AN ASSESSMENT OF THE ACCURACY OF A QUANTITY SURVEYORS ESTIMATE IN KADUNA STATE

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Abstract: Estimates are one of the most important functions of a successful project. Accurate estimates optimize good contracting as well as the process of calculating and analyzing all the cost that will enter into a particular job to arrive at a set total. Cost overrun is a very common phenomenon as a number of construction projects in Nigeria are facing this problem, this occurs when the final cost or expenditure of the construction project is beyond the original estimated cost, this study is aimed at investigating the accuracy of Quantity Surveyors estimates in Kaduna state. The study compared the estimated total cost of selected construction projects with the final account figures of construction projects and examined the factors that influence the accuracy of estimates of the projects identified using a case study of 35 completed projects. Feedback comparative analysis was employed to compare the results. The findings shows that there is an average of 0.24% variance in the estimated contract sum and the final account figure and design changes (22.85%) and fluctuations (20.0%) are the major reasons for the variance in the costs of the projects studied. The study recommends that consultants should obtain enough information from the client before commencement of projects to reduce design changes during the project.

Keywords: Construction industry, cost estimating, cost overrun, final account

Introduction

Transformation in the construction industry will likely prompt a change in the economy of any nation (Mohammed, Mohammed & Nida, 2013). The rate of achievement of an undertaking relies upon the accuracy of the estimates (Farrukh *et al.*, 2013). Estimates must be as precise as possible on the grounds that these make up the reason for tender comparison, evaluation or negotiations. In the event that these evaluations are terribly insufficient, decisions to award maybe very difficult (Oladokun and Odesola, 2010). Practically in every contract, preparation of a cost estimate that is realistic is an important component of any construction process as this helps in forecasting the cost of a project during the planning and design stage (Oladokun and Odesola, 2010). The estimate assists as basis for financial provision decision and control of cost. At the planning stage, clients are interested in knowing the total project cost commitments. Mohammed *et al*. (2013) defines estimating as the process of calculating the future costs of a construction project before the construction process commences. The Quantity Surveyor is responsible for these estimates which serve to make sure that construction project will have a successful financial outcome.

Statement of the problem

Cost overrun is a very common phenomenon as a number of construction projects in Nigeria are facing this problem, this occurs when the final cost or expenditure of the construction project is beyond the original estimation cost (Ali, 2017). Maintaining the cost of construction within the estimated cost and schedules requires sound strategies, good practices and careful judgment much to the displeasure of client's contractors and consultants, however project experience extensive delays and thereby exceed initial time and cost estimates (Aliyu, 2015). According to Odusami and Onukwube (2017), one of the factors that cause cost overrun in Nigeria construction industry which is the inaccuracy of cost estimating prepared by Quantity Surveyors, the possible consequence of cost overrun is abandon of construction project due to under estimation. To deliver a project within specified budget, the accuracy of the estimates and realistic assessment of the factors that influence accuracy of estimates must be carefully conducted (Alumbugu *et al.*, 2014). Thus, this study is aimed at investigating the accuracy of Quantity Surveyor's cost estimate in Kaduna state.

Cost estimating definition

Cost estimating has been interpreted differently by various industry professionals. Akintoyeni (2016) describes cost estimating as a process of predicting costs that are required for the completion of the work. Cost estimating can be defined as an approximation of the probable cost of a product, project computed on the basis of available information. Morrison (2014) sees cost estimate as the deviation from the lowest acceptable tender received in competition for the project. He further describes cost estimates for scheme plans prepared in the early design stage that go unaltered before the invitations for tenders are sent out. In this case, the lowest tender bid cannot be realistically compared with the estimate as the tender is for a different (updated) plan. This makes the decisions made by the Quantity Surveyor's ability to measure cost estimated performance against lowest tenders reliant on the variability of the lowest tenders. Mohamed & Madi (2017) explain that estimating is an important step in the construction process as the reliability of its estimate accuracy from conceptual to detailed stages determines the success or failure of a project. The above definitions describe cost estimating as being the process of calculated estimates based on a look into the future costs of a project or product prior to its commencement.

Factors influencing accuracy

Researches have been carried out in a number of countries to identify precise factors which affect accuracy of estimates, Cost estimation is a complex process, during the estimation process; there is no such thing as an accurate estimate. A poor estimation would lead to the project failure; in terms of time, cost or even on the stakeholder' s opinion (Larson and Gray, 2011; Muhammad *et al.,* 2018). A close consideration of the following factors while preparing an estimate will assist in improving the accuracy of the estimates:

Complexity of project: Akintoyeni (2016) emphasizes that the construction industry has become increasingly complex through the years as a result of improvement and advance in technology, natural evolution and litigation. Aliyu (2015) states that the level of complexity of a construction project is a function of three features which include organization complexity, resource complexity and or technical complexity. Cost estimation might be influenced by organizational complexity, resource complexity and technical complexity.

Labor productivity: Aiyetan, Ayodeji & Olatunji (2010) construction productivity is influence by many factors which include material equipment, tools, construction methods, management skills in terms of adequacy and accurate application. Mc Donald (2014) mentioned that as a result of poor project management may be caused by the failure to properly schedule and co-ordinate the work and the estimator might not expect that event of the poor project management.

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Insufficient time: Aibinu and Pasco (2008) emphasizes that construction projects involving design time of months or years which request the contractors to digest the tender documents and submit the tender within a relative short period. The planning, estimating, developing a work method, studies and others are prepared within a short period or an insufficient time is allowed. The contractors is required an approximate tender period to develop the rough tender.

Inadequate information: According to Olatunji (2016) several contractors face problems when tendering for a construction project which the information provided is insufficient under this circumstance, the estimator must make his or her own estimation and assumption on it, if inaccurate estimation has been made, it may result in overestimate or underestimate.

Lack of availability of equipment: There are two major conditions which faced by the estimator when estimating or pricing the tender. Firstly, the estimator might require estimating the fluctuation of the price of equipment for relative long of period as the construction period normally last for few years. Secondly, during tendering stage the estimator might require deciding whether own equipment or hire the equipment from Specialist Company if the project requires certain equipment which the contractor does not own (Odusami and Onukwube, 2016).

Incomplete drawing and detail design: Aiyetan, Ayodeji & Olatunji (2015) emphasizes that the accuracy of estimate also will depend on completeness of the contractor documents provided and others. In addition, the factors of incomplete drawing and detail design as the factors which cause inaccuracy of estimation in construction project. During tendering, the contractors estimator is carry out the estimating work done to drawing is unclear and none very detail shown in the drawing. The estimator has to make his or her own assumption for estimating and pricing the tender. This factor will increase the chance of inaccuracy estimation for the particular construction project.

Computerized estimating software: Olatunji (2016) mentions that computerized estimate software could obsolesce of standards due to evolution of information technology in the estimating industry especially description libraries and databases used for automatic estimating. Estimator or applications must be updated frequently when built into a programme as reference standards for reviewed, otherwise that the program possibility miss-apply the standards.

Experience or qualification of quantity surveyor estimator: Ibrahim (215) expert Quantity Surveyors in the Nigeria provided evidence of significant differences in estimating accuracy between the individual Surveyors involved. Dysert (2006) has described that contractor's estimator should associated with certain qualities. These include good basic numerate and literate education, reasonable time spent on site, interpret drawings, ability to communicate, facility to make accurate mathematical calculations, application of logic and common sense, patience, able to cope with a vast volume of paper, a working knowledge of all the major trades, close relationship with these peoples who are responsible for construction.

Availability of historical price data: Ashworth (1999) states that estimating method used for cost planning and estimating which relies on historical cost data during early stages, whereas current price apply by analytical estimating approach to resource for a well-developed design. Most establish companies make it a policy to keep records of actual costs incurred on their various construction projects.

Financial factors: Olatunji (2016) states that the performance of construction projects negatively affects by financial risk, financial risks might include high inflation and increased construction of the project. These factors affect particular projects where materials and goods are required for construction have to be improved.

Fluctuation in Money Exchange: Aliyu (2015) that fluctuations in construction prices make it difficult for cost estimators to accurately estimate construction project costs. As suggested by Nega (2008), if the materials or other elements of the construction project are being purchased from foreign countries, the change in foreign exchange rate is particularly relevant to it.

Inflation: Aliyu (2015) states that the construction costs can increase due to inflation. If the rate of inflation increases above the predicted level during the construction stage, then the original cost estimate will be exceeded obviously that delays of a construction project, it will expose the project to the risk of further inflationary cost increases.

Government policy: As stated by Olatunji (2016) the social environment concerns needs for projects or individuals while the political environment is concerned with government policy and the effect of political decisions on construction projects. According to Ashworth (1999), the client's fundamental needs can be summarized as follows: satisfaction that the building meets their needs, that it is available for occupation on the specified data for completion, that the final account closely resembles the estimate and that the construction project can be maintained at reasonable cost. One of the client's prior requirements in respect of any construction project is the assessment of its expected cost.

Consultant: Ibrahim, (2015) emphasize cost consideration are among the most prior and basic considerations that consultants must deal with. It is necessary to observe that projects are contained within the client's budget and cost forecasts.

Contractor: According to Mohd and Madi (2017), reliable cost estimate alone determine profitability for a contractor. Cost estimates assist the contractor either to prepare cost plus basis bid or a competitive bid for a stipulated price contract. Odusami and Onkuwube (2016) identified and studied that the environmental factor that affect the accuracy of cost estimating as follows: location of projects, weather condition, site ground condition, soil and land stability, social and cultural impacts, law and regulations, method used for estimating preliminary estimates, intermediate estimate, final estimates, approximate quantities, cost plant, analytical estimating.

The Ways to improve the accuracy of cost estimates
The cost estimate are needed to progress as the construction industry becomes more complicated. It happens because the introduction of new technology and procurement option into the industry. QS Consultants hired under them need to takes action so that they can enhance their estimating policies and procedures. This ensures the estimates are in tolerable quality, more accurate and acceptable to clients. Some researchers say the current estimating process should be improved and introduction of approaches should take place in Quantity Surveying practices for sustainable approaches

Materials and Methods
Research Design: This study employed the qualitative method which involved collection of data from previous projects handled by consulting firms. The data collected includes initial estimates of completed projects, details of factors that caused deviations from the contract sum and the final account figures of completed projects.

Data collection
This case study comprises a data back-costing comparative analysis. This method has been used in previous studies (Ibrahim, 2015; Olatunji, 2016; Ali, 2017) to compare estimates.

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Data back-costing/feedback comparative analysis
The data collection process is the data back-costing/feedback comparative analysis which comprises a three-step process:
i) Obtain the estimate used to forecast the construction cost.
ii) Use the estimate as the comparison of the actual construction end cost
iii) Display the difference of the estimate to the actual construction cost as a plus or minus (+ -)

The purpose of doing a feedback analysis of each project is to take what has been explained and identified in literature as measure and factors affecting the estimating process and then see how they affect the accuracy of the estimates. Moreover, the estimates are not effective if they are done at random for projects of different value, so the projects will need to be grouped according to value of the most commonly encountered ones.

Data analysis
Table 1 shows that 15 out of the 35 projects studied i.e. 42.9% of the projects studied are between N10-50 million, 20% are between N 51-100 million, 11.5% are between N 101-200 million, 17.1% are between N201-500 million, 5.71% are between N501- N 1 billion, while 2.86% of the projects are over a billion.

Table 1: Project value range

Project value range '000,000 (₦)	Number of projects	%
10-50	15	42.9
51-100	7	20.0
101-200'	4	11.5
201-500	6	17.1
501-1000	2	5.71
1001 and above	1	2.86
Total	**35**	**100**

Table 2: Comparison of quantity surveyors estimates and the final account figure

Case No.	Estimated Contract Sum	Final Account	Variance	%
1	359,218,461.74	363,602,548.01	-4,384,086.27	-1.22
2	434,396,060.63	436,685,012.74	-2,288,952.11	-0.53
3	699,065,326.85	691,376,504.26	7,688,822.59	1.10
4	209,719,598.05	211,864,504.86	-2,144,906.81	-1.02
5	253,609,925.26	251,739,032.18	1,870,893.08	0.74
6	154,519,708.87	148,697,023.53	5,822,685.34	3.77
7	495,897,165.80	491,067,984.08	4,829,181.72	0.97
8	599,679,020.56	596,638,259.46	3,040,761.10	0.51
9	1,072,825,767.77	1,071,857,401.94	968,365.83	0.09
10	132,441,413.86	137,119,746.02	-4,678,332.16	-3.53
11	277,828,528.74	287,999,617.29	-10,171,088.55	-3.66
12	193,218,405.12	193,309,405.14	-91,000.02	-0.05
13	144,519,708.86	154,519,608.27	-9,999,899.41	-6.92
14	5,951,810.00	6,646,893.00	-695,083.00	-11.68
15	7,598,465.00	7,156,246.00	442,219.00	5.82
16	8,981,124.00	8,148,347.00	832,777.00	9.27
17	8,439,991.00	9,084,489.00	-644,498.00	-7.64
18	8,629,934.00	8,806,657.00	-176,723.00	-2.05
19	7,884,936.00	7,878,570.00	6,366.00	0.08
20	7,356,186.00	6,770,824.00	585,362.00	7.96
21	8,819,514.00	9,208,789.00	-389,275.00	-4.41
22	9,904,513.00	10,690,800.00	-786,287.00	-7.94
23	8,432,619.00	7,605,941.00	826,678.00	9.80
24	7,581,462.00	7,764,941.00	-183,479.00	-2.42
25	7,192,663.00	6,860,022.00	332,641.00	4.62
26	7,811,185.55	7,571,841.00	239,344.55	3.06
27	9,675,943.00	10,801,826.00	-1,125,883.00	-11.64
28	90,105,082.15	90,259,063.00	-153,980.85	-0.17
29	80,403,517.00	70,966,421.00	9,437,096.00	11.74
30	60,260,788.00	60,777,067.00	-516,279.00	-0.86
31	60,986,413.00	60,895,476.00	90,937.00	0.15
32	70,905,854.00	70,478,649.00	427,205.00	0.60
33	70,476,532.00	60,779,866.00	9,696,666.00	13.76
34	32,786,450.00	32,796,640.00	-10,190.00	-0.03
35	82,000,000.70	81,900,850.32	99,150.38	0.12
		Grand Total = 8.41 / 35 = 0.24%		

Table 2 shows the breakdown of Quantity Surveyor estimates and the amount that actually completed the project. The difference in percentage shows that there is an average of 0.24% from the estimated contract sum and final account which means that there is a positive linear relationship between estimated contract sum and the final account.

Table 3 shows the factors responsible for the discrepancy between the estimated figure and the final account figure for the 35 projects studied. The findings shows that 8 of the projects (22.85%) indicated that design changes ranked the highest among the factors responsible, 7 projects (20%) identified that fluctuation in the price of raw materials, 6 projects (17.14%) identified inflation relative price change as responsible for the discrepancy, 5 projects (14.28%) identified exchange rate as factor responsible, 4 projects (11.42%) identified poor project management as the factor responsible for the difference, 3 projects (8.57%) indicated that shortages of materials and plant caused the difference in the prices, while 2 projects (5.71%) identified unexpected ground conditions as the factor that influenced the discrepancy between the initial estimates and the final account figure.

Table 3: Factors influencing the cost of project

Factors	Number of projects	Mean (%)
Design changes	8	22.85
Exchange rate	5	14.28
Shortages of material and plant	3	8.57
Unexpected ground conditions	2	5.71
Fluctuation in price of raw materials	7	20.00
Poor project management	4	11.42
Inflation relative price change	6	17.14
Total	**35**	**100**

Design change was identified as the most important factor that affects the cost of a project this occurs when client adds additional elements in the projects, Fluctuation in price of raw material, Economic crisis, raw material prices knew only one direction upwards the sky seemed to be the limit, prices increase with irregularity and without any discernible pattern. Companies have a hard time correctly judging the risk of strongly fluctuation of raw material costs. Exchange Rate: Exchange rates are particularly affecting the cost of construction of constructing services or other elements regarding the project are purchased from other countries. These findings are consistent with the findings of McDornalds (2014) and Nega (2008) whose findings indicates that design changes if not properly controlled can inflate the cost of a project and ultimately inflates the initial estimates of projects. Nigeria is particularly noted for importing several materials mostly of specialist mature. If the exchange rate goes beyond the anticipated value then the cost of the project will be affected. Shortage of material and plant during periods where the level of development activity is unusually high in a particular region. There may be shortages of some construction materials, construction plant (machines and equipment used during construction) and service plant (equipment used in the operation of the infrastructure project). If this was not anticipated in the original cost estimate, delays may occur and the prices of these elements increase. Inflation/Relative price changes: Inflation can increase original estimate of construction costs. It is possible that this factor may have been included in the determination of the cost of the project, but if the rate of inflation increases beyond the anticipated level during the construction period, then the original cost estimate will be exceeded. Unexpected ground condition. This factor is not surprising as most construction projects experience such unexpected condition in the light of the expectation the bill of quantities of construction projects are deemed as provisional it is true that preparation is required

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before a construction project commences but every detailed item of a construction project cannot be known or shown no matter how well the construction drawings and specification are prepared. Some things can be learned only as construction is taking place. Changes in surface ground condition can result in several problems including difficulty in actually moving machinery and suppliers around the site and in undertaking excavation and laying foundation. This can be also increase costs and add to the construction time required. These findings conform with the findings of Ali (2017), Aibinu & Pasco (2008), Aiyetan *et al.* (2015)

Conclusion

Construction and building projects are progressively reaching a point of complexity in terms of size and cost. In other industries the cost of product is based on known manufacturing cost whereas in construction most projects must be priced before they are constructed making the industry distinct with risky operations. One important factor which plays a role when the performance of a construction project is cost. Indeed this factor is affected by various factors. They study found that unexpected ground conditions, design changes, shortages of material and plant, exchange rate and inflation / relative price changes are the factors that courses the cost of construction to overrun the initial budget. Subsequently the process of price determination this estimation is also impacted by several factors. The study discovered that complexity project, labour productivity, insufficient time, inadequate information, lack of availability of equipment, incomplete drawing and detail design, computerized estimation software, experience or qualification of quantity surveyor estimator, new/innovative techniques or material, financial factors, government policy and time allowed to prepared the estimate as the factors affecting the accuracy of a construction project.

Recommendations

1. Enough information about a project should be gathered to enhance the quality of estimate client should decide fully on their requirement for a particular project so that same can be incorporated in the design of the project.
2. It is recommended for contractors to be attentive about construction materials and prices, so they are advised to make purchase of the amount of material for construction prior to the commencements of work. Time schedule for material delivery to the site and usage of materials should be prepared in order to avoid shortage of materials.
3. Clients are recommended to allocate ample time to enhance the accuracy of estimates prepared by contractors. Contractor on the other hand should expedite the decision to tender so as to preserve enough time for estimate preparation thereby easing the pressure on estimators.
4. The estimator's expertise is one of the primary requirements for a successful project, so these suggestions for improvement may only be considered as a process similar to the feedback system to train the juniors by looking at past mistakes, discrepancies change does not happen overnight, this can provide a starting point for estimators to establish a routine for reviewing all projects after completion.

References

Ali MA 2017. Factor Affecting Accuracy of pre-tender cost Estimate in Gaza strip Msc Thesis. The Islamic University-Gaza.

Aibinu AA & Pasco T 2008. The accuracy of pre-tender building cost estimates in Australia. Construction Management & Economics.

Aiyetan, A & Olatunji 2015. Factors influencing construction productivity. *OOA Journal* 6(4).

Akintoyeni A 2016. Factors influencing project cost estimating practice construction. *Management and Cost Economics* 2(1).

Aliyu B 2015. Appraisal of accuracy of Early Cost Estimate in Nigerian Construction Industry Unpublished B.sc Thesis Quantity Surveying Department Ahmadu Bello University, Zaria.

Alumbugu PO, Wasiu AO, Ibrahim A, Mustapha M & Abdulmumin A 2014. Assessment of the factor affecting accuracy of pre-tender cost estimate in Kaduna State, Nigeria. IOSR *J. Envtal. Sci., Toxico. and Food Techn*.

Ashworth 1999. Cost Modelling in Building in Value. Arnold, London.

Dysert LR 2006. Is "Estimate Accuracy" an Oxymoron? 2006 AACE International Conference of Cost Estimating Transactions. University of West Africa Mubi.

Enshassi A, Mohamed S & Madi I 2007. Cost Estimation Practice in The Gaza Strip

Mohammed A, Mohammed T & Nidani B 2013. Factors influencing accuracy of construction project cost estimates in Pakistan: Perception and reality. *Int. J. Construction Mgt.*, 15(1): 59-70.

Farrukh AM, Sarosh & Nida 2013. The accuracy and monitoring of quantity surveyors' price forecasting for building work. *Construction Management & Economics.*

Henderickson C & Au T 1989. Project Management for Construction: Fundamental Concepts for Owners, Engineers, Architects, and Builders.

Ibrahim AD 2015. Procurement and its cost implications on construction projects. *NIQS* 2(1).

Mohammed A, Mohammed DA & Nida T 2013. Factors influencing construction time and cost overruns on high-rise projects in Indonesia. *Int. J. Projects and Architec. Mgt.*, 5(2) 211-227.

Larison A & Grey R 2011. An assessment of factors responsible for failed projects . Architecture Technology, 12(3).

Liu L & Zhu K 2007. Improving cost estimates of construction projects using phased cost factors. *Journal of Construction Engineering & Management*.

Mohammed M & Madi T 2017. How reliable are tender estimates? *Int. J. Construction Estimating,* 1(5): 11-23.

Morrison N 2014. The accuracy of quantity surveyors' cost estimating. *Construction Management & Economics*.

Aiyetan, Ayodeji & Olatunji (2010) quantity surveyors estimates, how reliable? International *J. Quality and Quality Mgt.,* Vol 1(5): 57-63.

Muhammad TH, Mohammed H, Ghaleb J & Rateb JS 2018. Factors affecting the accuracy of cost estimate: Case of Jordan. *Engr., Construction and Architec. Mgt.,* 25(1): 113-131.

Odunsami KT & Onukuube HN 2017. Factors affecting the Accuracy of pre-tender cost estimate in Nigeria. In the construction building and real estate research conference of the Royal institution of chartered surveyors; held at Dublin Institute of Technology.

Odusanmi Y & Onukwube HN 2016. An evaluation of factors which influence tender prices of building woks in Nigeria Journal of the Nigeria Institute of quantity surveyors 1(1).

Oladokun MG, Oladokun AA & Odesola IA 2010. The Accuracy of pre-tender cost estimates of consultant quantity surveyors in Nigeria. *OAU*, 5(1).

Olatunji O 2016. Factors influencing contrators performance in the tendering process. *Environtech*., 5(1): 25-32.

Larson G & Gray TN 2011. An assessment of the accuracy of quantity surveyors estimates in construction projects. *J. Construction and Econs.*, 6(2): 155-177.

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