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The tendering process and performance analysis of a public building project in Ghana

Samuel Laryea

School of Construction Management and Engineering, University of Reading, UK, RG6 6AW

s.laryea@reading.ac.uk

1. Abstract

A case study on the tendering process and cost/time performance of a public building project in Ghana is conducted. Competitive bids submitted by five contractors for the project, in which contractors were required to prepare their own quantities, were analyzed to compare differences in their pricing levels and risk/requirement perceptions. Queries sent to the consultants at the tender stage were also analyzed to identify the significant areas of concern to contractors in relation to the tender documentation. The five bidding prices were significantly different. The queries submitted for clarifications were significantly different, although a few were similar. Using a before-and-after experiment, the expected cost/time estimate at the start of the project was compared to the actual cost/time values, i.e. what happened in the actual construction phase. The analysis showed that the project exceeded its expected cost by 18% and its planned time by 210%. Variations and inadequate design were the major reasons. Following an exploration of these issues, an alternative tendering mechanism is recommended to clients. A shift away from the conventional approach of awarding work based on price, and serious consideration of alternative procurement routes can help clients in Ghana obtain better value for money on their projects.

Keywords: case study, contractor bidding, Ghana, project performance, tendering process.

2. Introduction

A case study of the tendering process and cost/time performance of a public building project constructed in Ghana within the last 10 years is presented. Construction projects may finish over-budget and over-time. The final account of a major construction project in Ghana was analyzed using a before-and after experiment to ascertain the extent of cost and time performance. Unstructured interviews with some of the project consultants helped gain a

better understanding of the client's tendering process and procurement approach. Another area of interest was to ascertain whether contractors with similar characteristics respond differently to the requirements and risks in a common project. This was done by analysing the bids submitted by each contractor for the same project. Consequently, documents and proceedings of the whole tendering process were examined to understand other issues in relation to the quality of tender documents and the difficulty experienced by contractors in pricing the job.

Clients have various strategies for tendering and selecting a suitable contractor, at a time appropriate to the circumstances, and to obtain from him at the proper time an acceptable tender or offer upon which a contract can be awarded (Hackett *et al*., 2007: 27). Once a project starts, one parameter that is not always simple to define and measure is performance. This is because of the different criteria that could be used to assess performance. Traditionally, cost, time and quality have been the parameters for assessing performance in construction (Ahmed *et al*., 2004).

Nowadays, some of the new concepts for measuring performance include value and whole life (Hackett *et al*., 2007). These concepts focus on the long-term business needs of a client in order to deliver the expected benefits whiles minimising the use of resources. The concept of whole life emphasises attention beyond just the construction phase but also the practicality of design, running costs, maintenance costs, ability to be remodelled to allow changes in use, and ease of extension). Conceptually, value for money can be understood as achieving the optimum use of resources (Hackett *et al*., 2007: 41). Therefore, performance measurement has become a more complex issue, and will depend on the particular needs of a client.

It is important to learn lessons from projects (Williams, 2004). However, project post-mortems may not happen very often. This may be due to several factors including the reluctance to place especially poor performances in the public domain. Williams (2004: 273) has suggested that another reason might be the difficulty in identifying the 'hard', non-intuitive lessons from projects, such as those resulting from feedback and dynamic, systemic effects (which are difficult to discern intuitively and can greatly exacerbate initially small effects). Access to the required information may also be another reason. A post-mortem of projects can provide lessons for continuous improvement in project performance (Williams, 2004).

Here, a case involving a tendering process where five contractors were given only drawings and specifications, without bill of quantities, to submit a tender price is investigated. This case was thought to provide a scenario where the contractors would price more cautiously because of the fixed price conditions. The issues examined include the: purpose of the project, method of procurement, tendering process, bids submitted by contractors, tender evaluation process, and an anatomy of the project. It was difficult to obtain a more recent case. This was because of the sensitive nature of the data involved and the need for a tender based on only drawings and specifications.

3. Research method

The data required were as follows: contractor bids for the project, correspondence during the tendering process, tender queries and responses, final account of the project, and interviews with the project consultants about the actual proceedings of the tendering process and the project itself in the construction phase. Hence, the project consultants were the main subjects of the study, while the project itself was the main focus. The main method used was a before-and-after experiment of the entire project (Gill and Johnson, 2002). The expected cost/time estimate at the start of the project was compared to the actual cost/time values, i.e. what happened in the actual construction phase. This was followed by unstructured interviews (Wilkinson and Birmingham, 2003; Denscombe, 2007) with the project consultants to ascertain the drivers of those significant differences between the expected estimates and actual costs to the client. Here, the aim is to simply present the case study.

4. Project description

The project was commissioned by a public sector organisation to provide commercial offices in the capital city, Accra. The estimated cost was around $24m. The estimated time was 30 months. The traditional method of procurement was used. A leading architectural firm in Ghana did the design, and a leading quantity surveying firm prepared a blank bill of quantities (BQ) that was issued to selected contractors. Nine major contractors were recommended to the consultants by the client's technical department based on their known capabilities and track record. All were European-owned firms working who has previously worked either in Ghana or one of Ghana's neighbouring countries.

5. Background to the tendering process

The client used selective tendering instead of the common open tendering system used by most public organisations. There were three main reasons: first, two of their completed projects had just ended up grossly over-budget and over-time. Therefore, the client had hoped to avoid a similar situation by using contractors with known capabilities and a better forecast of the project costs. Consequently, the selected contractors were given only drawings and specifications to take off their own quantities and offer a price the job; second, the client realised that the arbitrary allocation of prime cost sums and provisional sums were a major cause of the massive overruns experienced in some of their previous jobs. Therefore, it was hoped that actual estimates would now cover every aspect of the project; third, the client had hoped that drawings and specifications will be fully complete because of the fixed price. The next sections will show whether the client achieved these aims.

6. Proceedings of the tendering process

5.1 Tender documents

The tender documentation issued to the contractors comprised a blank bill of quantities, working drawings, and schedule of basic prices and preliminary items of work. The bill of quantities contained the instructions to bidders, sample form of bid security, form of tender, sample form of performance bank guarantee, sample form of bank guarantee to advance payment, articles of agreement, conditions of contract, and specifications. Nine contractors purchased the tender documents.

5.2 Bid submission requirements

The invitation letter specified the documents that should be included in the bid submission as follows: a valid social security clearance certificate; a valid tax clearance certificate; a valid company registration certificate; a valid certificate of financial classification from the government Ministry of Works and Housing; a valid labour certificate; a bid summary page; a form of tender; a confidential contract report; an outline programme of works; any other information deemed relevant to the bidder (signed and stamped); current bank statement

covering a period of six months immediately preceding the date bid documents are collected; and a bid security to the value of 2.5% of the total contract sum.

5.3 Contractor queries

Table 1 shows that altogether, contractors sent 239 written queries to the consultants for clarifications regarding several aspects of the tender documentation, during the tendering process. According to the contractor queries, several aspects of the architectural design drawings did not match with the structural design drawings. Because descriptions in the BQ were annotated (and not elemental), contractors also said it was difficult for them to relate some of the bill items to the exact location of works.

Table 1 Sources and distribution of queries

Query areas	No. of queries
Lack of data on appendix of conditions of contract	1
Lack of information on terms of advance payment	1
Omission of addressed tender return envelope	1
Requests for more design details	58
Requests for more specification details	15
Inadequate descriptions in BOQ	2
Omission of items in drawings from BOQ	92
Discrepancies between bill descriptions and drawing information	8
Items in BOQ not reflected in drawings	61
Total	239

This number of queries does not include any informal enquiries that might have been made through telephone or face-to-face discussions during the site visit or visits to the architect's office. Queries in relation to services installations - plumbing, electrical and lift installations, air conditioning, and fire fighting are also not included since they were outside the scope of main contractor's work. The specialist works were tendered separately. The analysis of the query sheets showed that some of the contractors actually outsourced the work to quantity surveying firms in Ghana. Some of the bidders did not have a full complement of estimating staff in Ghana. Other thought the bidding time was too short. Finally, some preferred to use the local firms because of their knowledge of the prevailing local conditions.

5.4 Bids received

Out of the nine contractors who purchased the tender documents, just five submitted a bid. Out of the four who failed to tender, one of them returned the documents with an explanation

that the bidding time of seven weeks was too short. Two of them simply wrote to decline further participation in the whole tendering process. The fourth one simply failed to show up on the tender submission day.

5.5 Bid evaluation

The contractor selection was based on a three-stage bid evaluation process as follows:

- First, each received bid was assessed for responsiveness. A contractor who submitted a bidding price, and attached all specified documents in the invitation letter was qualified into the second stage. At this stage, all five bids were qualified for the next stage.
- Second, a merit point system was applied where each bid was weighted and awarded points for the following parameters: bid figure – bidding price (30%); bid quantities (20%); presentation of bid documents (5%); personnel and staffing (5%); background and experience (15%); workload (5%); plant and equipment holding (10%); and basic rates and prices (10%).
- Third, a bidding price outside ±10% of the consultant's estimate is disqualified from the final stage. Two bids fell outside the consultant's control estimate. One fell below; one above. Therefore, the competition now remained between three contractors. In the end, the lowest bidder according to the criteria established by the merit point system won the job. This shows that the most important criterion of the client was price. A maximum point (30) was awarded to the lowest offer within ±10% of the consultant's estimate. This is then used as the reference point to award merit points to the other bidders on a pro-rata basis. The quantities of major items in the project are also evaluated against the consultant's quantities. Major items of work measured by bidders averaging 5% outside the consultant's quantities were rendered non-responsive.

7. Analysis and results

Tables 1-12 present the information on the project performance. Tables 1 (above) and 2 show that 239 queries were issued by contractors during the 7-week tendering process. 92 of the queries sought clarifications concerning information in the working drawings that were not captured in the BOQ. 61 requested for information on items stated in the BOQ that did not reflect in the drawings. 58 requested for additional details to make the design information clearer to price. The rest were for clarifications concerning specifications, discrepancies between BOQ information and drawing information, lack of details in BOQ descriptions, lack

of information regarding terms of advance payment, omission of data from the appendix to contract conditions, and omission of addressed tender return envelope.

Table 2 Queries by work areas

Work section	No. of queries
Substructure	35
Concrete work (concrete, reinforcement, formwork)	32
Block work / Walls	9
Joinery (doors, windows, frames, etc.)	45
Finishes (floor, wall, and ceiling finishes)	58
Tender documents	25
Metal / Structural steel work	6
Roofing	10
Painting and decorating	8
External works	11
Total	239

Table 2 shows the areas of work which attracted the most queries from contractors. This data can help consultants to identify the areas where to provide more information in working drawings. Finishes relating to floors, walls and ceilings attracted the most queries (58) for clarification. The next 45 queries were on joinery work such as doors, windows, frames, etc. The bidders wanted to know the specific types of doors, windows, and frames that were required in order to enable them to price it well. Queries on substructure (groundwork) and concrete work (concrete, formwork, reinforcement) were evenly distributed. The other queries related to the external works, structural steelwork, block work, and the tender documentation.

Table 3 Project cost performance

Description	Amount ($)
Estimated project cost	23,652,854
Final project cost	27,878,405
Cost overrun	4,225,550 (18%)

Table 3 shows that the project exceeded the expected cost by 18% despite the client's initial hopes to avoid another overrun situation. However, it is difficult to conclude on this because it is not known what the situation might have been if the client has not taken those precautions.

Table 4 Project time performance

Description	Months
Estimated completion time	30.00
1st contract time extension	8.50
2nd contract time extension	7.50
3rd contract time extension	6.00
4th contract time extension	6.00
5th contract time extension	5.00
Total	63.00

Table 4 may not reflect the client's time performance expectations concerning the project. The planned time was exceeded by 210%, i.e. from an estimated 30 to 63 months. Table 5 shows that variations amounted to nearly 20% of the total cost. However, not all the variations added extra expenses to the final cost. Some of the variations were issued to substitute existing specifications or designs. Others were completely new introductions. Thus, the total variations amount of almost $5.5m did increase the originally estimated $24m to $29.5m. 78% of all the variations related to additional fixings to the project. 11% of the changes related to additional works to main building superstructure. Additional works in the substructure resulted in 5% of the changes. The remaining 6% of the changes related to additional mild steel works, floor trunking, site maintenance office, external works, temporary water supply, additional ancillary works, and security fencing. A better understanding of these areas can help to minimise variations in similar projects of such nature in Ghana.

Table 5 Contract variations

Contract variations	Amount ($)	%
Additional works in substructure	295,232	5.38
Site hut/maintenance office & associated external works	54,135	0.99
Temporary water supply and associated pipe works	23,980	0.44
Entrance gate and ramp	4,215	0.08
Security fencing	20,302	0.37
Gate house - roof protection	7,787	0.14
Re-location of security fencing	5,561	0.10
Additional works to main building superstructure	578,866	10.56
Additional mild steel works	68,606	1.25
Cement block partition	34,179	0.62
Securing of floor trunking with conventions grouting	66,542	1.21
Additional ancillary works	22,094	0.40
Additional fixings	4,301,826	78.45
Total	5,483,330	100.00

Table 6 shows the 12 different nominated subcontractors on the project. The total cost of nominated subcontract works, i.e. around $33m, exceeded the value of the main contractor's work. Out of this, the biggest subcontract work was electrical installation – about 24%. This was followed by air conditioning (22%), curtain walling (19%), glazed aluminium doors and windows (9%), balusters (6%), installation of cleaning cradle (5%), acoustic ceiling (4%), lifts (4%), metal grille and roller shutter doors. Given the number and size of nominated subcontract works, it may be important to evaluate management or coordination ability as one of the criteria for selecting a main contractor for projects of such nature. This can be linked to Table 10 which confirms that subcontractors actually carried out more of the works than the

main contractor. Therefore, improvements in coordination of the practices and activities of subcontractors on site and early appointment could improve project performance.

Table 6 Nominated subcontracts

Description	Estimated cost ($)	Final cost ($)	Difference ($)	%age of works
Air-conditioning installations	7,551,881	7,722,821	170,940	21.92
Plumbing installations	1,747,256	1,804,748	57,492	5.12
Curtain walling	6,844,149	6,844,149	0	19.43
Lift installations	1,166,199	1,273,655	107,455	3.62
Electrical installation	7,722,323	8,380,156	657,833	23.79
Fire fighting equipment	796,766	823,605	26,839	2.34
Acoustic ceiling	1,314,285	1,551,295	237,009	4.40
Metal grille doors	42,142	42,412	270	0.12
Roller shutter doors	63,432	63,432	0	0.18
Installation of balusters	1,830,784	2,007,484	176,699	5.70
Glazed aluminium doors and windows	2,748,937	3,087,552	338,615	8.76
Install cleaning cradle	1,629,726	1,629,726	0	4.63
Total	33,457,886	35,231,041	1,773,155	100.00

Table 7 shows the major quantities making up the total project cost: excavation, reinforced concrete, reinforcement, formwork, floor finishes, and wall finishes. Even for the same requirements in the same project, contractors arrived at different measurements for the same amount of work. Each of the quantities measured by the five contractors for each of the six main areas was different. However, two bidders arrived at the same quantities for excavation. Reinforcement was the area where the bidders' quantities varied most – with a standard deviation (SD) of 66, 676 kg. This indicates a significant finding generally on the sourcing, purchasing and site management of reinforcement.

Table 7 Major bidders' quantities

Description	Bidder 1	Bidder 2	Bidder 3	Bidder 4	Bidder 5	STDEV
Excavation (m3)	9,416	9,484	9,484	8,414	8,856	479.62
Reinforced concrete	7,936 m3	7,844 m3	7,553 m3	7,483 m3	8,314 m3	332.70 m3
Reinforcement (kg)	1,181,389	1,281,111	1,271,673	1,240,784	1,364,724	66,676.60
Formwork (m2)	44,567	46,384	43,874	44,070	45,097	1,005.23
Floor finishes (m2)	13,995	14,403	13,914	13,310	16,300	1,139.86
Wall finishes (m2)	2,647	4,503	4,812	5,945	5,600	1,287.07

The SD for the quantities of formwork, floor finishes and wall finishes were approximately around 1100m^2 each. The five measurements for reinforced concrete and excavation were relatively close with an SD of 333 m^3 and 480m^3 respectively. Thus, there are several possible

ways of explaining the differences. The contractors may have perceived the requirements of the work differently, may have considered different factors, may have priced with different margins of error, may have perceived risks differently, etc. This can be linked to Table 11 where the SD of the five bidding prices was $1.6m.

Table 8 shows the 15 different work sections under which the entire project was performed. The seven biggest sections of the project were metalwork (28%), electrical installations (16%), preliminaries (15%), plumbing and engineering installations (15%), concrete work (11%), plasterwork and finishes (7%), and substructure (5%). The remaining 3% covered costs of the eight other work sections.

Table 8 Work sections

Description	Amount ($)	Percentage (%)
Preliminaries	3,446,991	14.89
Substructure	1,107,735	4.79
Concrete work	2,552,976	11.03
Block work	55,974	0.24
Roofing	238,879	1.03
Carpentry	7,653	0.03
Joinery	257,670	1.11
Structural steelwork	19,320	0.08
Metal work	6,526,339	28.20
Plumbing and Eng. Installations	3,396,000	14.67
Electrical Installations	3,606,500	15.58
Plasterwork and finishes	1,544,959	6.68
Glazing	1,672	0.01
Painting and decorating	77,727	0.34
External works	304,608	1.32
Total	23,145,011	100.00

Table 9 shows interesting results on the project cost performance. The works carried out according to the plan in the original BOQ was only 28%. The remaining 72% of the actual works costs were either the results of variations, fluctuations, extra losses/expenses, or interim property management and maintenance. Because the project delayed for very long, some sections of the work that had been completed long before needed to start receiving maintenance treatments whiles other aspects were being completed behind schedule. The results in Table 12 show that 62% of the fluctuation in prices was related to materials cost while the remaining 38% related to labour costs. Given that fluctuations comprised about 25% of the total project cost value, the early completion of work and stockpiling of materials can result in significant cost savings.

Table 9 Cost performance in relation to original BOQ specifications

Description	Amount ($)	Percentage
Works executed against the contract BOQ	7,824	28%
Variations in BOQ and Contract	8,431	30%
Fluctuations in material and labour prices	5,835	21%
Loss and/or Expense (additional and adjusted prelims)	4,994	18%
Interim property mgt. and maintenance	791	3%
Total	27,878	100%

Table 10 Ratio of main and subcontractor works

Description	Estimated ($)	Actual ($)	Percentage
Main contractor's work	23,652,854	27,878,074	44.17%
Subcontractors'' work	33,457,886	35,230,771	55.83%
Total	57,110,740	63,108,846	100.00%

Table 11 Bidding prices

Description	Bidding price ($)
Bidder 1	24,188,685
Bidder 2	25,789,215
Bidder 3	24,605,977
Bidder 4	21,501,810
Bidder 5	23,310,098
SDEV	1,600,624

Table 12 Fluctuations

Item	Amount ($)	Percentage
Materials	3,628,274	62%
Labour	2,207,559	38%
Total	5,835,834	100%

8. Discussion

One major point emerging from the study is the use of lowest price criteria for awarding work. For example, the bid evaluation process involved no visible mechanism that helps ensure that a bidding contractor fully understands the technical requirements of the work. The capacity may exist because of the class of contractors often specified but, in fact, this does little to guarantee that the real technical factors that will be encountered on a job (for which the client is going to pay) are actually captured in the supposed bargain prices. Contracts are often awarded on lowest price basis. However, clients should have realised that the false prices that are often delivered to them at tendering turns out to be much higher when the project actually completes. However, the tendering mechanism is not the only reason for poor performance. In Ghana, some of the other causes are discussed as follows:

- Design consultants, architects, who often do not do enough work to produce adequate designs and specifications to help price projects well and accurately. It is common to find the information relating to another project in some of the tender documents that are issued for a proposed new project.

- Cost consultants, quantity surveyors, who often fail to painstakingly build up accurate prices that are based on prevailing market prices and an appreciable understanding of the technical and practical requirements of a proposed project for which they often receive a decent fee. Is it not surprising that clients often have to rely on some of the people who have never experienced the nature of actual construction work on site (save what is learned in text-books) for delivering the yardstick that is used to measure the correctness of estimated actual construction costs? Unsurprisingly, some of them do not even bother to build up prices for something about which they do not have much practical knowledge. They may sensibly rely on some of the rates presented by contractors in recent bids to produce a consultant's (or engineer's) estimate against which bidding prices are often evaluated. But this may even be excused given that it may eventually mean nothing when the selection is based on a lowest price that may have been generated from a poor understanding of the requirements of a new job.
- The tendering system (procurement legislation) encourages the award of work based on lowest price criteria. But, there is also the need to ensure that a contractor who supplies the lowest price in order to win (which isn't necessarily a bad idea) also understands and knows how to take acceptable care of especially all the technical requirements of a project. Most projects end up grossly over projections, and that should tell us that something could be wrong somewhere.

Therefore, tendering practices should be reformed to help achieve value for money. So long as the current method is not amended, some contractors (especially those who are smart enough to exploit weaknesses in the system) would continue to win jobs by merely submitting lowest prices that has little implications in practice. They know that all one needs to do is to quote prices that are lowest enough to win but sensible enough to be believed. They know winning is the important thing since, in reality, most of the real issues of the project would be decided afterwards. The starting time of some already awarded projects even delay because of incomplete documentation. They know that the construction phase will bring a lot of opportunity, which is often based on inefficiency on the part of consultants, to the detriment of clients. They know that many changes and claims will arise to benefit them. And since consultants often have no liability for price performance, all the risk is on an unhappy client.

9. Conclusions

Learning lessons from projects is important (Williams, 2004). However, the practice of project post-mortems does not occur frequently in practice. The tendering procedure and

performance of a major project in Ghana are ascertained using unstructured interviews and documentary analysis. The analysis shows that the client's two main reasons for formulating the tendering mechanism were not achieved. Contractors did not find the design very complete during the bidding process. Consequently, 239 different queries were raised to ask several questions to clarify the design and specifications. The cost overrun was 18%, with a time overrun of 210%.

Therefore, the use of market competition by clients as the primary means of obtaining bargain prices from contractors should be maintained. A tendering mechanism that has no framework that is regulated by market competition could place clients at a high risk of exploitation by contractors. However, there is the need to also ensure that a contractor who supplies a highly optimistic (lowest) bid price in order to win clearly understands the full technical contents of the project and intend to be bound by the offer. An effective tendering mechanism should help to achieve reasonable prices at the start and value for money in the end. Therefore, an alternative tendering mechanism that combines both price and ability to perform the job at the stated price is proposed to stakeholders in the Ghanaian construction industry. The method, found in Shash and Abdul-Hadi (1992), is applied by semi-government organisations in Saudi Arabia.

The proposed tendering mechanism can involve the same way of inviting interested or selected contractors. The qualified contractors should be requested to submit their bids for the project comprising two different sealed envelopes; (1) a technical bid; and (2) a price bid. The technical bid would contain the contractor's understanding of the project requirements and his plan of utilising resources to accomplish the works. The price bid would contain the contractor's consideration for doing the specified job. To select, the technical bid is opened first and evaluated against an established criteria. A contractor who receives points that are greater than a set cut-off point remains in the competition. The price bid of the technically qualified contractors should then be opened and the job awarded to the lowest price.

Clients should be cautious in relying on consultant's estimates to award work. This example showed they could be seriously flawed. Perhaps a price performance liability, which could be tied to payment of professional fees, may incentivize better work from consultants. Since most projects end up grossly over expectations, it can be argued that in some cases, clients could have enjoyed relatively cheaper prices and better value for money if the work had been awarded to a would-be-contractor, who understands all the requirements of the project, but tendered a relatively little higher price.

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11. References

Ahmed, S.M. Azhar, S. and Ahmad, I. (2002) Evaluation of Florida General Contractor's risk management practices, *Journal of Construction Engineering*, CIB, **17**(1), 4-11.

Denscombe, M. (2007) T*he Good Research Guide for Small-Scale Social Research Projects*. **3ed**. Maidenhead: Open University.

Hackett, M., Robinson, I. and Statam, G. (2007) *Procurement, tendering, and contract administration*, Oxford: Blackwell.

Shash, A. A and N.H. Abdul-Hadi (1992) Factors affecting a constructor's margin-size decision in Saudi Arabia, *Construction Management and Economics*, 10, 415-429.

Wilkinson, D. and Birmingham, P. (2003) *Using research instruments*, London: Routledge.

Williams, T. (2004) Identifying the hard lessons from projects – easily, *International Journal of Project Management*, 22, **4**, 273-279.