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Research Article

Deviations between Contract Sums and Final Accounts: The Case of Capital Projects in Ghana

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Cost estimation is particularly difficult, often leading to considerable deviations. For capital projects, especially transport infrastructure projects, deviations hover around an average of 28% of the estimated cost. There are several factors that cause these deviations between the final accounts and the contract sum. How these factors combine to cause deviations between the contract sum and the final account in recent times has been of great concern to construction managers and researchers alike. This study sought to identify the significant factors that result in deviations between contract sums and the final accounts of capital projects. Using a sample size of 45, comprising contractors, consultants, and clients, the factors identified using Relative Important Indices were "price fluctuations," "late material delivery," "changes in the scope of work," "fluctuations in the market demand," and "changes in design." Using Kendall's coefficient of concordance, a coefficient p value of 0.068 was obtained. As such, the null hypothesis was rejected as there was a level of agreement among the respondents. Again, based on a significance test run, 26 out of the 40 identified factors used for the analysis were seen to be significant in influencing the deviations between contract sums and final accounts figures.

1. Introduction

One major worry to professionals in the construction industry is the wide gap (deviations) between final account figures, the tender, and the preliminary estimates earlier arrived at, at the precontract stage. This has caused a lot of anxiety to clients in going into infrastructural project development [1].

Before a project is embarked upon, bills of quantities are prepared for which the agreed sum becomes the contract sum on which tenders are floated for tenderers to tender. The contract sum in the bill of quantities is expected not to be exceeded after the project but, interestingly, upon completion when the final account is prepared it is realized that there have been deviations; either the contract sum exceeds the final account or the final account exceeds the contract sum.

Because of the issue of deviations, some researchers like Pheng and Ming [2] have criticized the bills of quantities as lacking precision. However, Cartlidge [3] and Davis et al. [4] claim that the bill of quantities still remains an unsurpassed model on which to obtain bids and is a useful tool for postcost control activities.

Razali et al. [5] have also criticized the bill of quantities saying that although it is widely used in the traditional procurement method for cost estimating and as part of tender and contract documents, its use is beginning to wane because the application of nontraditional procurement system has become the norm.

The tradition in Ghana has been that project expenditure is monitored to the final stage after which the final accounts are prepared. If the contract sum exceeds the final accounts, then the general convention is that the remainder is given to the client and it becomes an advantage to the client or the financiers as well as the contractor's team and that of the consultant. This may imply that the contractor's outfit may have employed very stringent cost control mechanisms to keep the construction cost within budget. The client would

have also achieved value for the money committed into the project. Additionally, the consulting team would have gained the credibility of being able to supervise and manage a construction project within its initial established budget. However, if the final account exceeds the contract sum, additional money will then be required and this becomes a disadvantage to the client, the project's consulting team, and the contractor as well, causing a whole lot of disappointment on the part of the client. A great deal of prospective clients has had to shelve future infrastructural development schemes due to previous experiences where the initial budgets were exceeded when the construction phase of the projects came to an end as there was the sense of not having achieved value for money.

One other occurrence in Ghana these days is the abandonment of most funded projects by the Government of Ghana. The major reason that is known to be responsible is the lack of funds to finance these projects to completion stage as estimates prepared, which formed the basis for initiating these projects, have been exceeded [1]. The country already spends about $1.2 billion per year on infrastructure, equivalent to about 7.5 percent of GDP. A further $1.1 billion is lost each year to inefficiencies, notably underpricing leaving a funding gap of about $0.4 billion per year [6]. Such occurrences signify injudicious spending of the tax payer's money. Again, foreign donors may quit funding developmental projects and on the whole the country gains a bad economic rating and reputation.

From the discussion above, the country is in no winning position; hence, this study sought to identify the factors leading to deviations between contract sums and final accounts so they can be catered for at the cost estimation stage.

2. Literature Review

2.1. Initial Estimated Cost. The estimating stage of a capital project during the precontract phase involves the development of a cost and duration estimate for the development of the project as part of the proposal of a contractor to a client. It is the stage at which assumptions of resource commitments to the necessary activities for the realization of the project are made. A careful and thorough analysis of the different conditions imposed by the project's design and by site characteristics is considered to determine the best estimate. The success of a contractor depends upon this estimate, not only to obtain a job but also to construct the building at the highest possible profit to keep the firm running. The cost estimator has to look for that time-cost combination that will allow the contractor to be successful in his commitment.

Ashworth [7] observed that the purpose of a pretender estimate or preliminary estimate is to provide an indication of the probable cost of construction. This will be an important factor to consider in the client's overall strategy of the decision to build. The estimate will also provide the basis for his budgetary and control of the construction cost. Also, Oboirien [8] stated that preliminary estimate is the forecasting of a probable project cost before detailed designs and contract document preparations are made. The building client, through the quantity surveyor, is made aware of likely financial commitments before extensive designs are undertaken.

2.2. Predesign Costing. Predesign cost estimation is a crucial element of any construction project. The accurate estimation of the early cost will support the project managers in the decision-making process. It allows the managers to choose adequate alternatives and to avoid misjudging of solutions. The cost of a construction project is impacted significantly by the decisions taken at the design phase. At this stage, designers use several cost estimation methods and intuitive judgments through their experience and data from other projects [9]. However, the approximate estimating method is often used in sequence on individual schemes. Firstly, a unit cost estimate is used for investigating the feasibility of the project, followed by an estimate based on floor area at the sketch planning stages, and approximate quantities for cost checking. This next estimate of cost produced by the contractor for use in his tender is of vital importance, since it forms the financial basis for the contract and, as a byproduct, provides all the cost information used by surveyors. Nevertheless, despite the fact that a tender is based on an accurate measurement of the items of work to be carried out, presented in the standardized form required by the standard method of measurement, the calculation of the rates is another form of approximate estimating.

2.3. Final Cost and Final Accounts. The final contract sum, usually stated as the total on the summary of account, is determined after the adjustment of prime cost and provisional sum items, remeasurement of provisional quantities, measurement of variations, valuation of fluctuations, and ascertainment of contract claims. The express provisions under which the contract sum of a construction project can be altered are normally stated in the conditions of contract. The quantifiable factors for the adjustment of the contract sum to obtain the final account include variations, remeasurement of provisional and prime cost sums, fluctuation, and claims. The bigger the project, the higher the difference between initial and final cost of construction. As the project takes longer to be completed, effects of fluctuation are also more pronounced especially in an unpredictable and inflationary economy like Ghana's.

2.4. Deviations in the Contract Sum and Final Accounts in Developing Countries. Frimpong et al. [10] studied the cost performance of water drilling projects in Ghana and found that 38 of a total of 47 investigated projects (a rate of 75%) faced cost overruns whereas the remaining 25% were completed within the budget. They attribute the cost overruns to poor contractor management, irregular monthly payment difficulties from agencies, poor materials procurement and management systems, poor technical performances on the part of contractors and consultants, and the escalation of material prices.

Frimpong et al. [10] further made the following recommendations: that appropriate funding levels should always be determined at the planning stage of the project so that

regular payment could be paid to contractors for work done; that in order to improve contractors' managerial skills there is the need for continuous work-training programmes for personnel in the industry to update their knowledge and be familiar with project management techniques and processes; that effective and efficient materials procurement and management systems should be established within projects, indicating that material procurement mismanagement has the potential to cause major delays to construction projects resulting in otherwise unwarranted cost overruns; that there should be adequate contingency allowance in order to cover the increase in material cost due to inflation.

Kaliba et al. [11] from Zambia also considered the project performance in road construction projects worth US$542.7 million and found that more than 50% of the projects could not meet the contract budget and were faced with cost overruns. The main causes of the cost escalation identified included bad or inclement weather due to heavy rain and flooding, scope changes, environmental protection and mitigation costs, schedule delays, strikes, technical challenges, inflation, and local government pressure.

Odeyinka et al. [12] also investigated the budgetary reliability of bills of quantities (BOQ) in building project procurement and concluded that the difference between the budgeted cost and the final cost incurred differed greatly depending on project type. The investigation concluded that with housing projects the percentage deviation from the BOQ was between −3.42% and +3.85%. With educational projects, the percentage deviation was found to be between −3.69% and +17.05%. The range with regard to commercial projects is between −19.94% and +19.92%. When refurbishment projects were looked at, the percentage deviation was found to be between −10.72% and +36.90%. This information shows that there can be a huge difference between the budgeted cost and the actual cost with commercial projects; this is in comparison to housing projects which have a small and acceptable deviation from the budgeted cost. It is therefore important to focus on commercial projects which include capital projects, with a view on identifying the risks which occur within commercial construction and establishing why the final cost is so often different from the original budgeted cost.

2.5. Factors of Deviation in Budgets and Final Accounts. There are several factors which may lead to the deviations between the final accounts and the contract sum and these factors have both positive and negative implications for the key stakeholders in particular and the industry in general. How these factors combine to cause deviations between the contract sum and the final accounts in recent times has been of great concern to the construction industry all over the world.

Frimpong et al. [10] conducted a survey consisting of 26 factors to identify the major contributors of cost differences in Ghana. The top 10 factors identified included monthly payment difficulties, poor contract management, material procurement lapses, inflation, contractors' financial difficulties, escalation of material prices, inadequate cash flow during construction, planning and scheduling deficiencies, bad weather, and deficiencies in cost estimates prepared.

Azhar et al. [13] also investigated cost overrun causes in the construction industry of Pakistan. Their survey, using a questionnaire containing forty-two (42) factors, showed that the top ten cost overrun factors found were fluctuation in prices of raw materials, unstable cost of manufactured materials, high cost of machineries, lowest bidding procurement procedures, poor project site management, poor cost control, delays between design and procurement phases, incorrect and inappropriate methods of cost estimation, additional work, improper planning, and unsupportive government policies.

Enshassi et al. [14] similarly conducted a survey to identify the major causes of cost overruns in construction projects of Gaza by investigating 42 factors amongst contractors, consultants, and owners. The results indicated that the top ten factors that cause cost overruns as perceived by the three parties included increment of materials prices due to continuous border closures, delay in supply of raw materials and equipment by contractors, fluctuations in the cost of building materials, unsettlement of the local currency in relation to dollar value, project materials monopoly by some suppliers, resources constraint: funds and associated auxiliaries not ready, lack of cost planning/monitoring during pre- and postcontract stages, improvements to standard drawings during construction stage, design changes, and inaccurate quantity take-off.

Kaliba and his team in 2009 also carried out a study to determine the contributors of cost escalations in road construction projects in Zambia. The findings of the study showed that the main causes of cost escalation included bad or inclement weather due to heavy rains and flooding, scope changes, environmental protection and mitigation costs, schedule delays, strikes, technical challenges, inflation, and local government pressure.

Ameh et al. in 2010 [15] also carried out an investigation to identify the causes of cost overruns in 53 telecommunication projects in Nigeria via a structured questionnaire survey containing 42 factors. Survey results showed that the top seven factors were the lack of experience of contractors, fluctuating prices of materials, frequent design changes, economic instability, high interest rates charged by banks on loans, and fraudulent practices including kickbacks.

Larkin et al. [16] explored some methods for evaluating risk impact on the variability between contract sum and final account in client-led and contractor-led design and build projects. Their study concluded that the set of factors involved in client-led design and build projects will be different from those relevant to contractor-led design and build projects.

Cunningham [17] also explained that the cost of construction work is influenced by a wide range of factors. These include the identity and priorities of the client, the nature of the project and who is responsible for developing its design, the choice of procurement options, the prevailing market conditions, and legislative constraints. Many of these factors are interlinked.

The factors identified under this section were later collated and used in the preparation of the survey questionnaire.

Table 1

Item	Scale
Very high	5
High	4
Moderate	3
Low	2
Very low	1

3. Materials and Methods

3.1. Research Design. A quantitative strategy was adopted in this research due to the fact that quantitative research follows a deductive approach in relation to theory and is concerned with design measurement and sampling. This means that quantitative research results could be generalised to a larger population within acceptable error limits. The study warranted a field survey and a questionnaire was developed for this purpose. The questionnaire had forty factors listed based on the literature review conducted and respondents were required to rank each factor on a Likert scale of 1–5 with the meanings shown in Table 1.

3.2. Population and Sampling. The population for the study comprised contractors, clients, and consultants in the Ghanaian construction industry engaged in capital projects in Ghana.

The contractors' population involved only D1K1 (a classification system for contractors in Ghana) class of contractors who had or were working on projects in Ghana. A list was obtained from the Ministry of Water Resources, Works and Housing and the Departments of Urban Roads, Highways and Feeder Roads as all contractors working in Ghana are required to register with the Ministry of Water Resources, Works and Housing for certification. In all, 15 certified contractors and 15 certified consultants were involved in the study.

In Ghana, the government is one major client when it comes to capital projects. It is able to execute these projects through the various ministries and agencies and the Metropolitan, Municipal and District Assemblies. There are 24 main ministries and the team only dealt with the ministries to reduce bureaucracy which was a major limitation factor as some of them (ministries) did not want to provide the required information let alone fill out the questionnaire.

The sample size was determined using the Israel [18] statistical formula as stated below:

$$n = \frac{N}{1 + N\,(e)^2}, \tag{1}$$

where n is the sample size, N is the population size, and e is the precision level (±5) (total error = 0.1 at a confidence level of 95%).

3.3. Sample Size for Client. The sample size for the client is as follows

$N = 24$ (government ministries).

$n = 24/1 + 24(0.05)^2 = 22.64 \approx 23.$

3.4. Sample Size for Contractors and Consultants. The sample size for contractors and consultants is as follows:

$N = 30$ (contractors and consultants working on government and/or donor funded capital projects).

$n = 30/1 + 30(0.05)^2 = 27.91 \approx 28.$

Purposive sampling which is an example of probability sampling was used in identifying the key respondents. In the end, only 45 out of 51 questionnaires were distributed giving a distribution rate of about 88%.

3.5. Data Measurement and Analysis. For this study, ordinal scales were used to rank the significant factors attributed to the deviations between contract sums and the final accounts for capital projects using a scale of 1–5. The Statistical Package for Social Sciences (SPSS.16) was used to analyze the factors that cause deviations between contract sums and the final accounts. The importance index determination was adopted from Lim and Alum [19] and is given by the formula below:

$$\text{RII} = \left\{ \frac{5n5 + 4n4 + 3n3 + 2n2 + 1n1}{5\,(n1 + n2 + n3 + n4 + n5)} \right\} \times 100. \tag{2}$$

Based on the important indices, the variables were ranked and the agreement among the establishments was determined by the use of Kendall's Concordance Analysis and Chi-Squared values.

3.6. Kendall's Concordance Coefficient and Observed Chi-Squared Value. Kendall's concordance coefficient measures the degree of agreement among sets of rankings. This is given as $W = S/(1/12)k^2(n^3 - n)$ and must be between 0 and 1, where

$$S = \sum (\text{SR})^2 - n\left(\overline{\text{SR}}\right)^2, \tag{3}$$

k represents groups (columns) with n items in each, and SR_i is the sum for each Row. The mean of $\text{SR}_i s = \overline{\text{SR}} = (n+1)k/2$. The observed Chi-Squared calculation formula is as follows: $\chi^{2(n-1)} = k(n-1)W$, where a high value of W indicates a high agreement among the set of rankings. The Kendall concordance coefficient and the observed Chi-Squared value were adopted from Legendre [20].

3.7. Hypothesis Testing (Chi-Squared Test (χ^2)). We tested the significance of W at $\alpha = 0.05$ (5%) level of significance:

H_0: the set of rankings by respondents is independent/unrelated (do not agree)

H_1: the set of rankings by respondents is dependent/related (do agree).

A significant level of $\alpha = 0.05$ was used.

We reject H_0 if $\chi^2_{\text{cal}} > \chi^2_{\text{table}}$, where χ^2_{cal} is the calculated Chi-Squared value and χ^2_{table} is the Chi-Squared value read from the Chi-Squared distribution table. If $\chi^2_{\text{cal}} < \chi^2_{\text{table}}$, we accept H_0 and reject H_1.

The above is as presented in Figure 1.

Table 2: Response rate of study participants.

Responding group	Frequency	Percent (%)	Valid percent (%)	Return frequency	Response rate (%)
Client's outfit	23	51.11	50.00	22	95.65
Consultant's outfit	10	22.22	22.73	10	100.00
Contractor's outfit	12	26.67	27.27	12	100.00
Total	*45*	*100.0*	*100.0*	*44*	*98.55*

Source: field survey, 2014.

Table 3: Factors influencing the deviations between contract sums and the final accounts for capital projects in Ghana.

S. number	Factors	Contractor		Consultant		Clients		Combined	
		Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
1	Changes in design	4.39	5	4.56	3	4.44	5	4.46	4
2	Changes in the scope of work	4.48	3	4.46	5	4.47	4	4.47	3
3	Price fluctuation	4.53	1	4.67	1	4.71	1	4.64	1
4	Fluctuation in the market demand	4.44	4	4.30	8	4.51	3	4.42	5
5	Late material delivery	4.51	2	4.61	2	4.59	2	4.57	2
6	Bureaucracy in tendering method	1.86	39	1.67	39	1.50	39	1.68	39
7	Economic stability	1.25	40	1.18	40	1.23	40	1.22	40

Source: field survey, 2014.

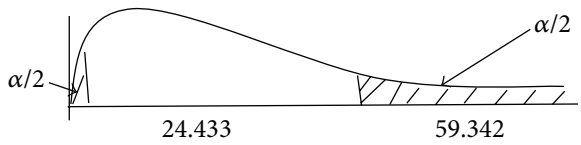

Figure 1: If $\chi^2 \leq \chi^2_{1-(\alpha/2)(n-1)}$, then reject H_0 and if $\chi^2 \geq \chi^2_{(\alpha/2)(n-1)}$, then reject H_0.

4. Data Analysis and Discussion of Results

4.1. Questionnaire Response Rate. From Table 2, the average response rate of the participants was 98.55% which was very encouraging.

4.2. Factors Influencing Deviations between Contract Sum and Final Accounts on Construction Projects. The data collection process involved two stages. The first stage consisted of literature search for information on the factors influencing deviations between contract sums and final accounts on projects in other countries. This phase resulted in the identification of 40 factors influencing deviations between contract sums and final accounts on capital projects. The second stage involved the development of a questionnaire incorporating the 40 factors which respondents were asked to rank according to their perception of level of influence. Using the RII, five key factors were identified. Table 3 shows the ranking of five identified key factors that are perceived to be the source of deviations between contract sums and final accounts on most capital projects in Ghana. The ranking was based on mean important indices values.

The results as shown in Table 3 indicate that the three groups of respondents (contractors, consultants, and clients) agree that "price fluctuations," "late material delivery," "changes in the scope of work," "fluctuations in the market demand," and "changes in design" are the top five most important factors influencing cost difference or overruns on capital projects in Ghana.

The last two insignificant factors of cost difference or overruns are bureaucracies in the tendering methods and economic conditions.

Prices are considered a key component of construction projects' success [14]. Any fluctuation in prices would significantly affect the final accounts of a project. When construction materials are in short supply on the markets, this leads to elevated prices and monopoly by suppliers who have quantities in stock; hence, a project is exposed to cost overruns. Often contractors' estimates for a tender are based on "current" prices on the markets. As such, whenever there are challenges which tend to cause the execution of the project to drag, there are bound to be cost overruns most particularly in Ghana where the prices of construction input materials increase averagely at a rate of about 10% per annum. Project delays have, therefore, a direct relation with cost overruns.

The delay in supplying necessary materials and equipment for projects leads to time loss and cost increments. In cases of prolonged delays, the cost of required materials or equipment may increase, or these (materials and equipment) may run short on the local markets quantity wise. This may create, as earlier stated with price fluctuations, monopoly situations leading eventually to high materials and equipment costs which in the end are borne by clients.

Given the nature of construction projects, any change in the scope of work will indeed impact either negatively or positively the cost of a project. Capital projects are cost intensive and as such subjected to very stringent cost planning and works execution programming processes. These are done way long before a project takes off. Due to the huge capital outlay required for such projects, it is worth appreciating therefore that the slightest change in the scope of works, particularly

Table 4: Kendall's coefficient of concordance.

W	Chi-square	df	p value	Decision
0.4516	52.837	39	0.068	Reject H_0

Significant at 0.05 significance level.

with those work items that per activity analysis are found to be critical, will greatly affect the duration of a project and, as a matter of principle in construction, time gained is cost reduced and vice versa.

Fluctuations in the market demand for construction materials also create differences between the contract sum and final accounts of a project. Several factors such as the availability of a variety of new and modern materials (technological advancements), competitors' actions, credit worthiness of vendors and customers, and general existing economic conditions may influence a contractor's choice of materials and equipment for a particular project which may be totally different from what might have been used on another project. The overall effect will be that of a positive or negative variance when comparing the contract sum to the final accounts' figures.

Changes on an engineering and construction project are expected, but the potential for cost and schedule consequences of those changes must be understood by those directing the change. The consequences involve not only the work package for which the change is directed, but other work packages and overhead functions as well. Several factors may warrant changes to a design and among these include changes to a client's preference, regulations, unavailability of specified materials, and unforeseen site conditions. Design errors may also warrant that changes be made to working design drawings. The culminated effect of these factors would be a decrease or increase in the final cost of a project though an increase is what is mostly experienced.

4.3. Degree of Agreement among the Clients, Contractors, and Consultants for Cost Difference or Overruns Groups. To determine whether there is a significant degree of agreement among the three parties (clients, contractors, and consultants), Kendall's coefficient of concordance was used and Table 4 shows the results of Kendall's coefficient of concordance W. As indicated in Table 4, if the p value is greater than $\alpha = 0.05$ (α is the level of significance), then the study rejects the null hypothesis, H_0. Therefore, the study concludes that there is sufficient evidence to support the alternative hypothesis, H_1. Hence, there is a degree of agreement among the clients, contractors, and consultants.

Calculation is done as follows:

$$W = \frac{S}{(1/12)\,k^2\left(n^3 - n\right)} = \frac{12 \times S}{k^2\left(n^3 - n\right)}, \tag{4}$$

where k represents groups = 3, n is the number of variables = 40, S is the sum of square deviation, $S = 21663.1$, $W = (12 \times 21663.1)/3^2(40^3 - 40) = 259957.2/9(63960) = 259957.2/575640 = 0.4516$, $\chi^2 = k(n-1)W$, $\chi^2 = 3(40-1) \times 0.4516 = 3(39) \times 0.4516 = 52.8372$, df $= n - 1 = 40 - 1 = 39$, p Value = Chidist(χ^2, df) = 0.0687.

Critical values of $\chi^2_{1-(\alpha/2)(n-1)}$, $\chi^2_{(\alpha/2)(n-1)}$ are as follows:

$$\chi^2_{0.975(39)} = 24.433,$$
$$\chi^2_{0.05(39)} = 59.342. \tag{5}$$

4.4. Significant Factors Causing the Deviation between the Contract Sum and the Final Account. Based on the significant test run, it was established that the significant factors causing the deviation between the contract sum and the final account are as contained in Table 5.

5. Conclusions and Recommendations

5.1. Conclusions. Out of the 40 factors listed, 26 factors came out as the significant factors that cause deviations between the contract sums and the final accounts of capital projects in Ghana. Among these, the five most prominent factors are "price fluctuations," "late material delivery," "changes in the scope of work," "fluctuations in the market demand," and "changes in design." These factors, according to the contractors, clients, and consultants, have a significant impact on the deviations between contract sums and final accounts of capital projects executed in Ghana. There is however a general situation in which more often than not final accounts exceed initial agreed contract sums.

5.2. Recommendations. One of the most important issues when it comes to construction particularly in a third-world economy like Ghana's is that of cost. Due to the scarcity of money, every effort is made by the stakeholders to a project to cut down on expenditure as much as possible and several actions are undertaken with regard to this. This study sought to identify the factors influencing cost deviations between agreed contract sums for capital projects in Ghana and their final accounts and to determine how significant these factors are. In that light, the following recommendations have been suggested to reduce the deviations:

(1) Parties to a project can opt for a works procurement system that seeks to phase out the various stages of a project. This approach will see the engagement and immediate interaction between a client's team and that of the consultant and contractor. Actual construction works can therefore begin in earnest while drawings are getting fine-tuned, eliminating waiting time. The effect of price fluctuations would therefore be reduced as there would be no need for the application of price fluctuation indices at the initial stages of actual construction works since prices would not have changed much if not at all.

(2) Planning and programming which are continuous processes during construction will have to commence immediately when the parties to a construction project agree to work together. An executing contractor should quickly commence detailed planning and programming in anticipation of the quality, quantity, and availability of input materials required.

Table 5: Significant test of the factors that cause the deviation between the contract sum and final account for capital projects in Ghana.

Number	Factors	Chi-sq.	df	Asym. sig.	Ranks
1	Increase in interest rate	20.364	3	0.000	Sig.
2	Obtaining permit	20.727	3	0.000	Sig.
3	Changes in design	32.182	3	0.000	Sig.
4	Discrepancies between design specifications and code	20.545	3	0.000	Sig.
5	Inadequate programme scheduling	22.682	2	0.000	Sig.
6	Contractors poor management ability	25.273	3	0.000	Sig.
7	Defects in design	22.364	3	0.000	Sig.
8	Underestimation	58.727	3	0.000	Sig.
9	Overestimation	43.045	4	0.000	Sig.
10	Delay in resolving disputes	31	4	0.000	Sig.
11	Feasibility of construction methods	11.818	3	0.000	Sig.
12	Price fluctuation	30.727	3	0.000	Sig.
13	Shortage of materials on site	26.455	4	0.000	Sig.
14	Late material delivery	19.091	3	0.000	Sig.
15	Mode of financing	38.773	2	0.000	Sig.
16	Default of contractor	27.818	3	0.000	Sig.
17	Fluctuation in the market demand	13.545	4	0.001	Sig.
18	Bureaucracy in tendering method	13.273	2	0.001	Sig.
19	Unexpected site conditions	16.682	4	0.002	Sig.
20	Changes in the scope of work	15.545	4	0.004	Sig.
21	Insurance cost	15.545	4	0.004	Sig.
22	Damage by flood	12.545	3	0.006	Sig
23	Government policies	9.864	2	0.007	Sig
24	Use of inappropriate plant	13.682	2	0.01	Sig
25	Bad weather	19.636	4	0.01	Sig.
26	Accident during construction	9.636	3	0.022	Sig.

Significant at 0.05 significance level.

In this way, late material delivery may be avoided. A holistic approach will be the adoption and practice of good materials management principles to ensure the availability of materials in their right quantities and quality.

(3) The realization of most capital projects is the result of executing several activities on site. The use of the traditional Gantt or bar chart only gives an indication of duration but fails to convey any other information such as how critical an activity is. Adopting any of the network analysis programming techniques will not only show the duration of an activity but also give an indication of how critical an activity is. This would guide the construction team when it comes to resource scheduling thereby keeping the project in scope that is within time, cost, and quality.

(4) Construction designs come with a whole lot of specifications for both materials and workmanship. Changes to some of these specifications positively and/or negatively affect a project's cost. There are several factors that might lead to design changes. To control the effects of these factors, it is recommended that proper research is undertaken by the design team to ensure the availability of materials and tradesmen to be used for the project. This is to prevent having to change designs and the scope of a project. Consulting architects and engineers also owe it as a professional duty in ensuring that designs are perused before being approved for use. Doing so will help eliminate design errors, reduce reworking time, reduce damage to structure due to reworking activities, and finally ensure that expenditure is kept within the project budget. Presite visits and careful analysis of the conditions both above and below ground by a project's engineers would also help do away with design changes and reworking activities.

(5) With regard to fluctuations in the market demand, some good research undertaken by the client's consulting team or the contractor would give them prior knowledge of what materials are in vogue and as such may be available in large quantities. This would help curtail the incidence of the nonavailability of specified materials or products on the market which may lead to having them imported, cumulatively adding on to the final cost figures.

Competing Interests

The authors declare that they have no competing interests.

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