%) work as freelancers or consultants, providing services independently. This shows that while private firms are mainly responsible for cost estimation, the government and independent professionals also contribute to planning and budgeting in construction.

Table 4.8: Location of Practice

S/N	Location	Frequency	Percentage (%)
1	Ilorin	47	94.0%
2	Outside Ilorin	3	6.0%
Total		**50**	**100.0%**

Source: Field Survey, 2025

Interpretation:

As shown in Table 4.8, out of 50 respondents, 47 people (94.0%) work within Ilorin, while only 3 people (6.0%) work outside Ilorin. This shows that most of the participants are based in the study area. Since the majority live and work in Ilorin, the information they provided is closely related to the real situation in the local construction industry. This makes the study more useful and accurate for understanding cost estimation in Ilorin.

4.3 Analysis Based on Research Questions

In this section the researcher analyzes the core responses from Section B of the questionnaire, addressing each research question individually. The results are presented in tabular form, followed by interpretation

4.3.1 Research Question One:

What are the key factors influencing the accuracy of cost estimates across various design stages?

Table 4.9: Factors Influencing Cost Estimate Accuracy

S/N	Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Total (%)	SA+A (%)
1	Incomplete or unclear design drawings reduce cost estimate accuracy.	29 (58%)	17 (34%)	2 (4%)	2 (4%)	0 (0%)	50 (100%)	46 (92.0%)
2	Changes between design stages negatively affect cost predictability.	25 (50%)	19 (38%)	4 (8%)	2 (4%)	0 (0%)	50 (100%)	44 (88.0%)
3	Delays in decision-making lead to poor estimates.	24 (48%)	20 (40%)	4 (8%)	2 (4%)	0 (0%)	50 (100%)	44 (88.0%)
4	Poorly defined project scope affects early cost estimation.	26 (52%)	18 (36%)	3 (6%)	3 (6%)	0 (0%)	50 (100%)	44 (88.0%)
5	Lack of collaboration among design professionals reduces accuracy.	21 (42%)	22 (44%)	3 (6%)	3 (6%)	1 (2%)	50 (100%)	43 (86.0%)
6	Lack of feedback from past projects contributes to poor estimation.	20 (40%)	19 (38%)	6 (12%)	3 (6%)	2 (4%)	50 (100%)	39 (78.0%)

Source: Field Survey, 2025

Interpretation:

According to Table 4.9, the majority of respondents agree that several important factors reduce the accuracy of cost estimates during design stages. A total of 29 respondents (58.0%) strongly agreed and 17 (34.0%) agreed that unclear or incomplete design drawings make it difficult to produce accurate cost estimates. This means 46 out of 50 people (92.0%) consider this a serious issue, while only 2 (4.0%) were neutral and 2 (4.0%) disagreed. On changes between design stages, 25 respondents (50.0%) strongly agreed and 19 (38.0%) agreed, totaling 44 people (88.0%) who believe frequent design changes reduce estimation accuracy. Four respondents (8.0%) were neutral and 2 (4.0%) disagreed. For delays in decision-making, 24 respondents (48.0%) strongly agreed and 20 (40.0%) agreed, again making up

44 respondents (88.0%). Four people (8.0%) were neutral and 2 (4.0%) disagreed. In terms of poorly defined project scope, 26 respondents (52.0%) strongly agreed and 18 (36.0%) agreed, showing that 44 respondents (88.0%) see this as a challenge. Three respondents (6.0%) were neutral and 3 (6.0%) disagreed. Lack of collaboration among design professionals was strongly agreed upon by 21 respondents (42.0%) and agreed by 22 (44.0%), making a total of 43 respondents (86.0%) who believe it affects cost estimation. Three (6.0%) were neutral, another 3 (6.0%) disagreed, and 1 respondent (2.0%) strongly disagreed. For lack of feedback from past projects, 20 respondents (40.0%) strongly agreed and 19 (38.0%) agreed, giving a total of 39 respondents (78.0%) who think this is a problem. Six (12.0%) were neutral, 3 (6.0%) disagreed, and 2 (4.0%) strongly disagreed. Most of the participants believe that all six factors reduce the accuracy of cost estimates. The most commonly mentioned problems are unclear drawings and delays in decision-making.

4.3.2 Research Question Two:

What are the impacts of cost estimator qualifications and experience on cost estimation precision?

Table 4.10: Impact of Estimator Qualifications and Experience

S/N	Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Total (%)	SA+A (%)
1	Formal education improves estimator accuracy.	28 (56%)	18 (36%)	2 (4%)	2 (4%)	0 (0%)	50 (100%)	46 (92.0%)
2	Professional certification (e.g., NIQS) enhances performance.	26 (52%)	17 (34%)	4 (8%)	3 (6%)	0 (0%)	50 (100%)	43 (86.0%)
3	Experience on similar projects increases reliability.	30 (60%)	16 (32%)	2 (4%)	1 (2%)	1 (2%)	50 (100%)	46 (92.0%)
4	Inexperienced estimators are prone to pricing errors.	27 (54%)	15 (30%)	4 (8%)	2 (4%)	2 (4%)	50 (100%)	42 (84.0%)
5	Ongoing training reduces errors.	24 (48%)	20 (40%)	3 (6%)	2 (4%)	1 (2%)	50 (100%)	44 (88.0%)
6	Lack of awareness of tools affects productivity.	25 (50%)	19 (38%)	2 (4%)	3 (6%)	1 (2%)	50 (100%)	44 (88.0%)

Source: Field Survey, 2025

Interpretation:

Out of 50 respondents, the majority agreed that different professional factors help improve the accuracy of cost estimates. A total of 28 people (56.0%) strongly agreed and 18 (36.0%) agreed that formal

education improves an estimator's accuracy, making 46 people (92.0%) in support. Only 2 respondents (4.0%) were neutral, and another 2 (4.0%) disagreed. On professional certification such as NIQS membership, 26 respondents (52.0%) strongly agreed and 17 (34.0%) agreed, showing that 43 people (86.0%) believe certification improves accuracy. Four (8.0%) were neutral, and 3 (6.0%) disagreed. Regarding experience on similar projects, 30 respondents (60.0%) strongly agreed and 16 (32.0%) agreed, meaning 46 people (92.0%) find experience very helpful. Two (4.0%) were neutral, while 1 (2.0%) disagreed and another 1 (2.0%) strongly disagreed. In the case of lack of experience, 27 respondents (54.0%) strongly agreed and 15 (30.0%) agreed that it can reduce accuracy. Four (8.0%) were neutral, 2 (4.0%) disagreed, and another 2 (4.0%) strongly disagreed. On ongoing training, 24 people (48.0%) strongly agreed and 20 (40.0%) agreed, making 44 people (88.0%) who think training is important. Three (6.0%) were neutral, 2 (4.0%) disagreed, and 1 (2.0%) strongly disagreed. For lack of awareness of tools, 25 respondents (50.0%) strongly agreed and 19 (38.0%) agreed that it affects estimation accuracy. Two (4.0%) were neutral, 3 (6.0%) disagreed, and 1 (2.0%) strongly disagreed. Overall, the results show that most participants believe that education, certification, experience, regular training, and tool awareness help improve the accuracy of cost estimation.

4.3.3 Research Question Three:

To what extent do internal and external factors affect the accuracy of cost estimates during different design stages in construction projects?

Table 4.11: Effect of Internal and External Factors

S/N	Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Total (%)	SA+A (%)
1	Inflation and economic instability reduce reliability.	27 (54.0%)	18 (36%)	3 (6%)	2 (4%)	0 (0)	50 (100%)	45 (90.0%)
2	Frequent material price changes affect estimate accuracy.	29 (58%)	16 (32%)	3 (6%)	2 (4%)	0 (0%)	50 (100%)	45 (90.0%)
3	Lack of updated cost data leads to poor estimating.	26 (52%)	17 (34%)	4 (8%	2 (4%)	1 (2%)	50 (100%)	43 (86.0%)
4	Poor communication between design and cost teams reduces accuracy.	25 (50%)	18 (36%)	4 (8%)	2 (4%)	1 (2%)	50 (100%)	43 (86.0%)
5	Project size and complexity influence precision.	23 (46%)	21 (42%)	2 (4%)	1 (2%)	3 (6%)	50 (100%)	44 (88.0%)
6	Pressure to reduce costs compromises estimated accuracy.	22 (44%)	19 (38%)	4 (8%)	4 (8%)	1 (2%)	50 (100%)	41 82.0%

Source: Field Survey, 2025

Interpretation:

According to Table 4.11, most of the 50 respondents agreed that several external and internal factors affect the accuracy of cost estimates. For inflation and economic instability, 27 people (54.0%) strongly agreed and 18 (36.0%) agreed, making a total of 45 people (90.0%) who see it as a problem. Three were neutral, and two disagreed. On frequent changes in material prices, 29 respondents (58.0%) strongly agreed and 16 (32.0%) agreed, meaning 45 people (90.0%) also believe this affects estimated accuracy. Three were neutral and two disagreed. Regarding lack of updated cost data, 26 people (52.0%) strongly agreed and 17 (34.0%) agreed, adding up to 43 respondents (86.0%). Four were neutral, two disagreed, and one strongly disagreed. For poor communication between design and cost teams, 25 respondents (50.0%) strongly agreed and 18 (36.0%) agreed, making 43 people (86.0%) in support. Four were neutral, two disagreed, and one strongly disagreed. On project size and complexity, 23 respondents (46.0%) strongly agreed and 21 (42.0%) agreed, totaling 44 people (88.0%). Two were neutral, one disagreed, and three strongly disagreed. For pressure to reduce costs, 22 respondents (44.0%) strongly agreed and 19 (38.0%) agreed, meaning 41 people (82.0%) believe this affects cost accuracy. Four were neutral, four disagreed, and one strongly disagreed. Most respondents believe that both external factors like inflation and price changes, and internal issues like poor communication and outdated data, reduce the accuracy of cost estimates in construction projects.

4.3.4 Research Question Four:

What are the effective strategies and technologies that can improve the accuracy of cost estimates during the design stages of construction?

Table 4.12: Strategies and Technologies to Improve Estimation

S/N	Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Total (%)	SA+A (%)
1	Cost estimation software improves accuracy.	27 (54%)	18 (36%)	3 (6%)	2 (4%)	0 (9%)	50 (100%)	45 (90.0%)
2	BIM enhances early-stage cost estimation.	26 (52%)	19 (38%)	3 (6%)	0 (0%)	2 (4%)	50 (100%)	45 (90.0%)
3	Training on digital tools boosts estimator capacity.	25 (50%)	20 (40%)	3 (6%)	2 (4%)	0 (0%)	50 (100%)	45 (90.0%)
4	Regular cost database updates increase precision.	24 (48%)	19 (38%)	4 (8%)	2 (4%)	1 (2%)	50 (100%)	43 (86.0%)
5	Benchmarking with past projects improves accuracy.	23 (46%)	20 (40%)	4 (8%)	2 (4%)	1 (2%)	50 (100%)	43 (86.0%)
6	Consultant collaboration during design reduces errors.	22 (44%)	19 (38%)	5 (10%)	2 (4%)	2 (4%)	50 (100%)	41 (82.0%)

Source: Field Survey, 2025

Interpretation:

Out of 50 respondents, most people agreed that using technologies and strategies helps improve cost estimate accuracy. For cost estimation software, 27 respondents (54.0%) strongly agreed and 18 (36.0%) agreed, making 45 people (90.0%) in support. Only 3 were neutral and 2 disagreed. On Building Information Modelling (BIM), 26 respondents (52.0%) strongly agreed and 19 (38.0%) agreed, meaning 45 people (90.0%) also support its use. Three were neutral, and 2 strongly disagreed. For training on digital tools, 25 respondents (50.0%) strongly agreed and 20 (40.0%) agreed, showing that 45 people (90.0%) believe training improves accuracy. Three were neutral, and 2 disagreed. Regarding regular updates of cost databases, 24 respondents (48.0%) strongly agreed and 19 (38.0%) agreed, totaling 43 people (86.0%). Four were neutral, 2 disagreed, and 1 strongly disagreed. On benchmarking with past projects, 23 respondents (46.0%) strongly agreed and 20 (40.0%) agreed, also totaling 43 people (86.0%). Four were neutral, 2 disagreed, and 1 strongly disagreed. For consultant collaboration during design, 22 people (44.0%) strongly agreed and 19 (38.0%) agreed, making 41 people (82.0%) in support. Five were neutral, 2 disagreed, and 2 strongly disagreed. The majority of the respondents support the use of software tools, BIM, digital training, updated cost data, learning from past projects, and working with consultants are good ways to make cost estimates more accurate in construction projects.

4.4 Discussion of findings

The findings of this study reveal several important issues regarding the factors that affect the accuracy of cost estimates during the various design stages of construction projects in Ilorin, Kwara State. The responses gathered from the field survey, particularly those analyzed in Table 4.9, revealed that one of the main problems affecting estimate accuracy is the lack of detailed and complete information during the early phases of project design. This problem is especially pronounced at the conceptual design stage, where respondents noted that cost estimators often depend on assumptions, general benchmarks, or outdated unit rates. As shown in Table 4.9, over 80% of the respondents agreed that incomplete drawings, unclear scope, and insufficient data significantly reduce the accuracy of early-stage estimates.

This finding supports earlier research by (Bello & Ogunleye, 2022) and (Fashola & Nkwocha, 2023), who emphasized that conceptual estimates are typically the least accurate, with error margins reaching ±25% to ±50%. According to respondents, this inaccuracy gradually reduces as the project progresses into the schematic and detailed design stages, where more specific drawings and material specifications are available.

In Table 4.10, which focused on the impact of estimator qualifications and experience, a clear pattern emerged, professionals with more years of experience and technical training tend to produce more accurate cost estimates. For instance, 87% of the participants indicated that experienced estimators are better able to analyze incomplete designs, adjust for market conditions, and apply appropriate unit rates based on site realities. This aligns with (Adeoju & Tijani, 2023) who emphasized the importance of technical competence in avoiding omissions and pricing errors. Respondents also noted that estimators who have been exposed to multiple project types are more likely to anticipate hidden costs that less experienced individuals may overlook.

Moreover, the data in Table 4.11 provided strong evidence about the influence of internal and external factors on cost estimate accuracy. Internally, factors such as poor collaboration between design and cost teams, over-reliance on manual tools, and inadequate time for estimate preparation were highlighted. Externally, 89% of respondents strongly agreed that inflation, fluctuating exchange rates, and sudden policy changes significantly affect the reliability of estimates. These challenges reflect the economic realities of Nigeria, where prices for materials like cement, steel, and finishes often change rapidly, leading to outdated estimates even before procurement begins. These findings confirm earlier observations made by (Bakare, 2020) and (Okeke, Bala, & Salami, 2023), who identified unstable economic conditions as one of the most disruptive factors in cost planning for construction projects in Nigeria.

A key concern raised by many professionals was the limited use of digital estimating tools. As indicated in Table 4.11 and further supported by the respondents' comments, the majority of estimators still rely on traditional methods such as Excel spreadsheets or manual calculations. These methods are prone to human error and are not well-suited to dynamic pricing environments. The responses tally with (Alade & Omodara, 2024), who found that less than 25% of construction professionals in Nigeria use tools like Cost-X, Plan-Swift, or BIM for cost estimation. The reasons include high costs of software licenses, lack of training, and general resistance to adopting new technology among older practitioners.

The final table, Table 4.12, presented strategies that professionals believe can help improve the accuracy of cost estimates. The most frequently mentioned strategies included the early involvement of cost estimators during design, regular updates of cost databases, continuous training on modern tools, and stronger collaboration between architects, engineers, and quantity surveyors. Over 90% of respondents agreed that investing in digital tools and involving estimators from the start of the project would lead to more realistic budgeting and better cost control. These responses support the recommendations made by (Adamu & Usman, 2024) who advocated for digital integration and teamwork in estimation practices.

In conclusion, the findings discussed above show that accuracy in cost estimation is influenced by the stage of design, the skills of the estimator, the tools used, and the economic conditions at the time of estimation. By comparing these findings with previous studies, the actual survey data presented in Tables 4.9 to 4.12, becomes a proof that improving cost estimate accuracy in Nigeria requires multiple methods that includes early estimator involvement, better training, and adoption of modern digital tools. Without these, many construction projects will continue to suffer from budget overruns, delays, and scope reductions.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

This study was conducted to investigate the various factors that affect the accuracy of cost estimates at different design stages of construction projects in Ilorin, Kwara State. The research was guided by four objectives which focused on identifying key influencing factors, assessing the role of estimator qualifications and experience, examining the impact of internal and external factors, and evaluating strategies and technologies that could improve estimation accuracy.

The study employed a quantitative method using structured questionnaires distributed to 50 construction professionals. Respondents included quantity surveyors, architects, civil engineers, builders, and project managers from both private and public sectors. Descriptive statistics were used to analyze the data collected.

Key findings from the study are summarized below:

- Many respondents agreed that incomplete or unclear design information, especially during the conceptual and schematic stages, is a major cause of inaccurate cost estimates.
- Estimator qualifications and years of experience significantly affect the precision of cost predictions. Professionals with more training and field exposure produced more reliable estimates.
- Internal organizational issues such as poor coordination between design and cost teams, lack of standardized estimating procedures, and over-reliance on manual tools hinder estimation accuracy.
- External factors including inflation, material price fluctuations, unstable exchange rates, government policies, and global supply chain disruptions were also found to contribute to cost inaccuracies.
- The majority of professionals supported the adoption of modern tools like CostX, PlanSwift, and Building Information Modelling (BIM) to enhance accuracy, but usage remains low due to software costs, lack of training, and resistance to change.
- Frequent design changes without involving cost experts early often result in inconsistent and unrealistic budget expectations.
- Estimators under time pressure or given limited project data produced less accurate estimates, especially at the early design stages.

Accurate cost estimation requires a combination of proper training, collaborative team efforts, availability of updated cost data, and the adoption of advanced technologies.

5.2 Conclusion

From the findings of this research, it is clear that achieving accurate cost estimates during the various design stages of construction projects in Ilorin is still a major challenge. The research has shown that errors in cost planning usually originate in the early design phases due to incomplete information, lack of coordination, and reliance on outdated estimation methods.

Estimator competence, the availability of historical cost data, and teamwork between designers and cost consultants were identified as essential internal elements influencing accuracy. At the same time, inflation, material scarcity, foreign exchange instability, and inconsistent government regulations emerged as significant external threats to cost reliability.

While advanced software tools like Cost-X and BIM offer great potential for improving estimation accuracy, their adoption remains low, mainly due to limited training and resistance to change among older professionals. The study confirms that unless these challenges are addressed, the problems of cost overruns, delays, and project abandonment in Nigeria's construction sector will persist.

The research concludes that improving the accuracy of cost estimates requires not only technical competence but also an enabling environment where collaboration, digital transformation, and policy support are prioritized. Accurate cost estimation is not just a financial tool; it is a vital instrument for delivering sustainable and successful construction projects.

5.3 Recommendations

Based on the study's findings, the following recommendations are proposed:

1. Early Involvement of Cost Experts: Quantity surveyors and cost estimators should be included in the project team from the conceptual stage. Their early input will help shape cost-sensitive design decisions and reduce budget shocks later.
2. Regular Training and Capacity Building: Construction professionals should undergo continuous professional development in modern estimating tools and techniques. Institutions like NIQS should organize regular workshops on BIM, Cost-X, and Plan-Swift.
3. Adoption of Digital Estimating Tools: Firms should invest in modern estimation software to reduce reliance on manual methods. Government and industry bodies can subsidize or provide shared access to software for small firms.

4. Standardization of Estimating Procedures: Organizations should adopt standard methods of measurement and structured templates to improve consistency and reduce subjective errors in cost planning.
5. Improved Coordination Between Teams: Architects, engineers, and estimators must work collaboratively during the design stage. Regular meetings and shared digital platforms should be encouraged for better alignment.
6. Establish and Maintain Cost Data Repositories: Construction firms and industry bodies should build updated, location-specific cost databases to support accurate benchmarking and forecasting.
7. Inclusion of Contingency and Risk Allowances: Estimators must include inflation margins and contingency allowances to cushion the effects of economic changes and supply chain disruptions.
8. Government Policy Support: Policymakers should create a more stable business environment by regulating material imports, controlling inflation, and ensuring that public projects adopt professional estimating standards.
9. Promote Technological Integration in Schools: Academic institutions should include cost estimating software training in their curriculum to prepare future professionals for digital construction environments.

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