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Financial and operational effects of cost estimation inaccuracy, material price volatility, and payment delays in Nigerian construction projects

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Abstract

This study examined the impact of poor cost estimation, material price fluctuations, and payment delays on construction project performance and financial health in Nigeria. A quantitative approach was employed, collecting data via an online survey of 74 construction professionals, including quantity surveyors and contractors. Cost estimation errors, price variations, and payment delays were analysed using a five-point Likert scale and the Relative Importance Index (RII). Findings revealed that errors in the Bill of Quantities (BOQ) significantly damage professional reputation. Contractors' chances of securing future projects were most affected (mean = 3.42), followed by quantity surveyors obtaining new commissions (mean = 3.40). Underestimating project costs created high risks, particularly project delays and funding shortages that could result in bankruptcy (mean = 3.78). Contractors faced the greatest financial loss due to reduced profit margins from underestimation (mean = 3.88). Material cost fluctuations were another key concern, with inflation in building materials ranked highest (mean = 4.92), followed by rising transportation costs (mean = 4.76). Payment delays further contributed to cost overruns and schedule disruptions. The main causes were poor availability of client funds (RII = 0.71) and disputes over work valuation (RII = 0.72). The study underscores the importance of accurate cost estimation to safeguard company finances and maintain project schedules. It recommends improving costing methodologies, strengthening stakeholder communication, and mitigating payment delays through enhanced contract management and financial controls. These findings provide practical strategies for reducing financial and operational risks associated with cost inaccuracies and delayed payments in construction projects.

Keywords Cost estimation, Construction project management, Material price fluctuations, Payment delays, Financial impact

1 Introduction

The construction industry is a major driver of economic growth, contributing to GDP, jobs, and infrastructure development. However, it faces ongoing challenges that hurt productivity and financial stability. Around the world, problems like inaccurate cost estimation, fluctuating material prices, and payment delays are key issues. These challenges are especially pronounced in developing countries like Nigeria, which struggles due to weak governance and regulatory systems [1]. In cost estimation, poor forecasting results in budget overruns, disputes, and project cancellations. Countries such as the US, UK, and Australia have adopted digital technologies, Building Information Modelling (BIM), and data analytics to improve accuracy [2]. Still, unforeseen complexities and

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changes in project scope cause budget overruns, making cost estimation a universal issue. In Nigeria, these challenges worsen due to systematic inefficiencies, a lack of standardised pricing databases, limited use of digital tools, and a reliance on traditional methods [3]. Outdated cost data and insufficient information lead to cost projections that do not reflect market realities, damaging professionals' reputations and discouraging foreign investment [4].

Material price volatility is another global issue affecting construction. Supply chain disruptions, political events, environmental regulations, and changes in commodity prices have driven significant cost increases worldwide, particularly during the COVID-19 pandemic [5]. Nigeria's heavy reliance on imports, combined with inflation and instability in foreign exchange, makes this problem even worse [6]. The weakening of the Naira raises the cost of imported materials such as steel and tiles. Transportation costs, which make up a large share of construction expenses, also fluctuate due to changing fuel prices and poor road infrastructure. This makes Nigeria more susceptible to global material price shifts compared to countries with stronger rail and sea systems [7].

Payment delays are a common issue that disrupts project progress, liquidity, and contractor solvency. While countries with strong contract enforcement and quick dispute resolution can reduce these delays, developing nations often face widespread issues from client cash flow problems, slow government funding, and valuation disputes [8, 9]. These delays create a ripple effect, causing cash flow issues for contractors that lead to late payments to staff, delays in purchasing materials, and work stoppages. This extends project durations, increases costs, and leads to disputes. Suppliers and subcontractors risk defaulting, while service providers may lose credibility. As a result, the financial health of construction firms, especially small and medium-sized enterprises with tight budgets and limited credit resources, is greatly weakened [10].

The link between cost underestimation and financial risks, including bankruptcy, is vital. Competitive bidding pressures and estimation errors can push contractors to take on contracts at a loss, as shown by the collapse of Carillion PLC in the UK [11]. Financial vulnerability is not limited to developing nations; the stability of firms relies on accurate cost predictions and reliable payments. In Nigeria, informal contract practices, weak risk management, and lack of insurance worsen these challenges [12]. Many contractors lack comprehensive project insurance, and financial institutions hesitate to offer credit due to perceived risks in the sector, perpetuating a cycle of financial strain [13].

To tackle these challenges, strategic measures are recommended based on global best practices. Updating cost estimation methods using digital tools such as BIM, integrated costing software, and cloud-based management platforms is key to improving accuracy. This has been successful in Singapore and Sweden, which implemented digital mandates for public projects [14]. Nigeria can follow suit by creating national digital cost databases [15]. Improving stakeholder communication is essential for transparency, especially regarding work valuation and payment certification. Collaborative contract models like the NEC encourage shared risks and joint problem-solving [16]. Policy reform is necessary to stabilise material costs, emphasising local production of essential materials, reducing reliance on imports, and promoting alternative materials through incentives and grants, similar to local content initiatives in the oil and gas sector [17]. Finally, boosting financial controls and contract management through prompt payment laws, dispute resolution boards, and enforced payment schedules is crucial. Countries like the UAE and Hong Kong have effectively reduced payment delays by putting in place legal timeframes for payments and adjudication processes [18].

Construction projects in Nigeria often suffer from financial challenges, including poor cost estimation, fluctuating material prices, delayed payments, and a lack of qualified quantity surveyors. These factors lead to budget overruns, disputes, project failures, and abandoned projects, with reports indicating over 450 billion Naira in failed or abandoned construction projects due to lack of financing [19]. Cost estimation, a vital role for quantity surveyors, is frequently oversimplified in Nigeria, overlooking issues like material price volatility and omitted items, thus creating financial gaps [7]. Material price fluctuations greatly contribute to project failures. Without price control policies and in a volatile global market, rising material costs affect contractors' ability to meet deadlines and budget constraints. This can lead to disputes and budget overruns. [17] found that changes in material costs negatively impact project schedules and budgeting in Nigeria. Additionally, delayed payments to contractors hinder their working capital and resource management, causing further project delays and inefficiencies. These delays are often linked to errors in claims submission by contractors, such as insufficient supporting evidence, incorrect calculations, or improper filing of claims, which increase financial burdens and cause timeline adjustments [1, 8].

In developing nations, construction projects typically use the design-bid-build procurement method, where the Bill of Quantities (BOQ) plays a crucial role in determining costs [18]. However, inadequate financial planning, failure to consider wastage, material price changes, and

forecasting for cost overruns heighten financial risks significantly [4]. Many project participants are unaware of how to manage cost overruns and price increases [19]. To reduce these issues, it is essential to improve cost estimation methods, manage material price variations, and expedite payment processes [6]. Educating stakeholders, especially quantity surveyors and contractors, on financial management and including variable pricing clauses in contracts can help minimise disputes and project abandonment [10]. Construction cost management includes pre-contract activities like cost planning and estimation, as well as post-contract activities that focus on cost control [20]. Quantity surveyors play a key role in both phases, managing all cost-related aspects from estimation to final accounts to ensure projects are completed at the right price without sacrificing quality or legal compliance [21]. The Bill of Quantities (BOQ) is a crucial tool for estimating and controlling project costs, detailing material and labour requirements and associated costs early on [18]. It captures cost, time, and quality and serves as a principal document in conventional development procurement, particularly in Nigeria and Commonwealth countries. However, the decreasing use of BOQs in places like the UK and Australia, where alternative procurement methods are preferred, raises concerns about its relevance [2]. There are also worries about the higher potential for professional errors in BOQs, which can cause disputes and project delays. In Nigeria, poor-quality BOQs, often stemming from inadequate training or resources, worsen challenges in cost projections, resulting in project failures or cancellations [7]. While the risks associated with BOQ errors are acknowledged, specific studies examining the extent of these errors in the Nigerian construction industry are lacking [15].

The accuracy of cost estimates in construction projects is influenced by many factors, including current market conditions, geographic location, project complexity, and the financial situation of the client [2]. The chosen construction method, project site, and even the client's funding can greatly affect the reliability of estimates. Additionally, the integration of information technology (IT) and the overall business environment play significant roles in the cost estimation process [14]. Modern tools like project management software, spreadsheets, and computerised estimating systems can improve cost plan accuracy. It is expected that widespread use of IT-enabled tools will shift expectations among estimators, ensuring that technological innovations are effectively applied to yield more reliable estimates [2]. For systems like the Bill of Quantities (BOQ) to remain effective amidst technological changes, several issues need addressing. These include reducing professional misconduct, enhancing understanding of cost estimation variables, and introducing new strategies in project planning [7]. Cost estimation is an inherently complex process that combines information, methods, and skills, making the quality of fundamental tools essential for producing dependable estimates [22]. The information used must be comprehensive, current with market trends, and tailored to the specific project [15]. Estimating techniques, such as analogies, parametric estimation, or bottom-up estimation, should be carefully selected based on project complexity and required accuracy [1]. Creating schedules is another critical aspect, as it highlights the relationship between the estimating process and the project's timeline, aligning with the client's financial and time expectations [13].

Price fluctuations, especially regarding construction material costs, are a serious financial issue in the industry. In Nigeria, economic factors like high inflation rates, unstable foreign markets, and supply chain obstacles contribute to this price volatility [18]. The prices of essential building materials like cement, steel, and timber vary substantially, influenced by factors beyond direct pricing, such as government energy policies and the demand and supply dynamics of raw materials. The significant rise in building material prices in Nigeria, coupled with the devaluation of the Naira, creates considerable cost uncertainty for construction projects, often leading to budget overruns and project cancellations [17]. Empirical findings confirm that this price variability is among the major financial stressors in construction projects [4]. The consistent increase in material prices complicates contractors' efforts to stay within budget and meet project timelines, resulting in gaps between contract amounts and completion dates [10].

External factors like government economic policies, energy pricing, and inflation also drive the fluctuating prices of building materials. This is because energy and raw materials for construction are often priced based on international market standards, meaning any global market shifts can lead to domestic price changes for construction materials. For instance, increases in fuel prices raise overall construction costs by increasing transportation expenses for raw materials to project sites [5]. Inflation, defined as the rate at which prices rise, indirectly affects a contractor's purchasing power, requiring ongoing price adjustments in contracts [6]. Access to financial resources for executing construction projects is crucial. Effective cost estimating, strong financial management practices, and careful monitoring of material pricing are vital to prevent project losses [13]. Quantity surveyors are essential in this critical area of project financial management, highlighting the importance of effective cost control for project success [23]. As modern cost estimation approaches become standard, improvements in skills

and market awareness will be key to alleviating financial pressures and enhancing project outcomes in Nigeria's construction sector [15].

Recent literature confirms the seriousness of cost estimation, BOQ inaccuracies, and payment delays in Nigeria and similar emerging economies. An SCIRP study found that lack of monitoring, weak cost-control methods, and poor project planning are major factors in rising costs for construction projects in Nigeria [23]. Globally, studies like Growing Demand for Housing in Iraq show that delays in payments are among the biggest barriers to productivity in housing projects. Also, the work Transforming Construction in Emerging Economies provides evidence that industrialised construction systems, such as prefabrication and IBS, can reduce cost fluctuations. However, challenges like transportation issues, material supply problems, and a shortage of skilled labour limit their use. Artisan-level studies in Nigeria, particularly in Enugu, reveal that inconsistent payments, unstable material prices, and regulatory inefficiencies are especially tough for small contractors.

Recent empirical studies further support that cost estimation challenges in Nigeria result from multiple interconnected factors and lead to serious financial issues. For instance, [4.23] identify rising building material costs as the main cause of cost overruns. This is followed by frequent design changes, mistakes and omissions in Bills of Quantities, and reliance on imports. Additionally, "The Construction Cost Conundrum in Africa" highlights that many African countries, including Nigeria, depend heavily on importing key building materials like steel and cement. This reliance exposes projects to foreign exchange risks, supply chain instability, and regulatory and quality standard challenges. A specific analysis in Lagos State [10] shows that the inflation rate, exchange rate, and interest rate all increase building material prices. These findings support your points about outdated cost data, weak risk management, material price volatility, BOQ errors, and payment delays working together to cause cost overruns, disputes, project delays, and abandonment.

2 Methodology

The research utilized a quantitative method, collecting data through an online survey. This approach is considered the classic scientific method for social science research, as it generates quantifiable data that can be subjected to statistical analysis. The questionnaire was divided into two sections: general information and the effects of inaccurate cost estimation, price fluctuation, and payment delays. Purposive sampling was used, selecting participants based on their professional roles, experiences, and expertise within the construction industry. A total of 142 emails were sent via a survey website link to respondents from Quantity Surveying Professionals, general building contractors, and other construction professionals. A high response rate of 82% was recorded, with 74% of respondents answering questions one and two, and 77 respondents completing question three. The questionnaire was designed to generate statistical data for quantitative analysis, using a five-point Likert scale for analysing responses related to risk exposure and financial loss due to inaccurate cost estimation. For other questions, the Relative Importance Index (RII) was used to assess the impact of material price fluctuation on financial capacity and strategies for mitigating adverse effects. RII was calculated using the formula:

$$RII = \frac{5n5 + 4n4 + 3n3 + 2n2 + n1}{5n}$$

3 Data analysis

Data analysis in this work involves examining survey responses and quantitative results to understand how inaccurate cost estimation affects project stakeholders. It helps identify key patterns, rank impacts, and measure relative importance using mean values and the Relative Importance Index (RII).

3.1 Inaccurate cost estimation

This process ensures an objective evaluation, offers useful insights, and supports conclusions based on evidence that reflects the realities of challenges in construction cost estimation.

Inaccurate cost estimation in the Bill of Quantities (BOQ) threatens the credibility and standing of construction professionals. As shown in Table 1, contractors are the most affected, with future project opportunities rated highest (mean = 3.42). Next are quantity surveyors' chances of securing commissions (mean = 3.40) and project owners' prospects for new projects (mean = 3.39). The average mean value (3.14) shows that reputational risks affect all professionals, including project managers, architects, and engineers. These results match the work of [24], who highlight reputational loss, financial issues, and project cancellations.

3.2 Exposure to risk

Respondents rated the significance of risk exposure due to inaccurate cost estimation in Table 2 with bankruptcy risk from fund shortages (MV = 3.78), delay risk due to cash flow issues (MV = 3.78), and increased claims from contract price hikes (MV = 3.73). Risks in construction—spanning financial, environmental, legal, and operational factors—impact time, cost, and quality. Poorly managed

Table 1 Effects of inaccurate cost estimation on stakeholders' reputation and credibility

Effect	Mean	RII	Rank
Contract reawarding	3.42	1.26	1
The quantity surveyor will receive a commission on another project	3.40	1.17	2
The project owner will start a new project	3.39	0.99	3
The project manager will receive commission on another project	3.22	0.99	4
The financing institution will fund another project	3.15	1.00	5
The architect will receive commission on another project	3.07	0.95	6
The civil engineer will receive a commission on another project	3.01	0.98	7
The mechanical engineer will receive a commission on another project	3.00	1.13	8
The electrical engineer will receive a commission on another project	2.92	1.03	9
The structural engineer will receive a commission on another project	2.89	1.02	10
Average mean value	3.14		

Table 2 Risk exposure due to effects of inaccurate cost estimation

Risk Exposure	Mean	RII	Rank
Poor cash flow leading to bankruptcy	3.78	0.74	1
Time overrun	3.78	0.83	2
Claims increase	3.73	0.66	3
Abandonment of project	3.66	0.68	4
Increase in litigation	3.43	0.81	5
Poor quality	3.35	1.18	6
Damage to work	3.28	0.58	7
Average mean	3.57		

risks can lead to substantial contractor losses and project failure [25].

The average mean value (AMV) of 3.57 falls between average and high across all the variables related to exposure to risk, specifically regarding the impact of inaccurate cost estimates on construction projects.

3.3 Financial loss

Respondents indicated the level of financial loss they experienced due to improper cost estimation in construction projects. They rated their responses on a scale from 1 \to 5, where 1 means it does not matter, 2 means it matters a little, 3 means it matters reasonably, 4 means it matters, and 5 means it matters a lot. 'U' indicates they don't know. As shown in Table 3, contractors rated their loss of profitability the highest at MV = 3.88. The loss of client resources received the second-highest rating at MV = 3.80, and the loss of revenue to the funding bank was third at MV = 3.55. Additionally, an over- or under-estimated project cost will negatively affect a contractor's profit margin as well as other parties involved.

Table 3 Effects of inaccurate cost estimation on financial loss in construction projects

Financial Loss	Mean	RII	Rank
Profit loss to contractors	3.88	0.95	1
Client loss of inputs	3.80	0.84	2
Financial institution loss of income	3.55	1.21	3
Negative effect on project end user	3.36	1.21	4
Misapplication of financial resources	3.22	1.05	5
Loss of income to mechanical engineer	3.09	1.13	6
Loss of income to quantity surveyor	3.07	1.10	7
Loss of income to structural engineer	3.07	1.11	8
Loss of income to electrical engineer	3.05	1.12	9
Loss of income to civil engineer	3.01	1.10	10
Loss of income to architect	3.00	1.07	11
Loss of work in the construction industry	2.98	1.12	12
Average Mean Value	3.25	—	—

Table 3 shows the financial impacts of inaccurate cost estimation in construction projects. Contractors face the largest profit loss, with a mean of 3.88. Clients also see significant losses of project inputs, at a mean of 3.80. Financial institutions and end users are affected too, pointing to the widespread consequences in the industry. Engineers, architects, and quantity surveyors see reduced income due to misapplication of resources and project delays. The average mean value of 3.25 shows that financial loss is a major outcome of poor cost estimation, in line with research on cost overruns, fund mismanagement, and lower profitability for stakeholders in construction projects.

3.4 Effects of inaccurate cost estimation

From the ranking of average mean values for the effects of inaccurate cost estimates on construction project

Table 4 Effects of inaccurate cost estimation

Effects of Inaccurate Cost Estimation	Average measure value	Rank
Risk exposure from inaccurate cost estimation methods	3.67	1
Financial loss from inaccurate cost estimation	3.35	2
Loss of reputation and credibility for project stakeholders	3.24	3

stakeholders, Table 4 shows that risk exposure is the biggest effect of inaccurate cost estimation.

Table 4 summarises how inaccurate cost estimation impacts construction projects. Risk exposure ranks highest, with an average measure of value (AMV) of 3.67. This shows that stakeholders face significant uncertainty and a greater chance of project failure due to unreliable estimation methods. Financial loss comes next, with an AMV of 3.35. This reflects lower profitability, misapplication of resources, and lost income for contractors, engineers, and clients. The loss of reputation and credibility is also important, with an AMV of 3.24. This highlights the professional consequences for stakeholders, including fewer chances for future projects. Together, these findings show that poor cost estimation affects not just project finances but also undermines stakeholder trust, performance, and industry stability.

3.5 Effects of material price fluctuation factors on financial capacity and causes of project failures

The study shows that inflation of building materials, import duty rates on materials, transportation costs, currency exchange rates, and energy costs (fuel, electricity, and gas) have a strong impact on contractors' cost performance. Their MIS values are 4.92, 4.87, 4.76, 4.72, and 4.50, respectively. Meanwhile, the factors that have the least impact on contractors' cost performance are the availability of substitute products and frequent changes in weather conditions, with MIS scores of 3.13 and 2.76, respectively.

Table 5 shows how different factors that cause material price fluctuations affect the cost performance of building projects. Inflation, import duties, transportation costs, and currency exchange rates are the most significant, with a very high effect on project costs. Other factors, like interest rates, material waste, poor planning, and energy costs, have a high effect, indicating their strong impact on total spending. Supplier defaults, frequent design changes, availability of substitutes, and weather conditions have moderate effects. These findings highlight that both economic and operational factors play a key role in determining construction cost performance.

Table 5 Effects of material price fluctuation factors on cost performance of building projects

S/N	Material Price Fluctuation Factors	MIS	Rank	Effect
1	Inflation of building materials	4.92	1	Very high effect
2	Import duty rates on materials	4.87	2	Very high effect
3	Cost of transportation	4.76	3	Very high effect
4	Exchange rates of currency	4.72	4	Very high effect
5	Cost of energy (fuel, electricity, gas)	4.50	5	Very high effect
6	Interest rate on materials	4.45	6	High effect
7	Rapid devaluation of national currency	4.42	7	High effect
8	Ineffective planning	4.30	8	High effect
9	Material wastage on site	4.21	9	High effect
10	Level of supply and demand	4.00	10	High effect
11	Unstable crude oil prices	3.98	11	High effect
12	Raw materials and input costs	3.81	12	High effect
13	Market stockpile of needed materials	3.80	13	High effect
14	Human factors	3.76	14	High effect
15	Ordering and delivery process	3.71	15	High effect
16	Force majeure (act of God)	3.68	16	High effect
17	Political instability	3.55	17	High effect
18	Government policy	3.52	18	High effect
19	Supplier defaults	3.39	19	Moderate effect
20	Frequent design changes	3.16	20	Moderate effect
21	Availability of substitute products	3.13	21	Moderate effect
22	Frequent weather condition changes	2.76	22	Moderate effect

3.6 Relationships between delays in payment of construction contractors and financial capacity of a project

Table 6 identifies factors causing delayed payments in construction projects, categorised into client, contractor, consultant, and contractual factors.

Factors associated with clients: The leading reasons include optimistic cash inflows and ineffective financial strategy (both RII = 0.71), with deferred remuneration expectation surveyed the least (RII = 0.60). Factors associated with contractors: Priority reasons include the parties being unable to reach consensus on a value of work done (RII = 0.72), subsequent claiming errors (RII = 0.71), and non-compliance with the procedures of claiming (RII = 0.69). The least ranked is delay in claims submission (RII = 0.63). Factors relating to consultants: The most important factors are poor coordination of the project team (RII = 0.74) and low level of information (RII = 0.72), while the least important are delay in work valuation by the quantity surveyor (RII = 0.66) and poor estimation of costs (RII = 0.65). Factors associated with contracts: The most important

Table 6 Identified factors causing delayed payments in construction projects

Category	Causes of Delayed Payment	Relative Importance Index (RII)	Rank
Client-related factors	Unrealistic cash flow	0.71	1
Client-related factors	Client's poor financial management	0.70	2
Client-related factors	Client's failure to raise funds for financial sources	0.69	3
Client-related factors	Clients' failure to follow pre-set procedures	0.68	4
Client-related factors	Client's failure to agree to the valuation of work	0.65	5
Client-related factors	Client's failure to understand the contract agreement	0.64	6
Client-related factors	Client's failure to maintain a good attitude by wrongfully withholding payment to the contractor	0.60	7
Contractors' related factors	Contractor's failure to agree to the valuation of work	0.72	1
Contractors' related factors	Error in contractor claims	0.71	2
Contractors' related factors	Contractors' failure to follow certain procedures in claims	0.69	3
Contractors' related factors	Contractor's failure to do work based on BOQ	0.68	4
Contractors' related factors	Contractors' failure to understand the contract agreement	0.67	5
Contractors' related factors	Contractors' failure to back up their claims	0.66	6
Contractors' related factors	Contractors' failure to apply for claims	0.65	7
Contractors' related factors	Contractor's delay in submitting claims	0.63	8
Contractual-related factors	Contracts used are not thorough in dealing with payment issues	0.61	1
Contractual-related factors	Improper choice of standard form of contract	0.61	1
Contractual-related factors	Unfair contract terms	0.58	3
Contractual-related factors	Contracts used are too complicated for the parties to understand	0.55	4
Consultant-related factors	Lack of coordination among project team activities	0.74	1
Consultant-related factors	Inadequate flow of information within the project team	0.72	2
Consultant-related factors	Consultant's failure in handling claims	0.71	3
Consultant-related factors	Delay in certifying work done by the architect or contract administration	0.70	4
Consultant-related factors	Inability of the consultant to manage funds	0.67	5
Consultant-related factors	Delay in valuing work completed by the quantity surveyor	0.66	6
Consultant-related factors	Poor estimation of project cost	0.65	7

causes include inadequate contract clauses on payment issues and selection of the wrong contract (RII = 0.61), while the highest complexity of contracts is ranked second lowest (RII = 0.55). Where the client is the major financer, if there is a poor cash flow from the client, this affects the consultant's preparation of interim payments, causing delay in payment to contractors, which can result in suspension of the works.

Table 6 shows the reasons for delayed payments among clients, contractors, contracts, and consultants, ranked by Relative Importance Index (RII). Client-related delays mostly happen because of unrealistic cash flow (RII = 0.71) and poor financial management. Contractor-related delays arise from disputes over work valuation (RII = 0.72) and mistakes in procedures. Contractual issues, like incomplete or complicated contracts, contribute moderately to payment delays. Problems related to consultants, such as lack of coordination (RII = 0.74) and insufficient information flow, rank the highest across all categories. Overall, the findings suggest that delayed payments come from financial, procedural, contractual, and management issues across all project participants.

4 Results and discussion

The data analysis highlights the various effects of inaccurate cost estimation, material price changes, and delayed payments on construction project performance and the financial health of stakeholders. Table 1 shows that reputation loss is a major consequence of cost underestimation. Contractors (mean = 3.42) and quantity surveyors (mean = 3.40) are the most affected, which confirms previous findings that professional credibility is linked to accurate financial forecasts and successful project delivery [7, 21].

Table 2 reveals that the biggest risk associated with inaccurate cost estimation is exposure to bankruptcy, project delays, and increased claims (average mean value = 3.57). This aligns with studies that stress the importance of managing financial and operational risks to prevent project failures [14, 26, 27]. Table 3

emphasizes the extent of financial loss among stakeholders. Contractors experience profit loss (MV = 3.88), project owners face resource depletion (MV = 3.80), and banks see revenue reductions (MV = 3.55). This supports earlier research showing how vulnerable SMEs and funding institutions are to cash flow issues in developing economies [16, 28, 29].

The overall analysis in Table 4 suggests that the risk exposure is greater than the financial loss and reputation damage, highlighting the need for strong cost control and contingency planning [30]. Table 5 shows that rising building material costs (MIS = 4.92), high import duty rates (MIS = 4.87), transportation expenses (MIS = 4.76), fluctuating exchange rates (MIS = 4.72), and energy costs (MIS = 4.50) put the most pressure on contractors' financial stability. This indicates that construction budgets are sensitive to macroeconomic and supply chain changes, consistent with findings by [18, 21]. On the other hand, weather changes (MIS = 2.76) and availability of substitutes (MIS = 3.13) have lower impacts, suggesting that certain operational and procurement strategies can help manage risks.

Table 6 sheds light on delayed payments. Client-related factors, such as unrealistic cash flow (RII = 0.71) and poor financial management (RII = 0.70), are key causes. Contractor-related mistakes in claims submission (RII = 0.71–0.72), issues with consultant coordination (RII = 0.74), and weak contractual clauses (RII = 0.61) also contribute to delays. These findings support earlier studies indicating that cash flow problems, procedural delays, and unclear contracts hinder timely payments in the construction industry and affect liquidity, project progress, and stakeholder trust [28, 29].

Overall, this analysis shows that inaccurate cost estimation, along with fluctuating material prices and delayed payments, creates a combined effect that threatens project sustainability. It emphasis the need for better financial planning, improved communication among stakeholders, the use of digital cost estimation tools, and the enforcement of contractual and regulatory measures to protect project performance and professional credibility.

5 Conclusions

This study focuses on the effects of cost estimation on construction projects. Here, under "Cost Overrun Consequences", it is stated that miscalculating the cost of the project may lead to financial incapacity and ultimately project failure/termination of the project. Factors such as inflation of building materials cost and duty charges are identified and expected to be curtailed to mitigate overall project cost. The paper also presents measures to address the issue of material price fluctuations, which include proper planning, availability of current information, prompt payment, value engineering, better financial management, strong system controls, reduction in variation, and comprehension of project requirements. The contention that delayed payments can ruin the financial capacity of contractors, thus increasing the risk of project failures, is instructive in this respect. This paper speaks about the need to control the worsened economic situation and accurate cost estimation in every financial aspect of building work undertaken. If not, financial implications, loss of goodwill and trust, time overrun and, in some cases, complete abandonment of the project may occur. Therefore, these risks should encourage construction stakeholders to focus on proper estimates, good planning, openness, proper financial management, fast payment, and contract choice.

The findings of the research recommend that it is essential for project stakeholders to exercise caution when making estimates of the cost of the project and consider the factors that influence the accuracy of the estimates. This will enhance the accuracy of project cost estimation in addition to aiding the identification, planning, management, and mitigation of risks that are related to cost-bearing elements. Efficient contractor scheduling and onsite planning are essential to prevent delays and extra costs associated with the project. Delays tend to cause fluctuations in pricing. To alleviate the adverse effect of delayed payments on the delivery of a project, ensure a cordial relationship among stakeholders, aggressive payment follow-up via organized means, and a high level of cooperation among project managers. Clients, too, must have other investors to inject funds for the project. All these suggestions will play a vital role in enhancing the accuracy of project cost estimates and minimizing the time overruns in construction projects.

The work consolidates knowledge by revealing the consequences on the financial capacity of construction projects that result due to poor cost estimation of a given project and hence its contribution to project failure. Risk factors are identified, such as bankruptcy, delays, increased claims and losses suffered by different stakeholders. The study gives a practical approach to overcoming material price changes and payment delays, useful towards enhancing project financial control. It goes further to define costs, payments and contract management and why such aspects are relevant in understanding the success of construction projects.

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Authors' contributions
Nnadi Ezekiel: Concept development, data management, formal analysis, investigation, methodology, project administration, resource management, software application, supervision, validation, visualization, writing the original draft, and writing for review and editing. Josephine Najjobyo: Investigation, methodology, project administration, resource management, software application, writing for review and editing.

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Data availability
This study is based entirely on a review of existing literature. It did not involve gathering or analyzing any primary data. No datasets were created or examined during this research.

Declarations

Competing interests
The authors hereby state that there are competing interests in this work.

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