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# **External Market Conditions that Affect Cost of Tendering in Public Institutions: Evidence from Ghana**

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Author AKA performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author KTO did the literature review. Both authors designed the study. The final manuscript was read and approved by both authors.*

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## **ABSTRACT**

The study examined the external factors or low visibility factors that affect the accuracy of pre-tender estimate among building contractors of public institutions in the Brong and Ashanti Regions of Ghana. The study was structured within the framework of descriptive research approach. The study was conducted between August, 2016 and March, 2017. Building contractors who had registered with the various public institutions within the Ashanti and Brong Ahafo Regions of Ghana constituted the population of the study. The public institutions randomly selected for the study included: Tertiary Institutions, District, Municipal and Metropolitan Assemblies, Hospitals and other Ministries, Departments and Agencies (MDAs). Twenty (20) public institutions and sixty (60) registered construction firms were randomly chosen for the study. Self-administered questionnaire was used to obtain data from the respondents. The study found that the five most important factors that affect the accuracy of cost of tendering are: Material (prices, availability, supply, quality etc.); Currency exchange fluctuations, prevailing economy conditions, labour cost and availability and cost, availability and supply of equipment. The study thus concludes that external factors affect the accuracy of tender estimates among construction firms. It is recommended that the performance of

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estimate staff in terms of accuracy should be monitored and a qualified technical staff should be hired in order to obtain an accurate estimate. Further, training, seminars, and workshops must be organised for the construction firms and should aim to improve the local practice in cost estimation and increase the capabilities of estimators in using estimating software packages.

*Keywords: Cost estimates; pre-tender; public procurement; public institutions; construction industry.*

## 1. BACKGROUND TO THE STUDY

The importance of the construction industry in the national development and economic growth of any nation cannot be underestimated. [1] argues that the construction industry is noted to represent one of the most important industries in a nation's development especially in the developing countries. As a result, efforts are being made at all levels of the national socio-economic level to develop the construction industry to enable them to reach their potential. Specifically, construction is among one of the most significant industries in the Ghanaian economy [2]. [2] Estimate that the Gross Domestic Fixed Capital Formation of construction industry in Ghana is 45% to 60% of the total capital formation. This means that constructed items are significant to the pursuit of economic activity as they offer the space needed for the production of all goods and services. [3] also argue that the physical infrastructure built through construction activity is the foundation of every economy because it symbolises the arteries for the assistance of productive activity by facilitating goods and services to be distributed.

[2] Contends that construction firms are however particularly vulnerable to bankruptcy because of the disconnected feature of the industry, high production cost, bureaucratic processes involved in tendering, intemperate rivalry, generally low barrier to entry, high vulnerability and risk involved, and erratic fluctuations in construction volume. Among the variables influencing the operations of the construction business, [4] contend that issues related to accurate cost of tendering is the most essential element since it decides if a contract would be awarded to contractors or not. Consequently, [5] contends that it is critical for every construction firm to participate in public tendering and procurement related activities to enhance profitability. The public tendering process demands that procurement for works are opened to the overall population for tendering. Many components comes to play before a construction firm is

chosen. Among the elements are cost, quality and time.

It is contended that cost constitutes the most essential component during the selection of a contractor. This has additionally brought about price competition among construction firms during the tendering process. It is therefore critical to identify the various variables that influence the cost of tendering among construction firms. However, [6] contend that absence of accuracies and precision in cost estimation for tendering can cause the contractor, the customer and the consulting firm a considerable measure of challenges. Overestimation of cost may make the client spend additional money for no reasons. In addition, an inflated estimation cost may cause clients to reconsider the scope of a project particularly on the off chance that he/she is not persuaded that the cost estimates justifies the benefits that will be required to be obtained [4]. Once more, an overestimated cost may discourage financing institutions from loaning the required amount of cash because of questions with respect to the cost versus benefits of the project. [7] Thus argue that underestimating the cost of projects may lead the consultant, contractor and client to even more problems. In addition, [6] contend that underestimation has a tendency to bring conflicts among all parties involved in construction projects and cause them, particularly the client, to be considerate in developing the scope of the project and toward the end being not able to proceed with finishing the project or having to down scope so as to complete the project.

The discussion above underscores the significance of accuracy of cost of tendering in the construction business. [8] however noted that contractors do have available some reliable factors affecting cost of tendering: Labours, materials, equipment and other major components. These major items have a high visibility factor and consequently receive adequate attention in the preparation of the tender estimate. However, there are little known,

low visibility factors particularly, project specific factors that affect the accuracy of cost of tendering in public institutions which should be taken into consideration in the preparation of pre-tender estimates. Unfortunately, these factors are either entirely overlooked or sadly neglected by researchers and contractors in Ghana. Identification of these low visibility factors which affect the accuracy of pre-tender estimate is very important in order to improve the construction industry. This study is an attempt to identify these factors and their impact on the accuracy of construction cost estimation in Ghana.

## 2. LITERATURE REVIEW

### 2.1 The Concept of Public Procurement

According to [9], the conduct of public procurement reflects the tensions between public expectations of high standards of governance, management requirements for performance, overt (and covert) political influence and pressures from broader stakeholder interests such as businesses. [9] maintained that public procurement practices at one extreme are highly prescriptive and regulated structures, while others are characterised by almost complete deregulation and devolved responsibilities where procurement is just another element of mainstream management. According to [9], these disparities reflect fundamental differences in the understanding of procurement concepts in different jurisdictions, often deriving from their historical circumstances and political constraints.

[10] define public procurement as the process by which government departments or agencies purchase goods, works and services from the private sector. According to the authors, procurement takes place at both a national and regional level and usually the procurement process is subjugated to specific rules and policies covering how the relevant decisions are made. [9] also define procurement as the process of obtaining goods and services in any way, including borrowing, leasing and even force or pillage. [5] in their research conducted to ascertain the effectiveness of procurement in Ghana stated that procurement is a major function of any organization. The authors maintained that the volume and scope of procurement vary from organization to organization, however; The principles and procedures are basically the same. As part of recommendation, the authors suggested that it was therefore important to understand the

application of principles and procedures at all levels.

[2] Also put forward that the different definition and concepts given by different individuals different perceptions of what public procurement is for different organisations, agencies and stakeholders. This also suggests that reconciliation between these competing forces is not simply difficult but doubtful because it represents more than conflicting expectations about what procurement is all about. It also represents broader conflicting roles between, for example, central and operational organisations. From the above definitions, procurement can be simply defined as the procedure through which goods, services, works and consultancy are acquired by putting in the necessary effort. In relation to public procurement, procurement involves the process of buying supplies or equipment for a government department or a company or the process of obtaining something, especially with effort or difficulty. And this process is the life wire of every organization, private and public sectors.

Every system must operate under a legal framework if it is to be effective and efficient. [5] explains that enormous and unmaintainable overseas debts, disproportionate budget deficits, arrears of big contractual payment, poor construction performance, corruption and pressure from international financial institutions, pressed the government to oblige to a reform of public procurements, which resulted in the passage of the Public Procurement Act 2003 (Act 663). The argument put forward above suggests that the significance of public procurement since the enactment of the public procurement Act 2003 (Act 663) cannot be overemphasised since it contributes sustainability to its Gross Domestic Product (GDP). However, [9] recognized the inadequacy of the Procurement Act and call for enhanced contract management and superior professionalism in the procurement function. The authors opined that the solitary dependence upon the traditional method and the usage of basically price-based contractor selection criteria seems to be a fundamental mistake.

Similarly, [2] argues that the rationalist procurement theory considers the interaction of time, cost, quality and finances as the primary determinants of value in procurement and provides criteria for the selection and use of any particular procurement arrangement. The concept of choice and application of law, which

these different systems bring into play, is of itself a great benefit as it forces a methodical appraisal of the requirements of projects, the contextual conditions and risks and thus facilitates best value focused decision making. Nonetheless, [5] argue that these procurement systems and delivery techniques are paradigmatic and with reasoned application, can contribute to the realization of Ghana's quest for Value for Money in public procurement system. The Public Procurement Authority by the authorities vested in it by the Procurement Act, monitors and supervises public procurement and checks obedience with legislative requirements [9]. The author further argues that continuous checking of practitioners and institutions and education on the provisions of the Act lessens the likelihood of the incidence of fraudulent practices in procurement.

It is without a doubt from the above discussion that public procurement plays a prominently important role in the acquisition and delivery of goods, works, and services to end user organisation, groups, and individuals. Studies have shown that public procurement, apart from personnel emolument, represents between 50% and 70% of the national budget [9]. The contribution of public procurement to the government and the country's gross domestic product (GDP) is about 14%, this in no doubt explain why management of public procurement needs to be done with an agency of professionalism.

## **2.2 Methods and Processes of Public Tendering Selection**

In the opinion of [11], the alignment of public procurement with business policy could be reflected at numerous levels within the procurement cycle, without resorting to the use of expensive and anti-competitive price discrimination or breaching agreements such as the World Trade Organisation's Agreement on Government Procurement. For instance, [2] contents that typically more than 85% of government procurement transactions are of low value goods or services for which small local suppliers can have an inherent competitive advantage, or disadvantage, depending on how governments might go about aggregating these transactions into a higher value supply chain.

At another level, the tendering or competitive bidding exercises by government are generally expensive and time consuming for business: for

small businesses these costs can be prohibitive effectively barring them from competing even though they might otherwise be highly competitive [12]. For larger businesses and multinationals these costs can be readily absorbed. In this example, the procurement methodology adopted by government can be seen to be both anti-competitive as well as anti-small business generally to local businesses [8].

[13] disclosed that the process of selection of suppliers and consultants can be done both manually and through automation. The manual process comprises: preparation of the advertising; preparation of the short list of consultants; preparation and issuance of the request for proposal (RFP); Receipt of proposals; evaluation of technical proposals: consideration of quality; public opening of financial proposals; evaluation of financial proposal; final evaluation of quality and cost; and negotiations and award of the contract to the selected firm. On the other hand, the [7] provides that the automated process also involves: Preparation, notification, sourcing, evaluation, award and post award.

The method of selection should seek to develop mutual confidence and trust. Depending upon the various situations, [13] suggested the following different methods of selection of consultants;

### **2.2.1 Quality and cost-based selection (QCBS)**

This method is based on the quality of the proposals and the cost of the services to be provided. This method is appropriate when the scope of work of the assignment can be precisely defined and where the staff time as well as the other inputs and costs required can be estimated with reasonable precision.

### **2.2.2 Quality-based selection (QBS)**

This method can be suitable for complex or highly specialized assignments for which it is difficult to define precise terms of reference and the required input. The fees paid are invariably a small fraction of the total project life cycle cost and yet the work is pivotal to project success.

### **2.2.3 Selection under a fixed budget (SFB)**

This method is appropriate only when the assignment is simple and can be precisely defined and when the budget is fixed [8].

#### **2.2.4 Least cost selection (LCS)**

This method is only appropriate for selecting consultants for assignments of a standard or routine nature [8].

#### **2.2.5 Selection based on the consultants qualifications (CQS)**

This method may be used for small assignments for which the need for preparing and evaluating competitive proposals is not justified.

#### **2.2.6 Single source selection (SSS)**

Single-source selection of consultants does not provide the benefits of competition with regard to quality and cost, lacks transparency in selection, and could encourage unacceptable practices. Thus, single source selection should be used only in exceptional cases.

However, QCBS is the preferred policy method as it uses a competitive process among shortlisted firms and takes into account the quality of the proposal and the cost of the goods and services in the selection of the successful firm [13]. However, in practice it is not the most frequently used method. [9] submitted that the common procurement methods being practiced are the National Competitive Bidding, Price Quotation and the Sole Sourcing methods. However [9] observed that all contracts executed under the sole sourcing methods did not have the needed approval for the Public procurement Authority. Lack of funds and the disobliging of suppliers had been behind the high inclination towards using the method without approval.

The foregoing discussion has centred on public procurement management, first for compliance and second for effectiveness in terms of best value for money and fit for purpose outcomes. These objectives traditionally have each led jurisdictions down quite different paths, the first defining procurement as a legal process, the second in terms of management. Of further significance is the operational efficiency of the process as it relates both to government and to business. Efficiency of process is a concurrent consideration regardless of whether procurement is defined as a regulated process or managerial task. [3] also contend that the efficiency equation is important in this discussion because it introduces complications to the tension between centralisation and decentralisation of management of the framework.

The efficiency of procurement processes and some of the approaches intended to deliver value for money outcomes are not neutral to the degree of centralisation or devolution. Indeed, the sources of efficiency available to best practice procurement are multiple. The efficiency and effectiveness of procurement are often sensitive to scale and coordination and involve both public administrative processes and industry structural and transactional issues. In this way, efficiency overlaps with the concept of value-for-money outcomes.

### **2.3 Factors Affecting Cost of Tendering**

Construction industry is a major element in the Ghanaian economy. According to [5], any improvement in the construction industry will probably lead a clear improvement in the Ghanaian economy. The authors assert that any improvement in the construction industry can be achieved by improving the construction project management functions. One of the most important construction management functions is estimating the cost of tendering. According to [4], the success or failure of a project is dependent on the accuracy of estimates. [11] also argue that an accurate estimates optimize good contracting. It is the process of calculating and analyzing all the costs which will enter into a particular job and arriving at a total. In nearly all contract types, the preparation of a realistic cost estimate is a necessary part of any construction operation.

According to [14] clients and contractors develop cost estimate of a project from available information. [12] also argue that the procedure varies depending on what stage the project is on and, hence, what information available about the project structural constituents and the project characteristics. The project information and characteristics get clear as the project development advances along its traditional stages which include feasibility study, preliminary and detailed engineering, contract development and bid cycle, and construction.

Nine factors that have some influence on the accuracy of tendering the costs of construction work has been provided by [15]. According to [15] these factors are availability of design information, type and quantity of cost data, type of project, project size, number of bidders on competitive projects, stability of market conditions, personal factors, proficiency in estimating and sheer quantitative experience. [16] also summarized the factors that affect

construction tendering cost as follows: project type, special construction (complexity), project accessibility, time of year, labour rates, and material costs. It was also stated by [17] that technological and project design, contractor's expertise and management ability, and the client's desired level of construction sophistication play an important role in determining the cost of the project.

A study was conducted by [4] on the effect that four independent variables (building type, project size, sector and year) had on estimating project accuracy and tested these variables against 217 projects from a Quantity Surveyor based in the USA. They found that bias existed in project size and year, and consistency errors existed in project type, size and year. In a related study of 67 construction projects around the world, [14] identified 45 factors contributing to the accuracy of early stage estimates. They summarized the factors into 11 orthogonal elements. Out of the 11 factors, the five most important include: Process design, team experience and cost information, time allowed to prepare estimates, site requirements, and bidding and labour climate.

[18] Posit that there are two types of factors that influence and contributes to the cost of a tendering: control factors and idiosyncratic factors. The authors argued that the control factors are the factors that can be controlled estimators to improve the performance of estimation. Idiosyncratic factors are factors that influence tendering cost but outside the control of the estimators including market condition, project complexity, weather, size of contract, site constraints, resource availability, type of procurement system, contract work type, cost and availability of equipment etc. In the opinion of [11], idiosyncratic factors are more relevant due to the constable political and economic situations. It is also argued by [17] that most of the significant factors affecting tendering costs are qualitative such as client priority on construction time, procurement methods, and market conditions including the level of construction activity.

The above discussion shows that accurate estimating, which is done before the physical realization of the work, requires detailed study of the bid document and the environmental situation. It also involves a careful analysis of the results of the study in order to arrive at the most accurate estimate of the probable cost consistent

with the time available and the accuracy and completeness of the information submitted.

### 3. METHODOLOGY

This study was structured within the framework of descriptive research approach. The study was conducted between August, 2016 and March, 2017. The contractors who had registered with the various public institutions within the Ashanti and Brong Ahafo Regions of Ghana constituted the population of the study. The public institutions selected for the study included: Tertiary Institutions, District, Municipal and Metropolitan Assemblies, Hospitals and other Ministries, Departments and Agencies (MDAs). Twenty (20) public institutions and sixty (60) registered construction firms were chosen for the study. The study made use of both random and purposive sampling techniques. Simple random sampling technique was used to select the construction firms. The names of construction firms were written on a pieces of papers and mixed in a bowl. The researchers randomly picked the firms till the required number was obtained. The Quantity Surveyors, Office Managers, Project Managers and Office Engineer of the constructions firms were however purposively selected for the study. These categories of respondents were purposively chosen because of their strategic roles played during the estimation of cost of tendering.

A self-administered questionnaire was used to obtain data from the respondents. Series of questions were developed by the researchers to obtain data for the study. The questionnaires were mainly made up of Likert scale questions. Likert scale questionnaire normally has five or seven categories to show strengths of agreement or disagreement, and it is further asserted that the multiple-item scales such as the Likert scale are popular for three reasons. Firstly, a number of items are more likely to capture a broad concept than a single question. Secondly, the use of a number of items can help to illustrate finer distinctions items. Thirdly, if a question is misunderstood by a respondent and only one question is asked, that response will not be appropriately interpreted, whereas if a few questions are asked, a misunderstood question can be offset by those which are properly understood. In this study, only five categories were used, for example: Strongly Agree (SA), Agree (A), Neutral (N), Disagree (D), and Strongly Disagree (SD). Fifty (50) questionnaires

were distributed. The two researchers and three research assistants distributed the questionnaires.

Immediately after the field survey, data obtained were first edited to ensure consistency and accuracy in the responses and to check the response rate. The researchers organized, summarized and analysed the data using SPSS. The results were presented in tables in the form of simple frequencies, percentages, mean ratings, relative importance indices (RII), maximum values, minimum values and standard deviations. The variables were subsequently ranked according to what the respondents mostly perceived to influence the cost of tendering.

#### 4. DATA ANALYSIS

##### 4.1 Demographic Characteristics of Student Respondents

Before proceeding to analyze the general responses of the respondents in relation to the objectives of the study, the study sought to determine the demographic characteristics of the respondents in order to show the suitability of the respondents in giving valid, reliable and authentic responses. Table 1 presents the information on the demography of respondents.

Table 1 indicates that, 24 (40%) the respondents were project managers. Similarly, 13 (21.7%) of respondents were estimators or quantity surveyors. Table 1 further shows that 9 (15%) of respondents were office managers such as firm owner, general manager and firm director. Lastly, 14 (23.3%) of the respondents were engineers. It can be observed that more than 70% of the respondents had key positions that guarantees superiority of the information obtained.

As shown in Table 1, majority of the respondents (21%) of respondents had years of experience between 5 and 10 years. A further 14 (23.3%) of the respondents had years of experience between 11 and 15 years. Again, 16 (26.7%) of the respondents had years of experience less than 5 years while 9 (15.0%) of the respondents had more than 15 years of experience in project management and project costing. These results demonstrate that, roughly, almost 90.0% of the respondents had more than 10 years of experience. These results presents satisfaction level that the data obtained would reflect what it was designed for. As can be ascertained, those respondents had good positions in their

organizations to provide an accurate and precise data. The fact that almost 90.0% of the respondents had more than 5 years of experience was reflected in the level of completeness, consistency and precision of the information provided, and provides further validity for the results.

The study also measured the number of projects that the organization prepared tender cost estimates within the last five years. Table 1 shows that, 16 (26.7%) of the respondents had prepared tender cost estimate for between 10 and 20 projects in the last five years. Again, 14 (23.0%) respondents also prepared tender estimates for more than 30 projects during the last 5 years while 23 (38.3%) had also prepared tender estimates for between 21 and 30 projects in the last five years. Indeed, obtaining data from these firms with tremendous level of experience enhances the reliability of the results. It is imperative to indicate that the respondents who prepared cost estimate for more than 30 projects were big organization such as Consar, Berock, Wilkado etc.

The data obtained indicates that 27 (45.0%) of the projects estimated cost prepared within last five years averaged between 1 and 5 million Cedis, 18 (30.0%) of the projects had estimated value of between 6 and 10 million Cedis and 9 (15.0%) of the projects estimated for the last five years cost more than 10 million Cedis. On the other hand, 6 (10.0%) of the projects had estimated value of less than 1 million Cedis as presented in Table 1. It is imperative to indicate that majority of the projects were undertaken before 2016. The respondents were further asked to indicate the level of their satisfaction with regards to the accuracy level of estimation. As indicated in Table 1, majority (44.0%) of the respondents indicated that they were satisfied. A further 15 (25.0%) of the respondents were very satisfied while a low percentage (3.4%) of the respondents indicated that they were not very satisfied with the current level of estimate accuracy. Again, 11 (18.3%) of the respondents indicated they were dissatisfied with the current level of the accuracy of estimation.

The respondents were further asked to indicate whether they had separate estimation unit within their firms. Table 1 shows that, 37 (61.7%) of the respondents had separate estimation unit while only 23 (38.3%) of the respondents had no separate estimation unit. Those that had no separate estimation unit indicated that cost

estimation practice was meshed with other engineering services, or volume of the work is small, so there was no need for estimating unit. Others also indicated that a separate cost estimation unit was an extra burden to overhead cost and thus was not necessary.

Table 1 shows that, out of the 37 firms that had an estimation unit, 28 (75.7%) had less than 3 staff in the estimating unit, 5 (13.5%) of them had an average 3 to 5 employees while 4 (10.8%) had more than 5 employees. The result indicate that most common estimating unit size in the Brong Ahafo and Ashanti Regions of Ghana had less than three employees.

#### 4.2 External Factors and Market Conditions Affecting Tendering Cost

This section presents and discusses the results relating to the mean ratings, RII, standard deviations (SD), maximum values, minimum

values and ranks of external factors and market conditions that influences cost of tendering. These factors which are related to the external factors and market conditions comprises 11 factors. The factors are presented in Table 2.

From Table 2, it is observed that the costs/ accessibility/supply/quality/imports of material was positioned in the first position by the respondents with a mean rating of 4.84 and relative importance indices (RII) of 0.921. This implies that the respondents have a solid uniformity at this factor to be the first position. This outcome is reasonable, in light of the fact that any issue of materials in value, accessibility, supply, quality, and imports would fundamentally influence the success of a project. Most materials utilized for construction in Ghana are imported into the country from other countries. For instance, Ghana has observed a surge in the importation of cement from China and Nigeria. In circumstances where borders are closed,

**Table 1. Demographic characteristics of student respondents**

	Frequency	Percentage %
<b>Position of respondents</b>		
Project manager	24	40
Estimator/Quantity surveyor	13	21.7
Office manager	9	15
Office engineer	14	23.3
<b>Years of experience in project management</b>		
Less than 5 years	16	26.7
5-10 years	21	35.0
11-15 years	14	23.3
Above 15 years	9	15.0
<b>Number of projects in last five years</b>		
Less than 10	7	11.7
10 to 20	16	26.7
21 to 30	23	38.3
More than 30	14	23.3
<b>Size of projects estimated in last 5 years (in million Cedis)</b>		
Less than 1	6	10.0
1 to 5	27	45.0
6 to 10	18	30.0
More than 10	9	15.0
<b>Level of satisfaction with current level of cost estimate</b>		
Very satisfied	15	25.0
Satisfied	24	44.0
Neutral	8	13.3
Not satisfied	11	18.3
Very not satisfied	2	3.4
<b>Availability of estimation unit in organisation</b>		
Yes	37	61.7
No	23	38.3
<b>Number of staff in estimation unit</b>		
Less than 3	28	75.7
3 to 5	5	13.5
Above 5	4	10.8

Source: Field study, 2017



construction materials would be run out from the market, which in the end would prompt higher costs. Amid a time of deficiency of construction materials, the construction process would be put off. For instance, during the years 2015 and 2016, Ghana experienced shortage in cement and this caused the prices of cement to increase astronomically. In this way this factor must be calculated very carefully by estimators during the preparation of tender estimates. This result is in agreement with that of [18] who reported that consistent increment in materials cost might be supported by the increase in import taxes and other domestic taxes in Ghana and the precariousness of local market.

Similarly, the instability of the currency exchange was ranked in the second position by the respondents and obtained a mean rating and RII of 4.61 and 0.911 respectively. All the respondents had a strong agreement that this factor ought to be in the second position. The results have indicated in an unambiguous manner that, the respondents' opinions and observations about this factor is more concentrated and significant. Officially, the Cedi is the currency in Ghana. Nonetheless, most construction contracts are quoted in US Dollars due to some conditionalities attached to the source of their financing. In addition, majority of the construction materials are purchased or imported and their prices are mostly quoted or procured in the US Dollars. As a result of this, any variation or volatility in the exchange rate of the Cedi and high inflations would force contractors to raise the tender price so as to minimize the risk associated with probable increase in the unit price of materials used in the construction project. This result agrees with that of [14] and [18] who reported that the instability of the local currency in developing countries have had a big influence in the tender price of construction projects.

It can also be seen from Table 2 that the prevalent economic environment was positioned in the third place by the respondents with a mean rating of 4.54. The respondents placed this factor in the third position with RII of (0.868). This emphasizes that, when the Ghanaian economy is resilient and stable, contractors have a tendency to be less competitive in tendering and during economic stagnation, they are more competitive, since tendering is an attempt to forecast the tender sum of the contractors. The results is closer to the findings of [17] who ranked this factor in the 21 position out of 45 factors.

In addition, the cost and availability of labour was also ranked fourth with a mean rating of 4.26 and RII of 0.822. As indicated in Table 2, it was ascertained that some construction works required special expertise. These expertise are normally needed to operate special machines and equipment. In some cases, the skills needed for such tasks might be limited in supply locally and thus would demand the services of expatriates or specialised training for local staff. In this instance, the tender price would be higher than when the labour was available locally. This result endorses the findings of [8,14,17] who ranked labour variability high position among many other orthogonal factors.

The study further revealed that cost, availability and supply of equipment also affect the cost of tendering in public institutions in Ghana. This factor was ranked fifth among the external factors that affected cost of tendering in public institutions. Thus, the factor had a mean rating and RII of 4.16 and 0.815 respectively. This result is justified since most equipment used for construction in Ghana are imported. Again, construction in recent times demand sophisticated equipment and technologies. It stands therefore to concur that the cost, availability and supply of equipment also affect the cost of tendering in public institutions in Ghana. This result is in conformity with [6,18] who revealed that cost and availability of equipment is a major factor that affects the cost of tendering in public institutions.

The findings of the study, as presented in Table 2 shows that the bidding climate and the number of competitors in the market were also among the factors that affected the cost of tendering in public institutions. These factors were ranked in the sixth and seventh positions respectively with a respective mean ratings of 3.67 and 3.53. These factors also obtained RII of 0.807 and 0.753 respectively. The result on the number of competitors in the market particularly is justified since competition forces contractors to bid in such a way that their bidding would not be seen as too much compared to other competitors. This is particularly sensible since cost is the number one criteria for selecting a contractor as per the Public Procurement Act 2003 (Act 663). This result is closer to the findings of [11] who revealed that the number of bidders in a competitive bidding is one of the factor that affect the cost of tendering in public institutions.

**Table 2. External factors and market conditions affecting cost of tendering**

Variables	Mean	RII	SD	Max	Min	Ranking
Material (prices/availability/quality)	4.84	0.921	0.38	5	4	1 <sup>st</sup>
Currency exchange fluctuation	4.61	0.911	0.47	5	4	2 <sup>nd</sup>
The prevailing economic climate	4.54	0.868	1.14	5	3	3 <sup>rd</sup>
Labour (costs/availability)	4.26	0.822	1.24	5	3	4 <sup>th</sup>
Equipment (costs/availability/supply)	4.16	0.815	1.18	5	3	5 <sup>th</sup>
Bidding climate	3.67	0.807	1.64	5	3	6 <sup>th</sup>
Number of competitors	3.53	0.753	2.15	5	2	7 <sup>th</sup>
Impact of government regulations	3.34	0.751	1.68	5	2	8 <sup>th</sup>
Advertisement Timing (weather)	3.32	0.748	1.87	5	2	9 <sup>th</sup>
Social and cultural impact	3.25	0.632	2.86	5	2	10 <sup>th</sup>
Multiple projects being advertised	3.23	0.621	2.24	5	2	11 <sup>th</sup>

Source: Field study, 2017

(Mean scale: 5 = strongly agree, 4 = agree, 3 = undecided, 2 = disagree, 1 = strongly disagree)

The impact of government regulations and timing of advertisement were ranked in the 8<sup>th</sup> and 9<sup>th</sup> positions respectively. Their respective mean ratings and RII are 3.34 and 3.32 and 0.751 and 0.748. This suggests that the respondents were not unanimously convinced that these factors could have effects on the cost of tendering in public institutions. These results were supported by [17,18] where their results from respondents ranked the impact of government regulations requirement factor in the 60<sup>th</sup> position out of 67 factors.

Social and cultural impact together with the advertisement of multiple projects were ranked in the 10<sup>th</sup> and 11<sup>th</sup> positions respectively by both the respondents. These factors obtained mean ratings of 3.25 and 3.23 respectively. This means that the respondents had an average conformity that social and cultural factors and the advertisement of multiple projects affects the accuracy of pre-tender cost estimate. The result on the social and cultural factors contradicts with [18] who studied the effect of social and cultural factors on projects cost in Gaza strip. The author revealed that all respondents agreed that the social and cultural factors had big effect on the prices of the basic materials such as cement and aggregate, which result in an increase of project cost.

## 5. CONCLUSION

The result of analysis of different external factors considered in the questionnaire concluded that the five most important factors affecting the accuracy of cost of tendering are: Material (prices/availability/supply/quality/imports); currency exchange fluctuations; Prevailing

economy conditions; labour cost and availability and cost, availability and supply of equipment. Though these factors are outside the control of the contractors, and in some instance the Government of Ghana, however, the contractors should be aware of their impact on the tender price. It is important to note that a careful analyses of the factors that influence these variables will be very helpful to the contractors. These findings demonstrate how these factors can greatly influence the cost of tendering in public institutions. It is instructive to note that both clients and consultants as well as the contractors must be aware for these factors during the preparation of tender estimate.

The study further ascertained that the least important external factors that affect cost of tendering are: The advertisement of multiple projects; Social and cultural impacts; Time of advertisement; Government regulations and number of competitors. The contractors should however be aware that current conditions has resulted in a situation where these variables are less influential. However, a time may come where these factors will influence the tender price greatly. The contractors and stakeholders must therefore not lose sight of these variables.

It is thus recommended that the construction firms should give more consideration to cost estimating process in order to enhance productivity and accuracy. The performance of their estimates in terms of accuracy should be monitored and a qualified technical staff should be hired in order to obtain the accurate estimate.

The government and other stakeholders in the construction industry must also organise training

courses, seminars, and workshops in estimating methods, estimating process and computer applications in estimation. This training, seminars, and workshops should aim to improve the local practice in cost estimating and increases the capabilities of estimators in using estimating software packages.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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