Contractor project estimates vs. consultant project estimates in Ghana


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COBRA 2010

The Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors

Held at Dauphine Université, Paris, 2-3 September 2010

ISBN 978-1-84219-619-9

12 Great George Street
London SW1P 3AD
United Kingdom

www.rics.org/cobra

September 2010

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Contractor project estimates vs. consultant project estimates in Ghana

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Ten projects constructed in Ghana between 2003 and 2010 are examined and analysed to ascertain the reliability of estimated costs provided for the projects. Cost estimates for five of the projects were calculated by consultants and cost estimates for the five remaining projects were calculated by contractors. Cost estimates prepared by contractors seemed to be closer to actual costs than estimates calculated by consultants. Projects estimated by consultants experienced an average cost overrun of 40% and time overrun of 62% whereas projects priced by contractors experienced an average cost overrun of 6% and time overrun of 41%. It seemed that contractors had a better understanding of the actual construction processes and a clearer expectation of the needs of the client hence an ability to calculate estimates that were closer to reality. Construction clients in Ghana should rely on contractors for more realistic cost estimates as estimates by consultants may be inaccurate. Where consultants are employed, an allowance of up 40% should be added to the estimated costs as a margin for inaccuracy.

Keywords: consultant, contractor, cost estimate, Ghana.

1. Introduction

The preparation of a cost estimate is an important part of the procurement process of a construction project because it forms the basis of the price upon which a contract is let (as explained in Murdoch and Hughes, 2008). However, in practice, project estimates are not always accurate (Akintoye and Fitzgerald, 2000). Sometimes the cost estimate for a project is calculated by a builder or contractor. At other times, a consulting estimator or quantity surveyor (in Ghana) is employed to calculate the estimate. An analysis of ten projects constructed in Ghana between 2000 and 2010 shows that cost estimates calculated by contractors may be more reliable than estimates calculated by consultants.

2. Literature review

An estimate is a projection of the most likely costs of a project (Smith, 1986 and Brook, 2004). A group of UK estimators with a collective experience of over 100 years defined an estimate as: “A reasonably accurate calculation and assessment of the probable cost of carrying out defined work

under known conditions" (Harrison, 1981). The main purpose of an estimate is to give an idea of likely construction costs and to provide a basis for the contract price (Hackett *et al*., 2007: 27-28).

The elements of a construction estimate include the costs, overheads, profit, contingency and preliminaries (Smith, 1986). A questionnaire survey of 84 UK construction firms by Akintoye and Fitzgerald (2000: 165) revealed 14 different techniques for preparing cost estimates: estimating standard procedure, comparison with past similar projects based on personal experience, comparison with similar past projects based on documented facts, established standards, intuition, arithmetic formula, estimating software, published price information, capital estimating factors, shared information with subsidiary of the firm, range estimating, guessing, shared information from other firms and complex statistical formulas.

According to Smith (1986), the traditional steps involved in calculating a cost estimate are: the establishment of 'all-in' rates for key items such as labour, gang costs, and plant rates; the use of these 'all-in' rates together with prices per unit for materials in order to calculate unit rates for each item in the bill; the determination of the value of preliminaries once the 'measured' items within the work sections have been priced; the addition of PC and provisional sums contained in the BQ together with any general and special attendance items which may have been priced; the addition of domestic subcontractors' quotations for work to be sublet. Hall (1987) explains that each price build-up comprises the cost of materials (based on quotations from suppliers and merchants), unloading (including allowances for unloading), waste (2.5%-15%), labour, plant, and sundry items. The production of an estimate will typically be based upon the instructions to tenderers, specifications, conditions of contract, drawings, bill of quantities and standard form of contract (Buchan *et al*., 1993). Thus, in order to prepare a detailed estimate, the estimator must have the: clear plans, sections and other relevant details of the work; specifications indicating the exact nature and class of materials to be used; and the rates at which the different items of work are carried out.

Akintoye and Fitzgerald (2000) identified 20 causes of inaccurate cost estimate as insufficient time for estimating; poor tender documents; Insufficient tender document analysis; lack of understanding of project requirements; poor communication between project team; low participation in estimating by site team; lack of review of cost estimate by management; poor comprehension of site requirements; poor feedback on accuracy previous estimates; pressure from management; removal of estimate padding by management; poor project cost feedback; lack of diligence by estimators; lack of adequate guidelines for estimating; inaccurate production data used in estimating; lack of historical data on past estimates; poor analysis of cost data for cost estimate; lack of performance reviews of estimators; estimators' lack of data processing techniques; and frequent requests for changing of estimate.

3. Research method

The main research method used was documentary analysis and unstructured interview. This helped to obtain in-depth knowledge about the projects. Access was negotiated into the offices of a construction firm to enable the researcher carry out a thorough examination of files related to past projects. The projects were selected from a sample of projects constructed after 2000 to help obtain data that is quite recent. Out of ten projects selected, the cost estimate for five of them was calculated a consulting Quantity Surveyor (QS). Cost estimates for the remaining five was calculated by the contractor. For each project, the researcher examined the project files to record the data required.

4. Case studies

Ten construction projects executed in Ghana between 2000 and 2010 were examined and analyzed (see Tables 1 and 2). In the first group of five projects in Table 1 (CS01-CS05), the clients prepared their design and gave it to a consulting Quantity Surveyor to prepare a Bill of Quantities (BQ) for the project. The BQ was then given to a set of bidding contractors to price. Thus, work quantities in the BQ were supplied by the QS and contractors only had to insert a unit rate against the bill items. The projects CS01-CS05 were mainly public office buildings and an auditorium / lecture theatre complex.

In the second group of five projects in Table 2 (CS06-CS10), the clients prepared their design and gave it directly to a set of bidding contractors for a price. Thus in the first group of projects (CS01-05), work quantities were calculated by a consulting QS whereas quantities for the second group of projects (CS06-CS10) were calculated by the contractor. The second group of projects (CS06-CS10) were mainly industrial works constructed for private clients.

4.1 Analysis of consultant-priced projects

Table 1 examines and analyzes consultant-priced projects between 2000 and 2010. The main features of each of the projects examined and analyzed in Table 1 is as follows:

Table 1: Case studies of consultant-priced projects in Ghana

Case study	Type of job	Year	Location	Cost (Ghana cedis)		Difference (Overrun)	Time (months)		Difference (Overrun)
				E	F		E	F	
CS01	Office building	2007-08	Takoradi	916,402	1,511,160	+594,758 (65%)	8	9	+1 (12%)
CS02	Office building	2006-07	Takoradi	557,300	740,498	+183,198 (33%)	18	25	+7 (39%)
CS03	Auditorium bldg	2003-10	A. region	436,082	1,362,144	+926,062 (212%)	8	77	+69 (863%)
CS04	Office building	2003-04	C. Coast	409,929	509,608	+99,678 (24%)	6	8	+2 (33%)
CS05	Office building	2000-04	Takoradi	810,050	1,100,000	+300,000 (37%)	15	27	+12 (80%)
AVG					1,044,682	+420,739		29	18.2

Notes: Cost (+ over-budget or – under-budget) Time (+ over-time or - under-time); E – Estimated; F - Final

CS1: The original duration was for 8 months. The final duration was 9 months. The job was supposed to start in January 2007. However, immediately after site clearance and excavation started, due to unexpected/unforeseen ground conditions, the works could not continue and the entire substructure

works needed to be re-designed. The project consultants took one month to prepare a revised design for foundation and substructure works. Thus the project started in February 2007. There was also a delay of one month towards the end of the project. This delay resulted from design for external works and approval for its payment. Initially the client was reluctant to pay for re-design of the external works. However, later, the client paid albeit with a reduced work scope.

CS2: The estimated cost and time for this CS2 was 557,300 and 18 months. It ended up at 740,498 and 25 months. This represents a cost overrun of 33% and time overrun of 39%.

CS3: The anticipated final cost is now 1,400,000. This project started in October 2003 with an estimated cost of 436,082 and construction time of eight (8) months. As at March 2010 the project is till not completed and has exceeded its original time by over 69 months i.e. over six (6) years. The main reason was because of changes to the original design and plans for the project. Specifically, the new additions included the construction of reinforced concrete retaining wall in groundwater conditions; the creation of a basement; construction of a suspended floor; construction of additional reinforced concrete suspended fascia; and creation of additional four floor volume space. These changes resulted in the use of more plant and heavy equipment than originally intended for the contract with it attendant of same and fuel consumption; more intensive and regular use of surveyor on site to establish levels of work; increased use of senior level supervisory personnel; and the use of 150% more scaffolding in that area than envisaged. The most significant reason for the delay was a one-and-a-half year delay in payment - GHC 660,000,000. Currently, as at March 2010, there is an outstanding payment of GHC 980,000,000 which has been overdue since October 2009 i.e. for over five months. Unfortunately, according to the contractor “not all the accompanying cost of the above installed items can be recovered on all the unit rates of the new or additional works”. An estimate for the additional cost in preliminaries resulting from the changes covered the use of a foreman to establish lines, levels and condition of the work; extensive use of scaffolding for additional works; evacuation of debris and increase cleaning and disposal of the rubbish.

CS4: Delayed payment of certificates, nominated subcontractors (glazing/electrical and cashier cubicles late arrival on site; additional works to substructure)

CS5: This project had eight subcontractors. Handing over date was 29 October 2004.

4.2 Analysis of contractor-priced projects

Table 2: Case studies of contractor-priced projects in Ghana

Case study	Type of job	Year	Location	Cost (GH cedis)		Difference (Overrun)	Time		Difference (Overrun)
				E	F		E	F	
CS06	Mechanical installations	2007	Takoradi	370,000	370,000	0 (0%)	2.5	3.8	+1.25 (50%)
CS07	Retention system	2009	Takoradi	101,000	101,594	594.50 (1%)	3.5	5	+1.5 (43%)
CS08	Fender system	2008	Takoradi	292,212	295,072	2,860 (1%)	6	10	+4 (67%)
CS09	Sundry Works	2008-2009	Takoradi	151,545	151,545	0 (0%)	3	3	0 (0%)
CS10	Test bench for engines	2006-2007	Takoradi	290,000	360,010	70,010 (24%)	4	11	+7 (175%)
AVG					255,642	+14,961		6.6	+2.75

Notes: Cost (+ over-budget or – under-budget) Time (+ over-time or - under-time); E – Estimated; F - Final

Table 2 examines and analyzes contractor-priced projects between 2007 and 2010. Main features of each of the projects examined and analyzed in Table 1 is as follows:

CS6: Estimated contract time was 10 weeks. Contractor handed over in two phases. The actual completion time was 15 weeks. Three weeks was due to the plant that the client wanted to install. Some of the pins for the new plant could not fit into the existing holes so the plan had to be dismantled and fixed separately. For some aspects we had to construct new separate foundations. Two weeks was due us, contractor. Our subcontractor delayed in carrying out his works - metal fabrication. The subcontractor eventually had to abandon site because he seemed to have underestimated the expenses involved. So he thought he would lose. In the contract there was a clause that we could take it from him if he could not do it. So we drew on his performance bond and it led to the collapse of his company.

CS7: Delay caused by contractor's cashflow problem. The client was paying on time.

CS8: Clinker loading fender system at the clinker jetty. The reason for the increase in cost was as a result of additional works. The reasons for delay are (1) late delivery of client supplied elements; (2) higher than anticipated off-times as a result of client use of facility. The client was using the facility so we could not have access to work.

CS9: Project was finished on schedule and final price was the same. Client did not have cash flow problems and contractor also used all the money on this project for the job.

CS10: This job was priced in Euro. The job was supposed to end in Feb 07 but ended in Sept 2007. The variation in cost is due to additional works. According to the contractor, "The cost was agreed but the payment which had to come did not come so things had to shift and shift".

5. Discussion

Direct comparison of analyses and results from the two sets of projects in Tables 1 and 2 would be hard. However, the main point of the comparison here is to present a preliminary picture of how projects estimated by consultants and those estimated by contractors turn out in terms of cost and time performance. The analyses here shows that project estimates calculated by contractors (Table 2) ended up with lower levels of deviation from expected outcomes whereas project estimates calculated by consulting QSs (Table 1) ended up with high levels of deviation from expected outcomes.

Four main points are brought forward from the results for discussion. Tables 1 and 2 present results that can inform stakeholders of the construction sector in Ghana on issues including the accuracy of contractor and consultant project estimates, contractor project selection, skill of consulting QSs and apportionment of estimate and price responsibility.

5.1 Contractor vs. consultant estimates

The analyses in Table 2 shows that projects that were priced by the builders themselves had an average actual value of GHC 255,642 with an average cost and time overrun of GHC 14,961 and 2.75 months respectively. On the other hand, Table 1 shows that projects that were priced by consulting QSs had an average actual value of GHC 1,044,682 with an average cost and time overrun of GHC 420,739 and 18.2 months respectively. Hence, projects priced by contractors (CS06-CS10) would seem to have better cost and time performance than projects estimated by consultants (CS01-CS05).

5.2 Project selection and cash flow

The analyses in Tables 1 and 2 indicate that contractors in Ghana might be better off selecting relatively smaller projects owned by private clients in comparison to bigger projects owned by public clients. Projects owned by public clients (CS01-CS05) recorded an average cost overrun of 40% and time overrun of 62%. On the other hand, projects owned by private clients (CS06-CS10) recorded an average cost overrun of 6% and time overrun of 41% (see Table 3). On the face of it, projects in Table 1 (CS01-CS05) are bigger in value in comparison to projects in Table 2 (CS06-CS10). However, in terms of monthly cash flow, projects in Table 1 (CS01-CS05) generated an average of GHC 39,029 for the contractor whereas projects in Table 2 (CS06-CS10) generated GHC 35,777 (see Table 3). Hence, it can be seen that in terms of the monthly cash flows needed to sustain a business, projects in Table 1 and Table 2 are closely matched.

Table 3: Cash flow, cost overrun, time overrun analysis

Description	Group A projects (CS01-CS05)	Group B projects (CS06-CS10)
Average cash flow generated per month	39,029.39	35,776.79
Average cost overrun	40.27%	5.747%
Average time overrun	62.33%	41.98%

5.3 Skills of consulting quantity surveyors (QSs)

Results presented in Tables 1 and 2 bring into sharp focus a perennial complaint articulated by many construction clients in Ghana that consultants hardly perform a thorough job when it comes to providing design and estimating services. With projects estimated by contractors recording an average cost overrun of 6% and projects estimated by consultant QSs recording an average cost overrun of 40%, valid questions can be raised on whether consulting QSs have sufficient experience required to price a job well. In Ghana, actual site experience is not a prerequisite for becoming a Quantity Surveyor. As a result, many QSs do not strive have practical or actual site experience. This makes it difficult for them to envisage all the aspects to a construction project that they are estimating. In addition to this, in the industry in Ghana, there are no penalties or responsibility for inaccurate estimates or even wrong estimates. As a result, many consulting QSs hardly take the pains to produce

very detailed BQs, i.e. in cases where the QSs have the capacity to do so. A lot of QSs would simply prepare a bill titled as "Bill of Approximate Quantities" with the hope that actual construction costs would be known when the actual constructions begins and contractors submit their interim valuations. Clearly, this situation is a far cry from the teachings of modern project management (see PMI, 2004).

The main difference appears to lie in the calculation of quantities. When the quantities are calculated by the builder/contractor the variation between final and estimated expenses is very little (with an average cost variation of 5% and time variation of 1%). Quantities estimated by consultants tend to vary significantly from final construction costs (with an average cost variation of 75% and time variation of 50%). This may be due to either a lack of inability of consultants to appreciate the actual construction processes or lack of attention to detail. Most of the quantities seemed to be provided as approximate quantities. With the bills/quantities calculated by the contractors, the contracts were fixed price so that seemed to be an incentive to price the job well. Clients should appoint competent consultants who can provide accurate quantities or apportion quantities risk to their consultants. This will act as an incentive to get them to estimate and price a job well.

5.4 Short-cutting lines of construction procurement

On reasons why contractor-priced projects appeared to perform better than consultant-priced projects in terms of cost and time overrun, the Technical Manager explained it as follows: "We believe we do a thorough job to get the final cost; We make sure we understand what the client want; And also the lines of communication between us and the client is shorter, we have direct access to the client. In the other case, i.e. where consultants are leading the project, you have to talk to the client through the consultant. All those things waste time and result in cost increase.

6. Conclusion

The research here shows that project estimates calculated by contractors may be more reliable and accurate than estimates calculated by consultants. The main reason is because contractors may have a better understanding of the construction process. Clients in Ghana are advised to take advantage of a contractor's expertise when it comes to preparation of cost estimates. Project estimates calculated by consulting QSs may be inaccurate and final outcomes could exceed projected estimates by up to 40%. Hence, clients would be wise to use contractors to estimate the quantities and price of work, or add an allowance of up to 40% on top of consultant estimates as a contingency for errors and inaccuracies. Two issues that also emerged from observations in this study were first, consultants bear no penalty or responsibility for inaccurate estimates; and second BQs prepared by consulting QSs in Ghana are often "approximate" rather than "accurate" quantities of work. These issues should be addressed.

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