

Health And Safety At the Sourcing Stage of Public Works Procurement: A Case of Procurement Entities in the Bono, Bono East and Ahafo Regions of Ghana

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Abstract— Public authorities legitimately wish to ensure that the candidates they select have endorsed certain policies in their general professional behavior including safe working environment in achieving value for money. Once a contract has been signed for the tenderer to start work, it may be challenging and costly for the contracting authorities to modify or terminate the contract where the chosen candidate is not performing to the required health and safety standards.

The study became necessary from observation that some clients secure a low price tender at the expense of the health and safety of workforce resulting in winning tenderers likely to be the ones that do not provide health and safety for their workforce. The implications of such action prompt for investigation into the extent to which health and safety issues are considered by public entities during the sourcing stage of the public procurement process.

The objectives were to identify how Health and Safety considerations are applied and the effect of considering health and safety at the sourcing stage of works procurement on project performance in terms of cost, quality and timely delivery by public entities.

Procurement Entities of all the Municipal and District assemblies in the Bono, Bono East, and Ahafo Regions were chosen for the study. The total population for the research was made up of Heads of the Procurement Entities of all the Twenty-Nine (29) Municipal and District Assemblies in the Bono, Bono East, and Ahafo Regions, for whom questionnaires as research instruments were administered for data collection. A response rate of 70.37% was obtained for analysis.

The research concluded that though most of the procuring entities perform quite well in considering health and safety at the sourcing stage of works procurement, there is certainly more that could be done.

In the recommendations, clients were urged to act more responsibly in protecting the health and safety of workers while aiming at value for money at the sourcing stage and enforce the implementation of all requirements in the procurement processes.

Keywords—procurement; works; sourcing; utilisation; contract management

I. INTRODUCTION

Governments are major procurers of buildings, civil infrastructure and related construction services, commissioning approximately 30 per cent of construction output each year (Cotton et al.,2005).

The economic contributions of the construction industry in Ghana cannot be over emphasized. The industry plays a significant role in achieving socio-economic development goals, providing shelter, infrastructure and employment, and above all, contributing significantly to the Gross Domestic Product (GDP) of the country. For instance, since 2003 to 2008, the industry has consistently provided an average GDP growth of 6.1% to the economy. Indeed, the construction industry in Ghana was the third largest growing economic sector outstripping the manufacturing industry in 2004 with a constant GDP growth of about 7.3% in 2008 (IMF, 2009).

The procurement entity has a lead role in preventing work-related death, injury and disease in workplaces. The inherent hazards in construction work means safety must be a priority well before work commences on a site (Wells, and Hawkins, 2013). The anus then lies with the procurement entities to scrutinize various proposals they evaluate and approve for the award of contract.

As procurers, clients/employers/entities can also promote better health and safety by requiring projects to include a range of safety measures, such as specifying the safety budget, building layout or the use of certain construction materials (Site safe, 2000).

The inclusion of health and safety principles in the procurement process also has a number of commercial advantages, including: improved productivity, reduced costs, better prediction and management of production and operational costs over the lifecycle of the project and innovation in design and construction (Site safe, 2000).

The incorporation of health and safety into the procurement process is dependent on the size and complexity of the construction project, that is, for a small project an individual could be assigned the responsibility for health and safety issues whereas for medium and large multifaceted projects a lot more will be required as the understanding of the various processes that constitute the construction process is key for effective management of health and safety.

The role of the project OHS professional in the procurement process cannot be over emphasized as they advise on the project's safety requirements, collaborate with the project team and where necessary with other stakeholders (eg. with contractors during site audits), identify the need for technical safety specialists (eg. ergonomists, hygienists, engineers), assist with developing safety requirements in contracts and tender documents, contribute towards construction planning and decision making, regularly report on the project OHS performance linked to project risks and assist in monitoring contractor OHS performance (Wells, and Hawkins, 2013).

While there is a range of different considerations that are made during procurement under the generic set of key stages, such as Planning, Design, Tender, Contract, Construction and Evaluation, the health and safety issues which are relevant prior to the award of contract are substantive elements necessary for the tendering stage. Occupational health and safety should be a fundamental part of the selection process when tendering for construction work.

Procuring entities need to take reasonable steps to be satisfied that both the general duties under the labour Act 657 and the safety risks and requirements identified during the planning and design phases can be adequately addressed by the company that is selected to do the work. Tender documents provide an opportunity to assess all aspects of potential contractors' performance and it is essential all relevant information is provided to allow for a meaningful evaluation of each bid. Tender documents should not only specify that contractors are expected to comply with relevant OHS legislation but should also require them to demonstrate their safety capabilities with respect to the project (Wells, and Hawkins, 2013), within parentheses, following the example.

DEFINITION OF TERMS PROCUREMENT

Procurement may be defined as the acquisition of goods, works and services according to Peter B. et'al, 2008. This embraces not only purchasing, that is, buying of goods, but it also includes hiring of contractors and consultants to carry out services. Standards required in procurement are high quality service, economy and efficiency and fairness in competition. Thus a procedure must be followed and is applicable to all contracts for goods and works. The Oxford Advanced Learner's Dictionary (2001) defines procurement as the process of obtaining supplies of something, especially for a government or an organization. Procurement can also be defined as the acquisition of goods, buying or purchase of works, hiring contractors and consultancy services (International Bank for Reconstruction and Development Guidelines for Procurement, 2004). The definition of procurement according to (Mangan, et'al, 2008) states that procurement is a process of identifying and obtaining goods and services. It includes sourcing, purchasing and covers all activities from identifying potential suppliers through to delivery to the users or beneficiaries. It is favorable that the goods/services are appropriate and that they are procured at the best possible cost to meet the needs of the purchaser in terms of quality and quantity, time, and location. Henchcliffe (2005) also define procurement as a business management function that ensures identification, sourcing, access and management of the external resources that an organization needs or may need to fulfill its strategic objectives.

WORKS

Works means work associated with the construction, reconstruction, demolition, repair or renovation of a building or structure or surface and includes site preparation, excavation, erection, assembly, installation of plant, fixing of equipment and laying out of materials, decoration and finishing, and any incidental activity under a procurement contract (Mangan, et'al, 2008).

II. SIGNIFICANCE OF CONSTRUCTION PROCUREMENT

In the procurement of Construction works, there can be no direct acquisition of a building (unless it is a small prefabricated unit, for example, a school classroom). New buildings are seldom standard items, and the refurbishment of existing buildings can never be standard. The act of creating a new or extending or refurbishing an existing building cannot be directly compared to the procurement of goods, which can be requisitioned, are often 'off the shelf' and where an immediate choice can generally be made in terms of cost and quality (RIBA, 2005).

The procurement of a building involves commissioning professional services and creating a specific solution. The process is complex, involving the interaction of the Client, design team, contractor(s) (who provide the construction expertise, labour, materials and plant resources), suppliers and various statutory/public interest bodies. Building procurement is often the subject of joint funding, with the different parties having varying degrees of interest in the outcome of the building process. An agreement should be entered into with the various funders (RIBA, 2005).

III. THE CONSTRUCTION PROCUREMENT CYCLE

- *PLANNING*

Under this stage, procurement requirements are determined and specified by the user. The approach or strategy is decided considering also whether to produce the product(s) in-house or source them externally. Decisions is also taken on the funding, the applicable procurement rules and the method of procurement, which should be used (e.g. open or restricted tendering, request for quotations or proposals, single source etc). A timetable for the procurement process will be prepared under this stage (PPB, 2006).

- *SOURCING*

The PPB (2006) identifies that activities under this stage may include pre-qualification of potential suppliers, preparation and issue of tender documents, requests for quotation or requests for proposals, evaluation of responses and the selection of the successful tenderer. Negotiations may be required (PPB, 2006).

- *CONTRACTING*

A contract award is made under this phase and a formal contract document will be drawn up, using the agreed

terms and conditions, and signed by both parties (PPB, 2006).

- **CONTRACTS MANAGEMENT**

Management of the awarded contract is done under this phase to ensure that both the client and contractor perform their contractual obligations. Activities may include verifying documentation, technical supervision by an engineer and making payments.

- **UTILISATION**

In works procurement, Utilization starts when the facility is certified practically complete by the Engineer and therefore capable of performing the desired function for which it was designed to perform. Apart from the objective of performing the function for which it was designed, the facility should be aesthetically appealing and structurally safe for habitation for its entire useful life.

- **MAINTENANCE**

Cobbinah (2010), in his research, defined maintenance as the combination of all technical and associated administrative actions intended to retain an item or restore it to a state in which it can perform its required function. In works procurement, this refers to work that is done on the facility on a regular basis to keep the building safe and in good working condition. The Conditions of Contract in Public Works Procurement of Ghana (Act 663, 2003) requires that after practical completion, the Contractor remains liable for all defective works identified on the facility resulting from poor quality workmanship and or sub-standard materials incorporated onto the works, until the end of the Defects Liability Period. After the issuance of the Defective Liability Certificate, following the making good of defects identified and notified to the Contractor, the end user or the Procurement Entity assumes liability for all corrective and maintenance works for the entire useful life of the structure to ensure that the facility remains functional and safe for habitation. The Factories, Shop and Offices Act (Act 328, 1970), Workmen's Compensation Act of Ghana (PNDC Law 187, 1987) are all Constitutional provisions defining the liabilities of Building Owners /Procurement Entities and making it obligatory them to ensure that facilities are safe for Habitation. Employees or Users shall be awarded damages in the event of an accident resulting from the negligence of the Building Owner or his/her failure to comply with safety standards as provided in the Law.

Regular Maintenance to ensure Safety is therefore an obligation. Cobbinah (2010) also identified that a good maintenance system is an effective disaster mitigating measure in terms of cost and facility usage.

- **EVALUATION**

The process of assessing how well the procurement process has gone, identify any weaknesses, challenges and agree on actions to prevent repetition of similar occurrences in the future. Evaluation may include a formal procurement audit (PPB, 2006).

IV. THE GHANAIAN BUILDING CONSTRUCTION INDUSTRY AND HEALTH AND SAFETY

Due to the fact that construction is carried out in a constantly changing work environment, it is relatively prone to accidents. This is due to the nature of the construction work operations, construction methods, construction materials, heavy equipment used, and physical properties of the construction project itself. Indeed, based on the world statistics, the accident rate in the construction industry is almost three times higher than that of the manufacturing sector Sengupta, (1999). According to Haslam (2005), construction is widely regarded as an accident-prone industry. Armstrong (2006) also states that, thousands of people are killed at work every year and several hundred thousands more are injured or suffer ill-health. Laryea (2010) has stated that "the study by Kheni (2008) on health and safety practices among construction SMEs in Ghana revealed serious problems. The main problems identified by Kheni included lack of skilled human resources, inadequate government support for regulatory institutions and inefficiency in institutional frameworks responsible.

The activities of many government ministries and other organisations affect the construction industry of Ghana. Public institutions may interact directly with the industry by regulating its activities or act on behalf of government as financiers, suppliers, regulators, clients, or paymasters (Edmonds and Miles 1984).

Non-governmental organisations, which significantly influence the activities of the industry, include trade unions, employers' organisation, private clients, donor agencies, professional institutions, research institutions, and private educational institutions. To date, two government ministries have had direct responsibility over activities of construction businesses in Ghana and have had total control of implementation of state policy in the construction sector (Kheni et al, 2008). The key Ministry with respect to these is the Ministry of Roads and Transport. The Ministry of Roads and Transport is responsible for the road sector of the economy and has under it, the Ghana Highways Authority, Department of Urban Roads (DUR) and Department of Feeder Roads. The other is the Ministry of Water Resources, Works and Housing, which is responsible for policy development and implementation in respect of works, housing, water supply, sanitation and hydrology, and oversees the activities of building contractors. Generally, physical developments, such as roads, stadia, hospitals, schools, churches and housing are normally undertaken, after the relevant state agencies or departments certify and conclude that the project meets the requirements stipulated within the planning and building regulations of Ghana. The Ghana Government Conditions of Contract delegates all health and safety issues to the client and contractor, whereas environmental concerns are addressed by the Environmental Protection Agency (EPA). The Labour and the Factory Inspectorate Departments handle labour issues and other issues relating to employment as well as accidents from construction sites and other production units in the country. However, the Ministry of Health, through its Occupational Health Units is responsible for occupational health issues (Kheni, 2008).

SOURCING STAGE HEALTH AND SAFETY CONSIDERATIONS

The client's objectives for health and safety should be explained in the invitation to tender, with specific requirements set out in detail in the tender data and explained verbally at pre-tender meetings (Wells and Hawkins, 2013). If failure to convince the client of their capacity to meet these requirements is to be considered as a reason to reject a tender, this also should be clearly stated in the Tender data

Clients/Consultants may require contractors to submit with their tenders:

- a site specific health and safety plan (including, where appropriate, a fall protection plan)
- an outline of the procedures to be adopted to ensure that health and safety requirements are met, not only by the main contractor but also by subcontractors
- a system and format for recording and reporting accidents, incidents and near misses

So that there is no misunderstanding of what is required (and to ease the process of checking that the contractor has made adequate provision for health and safety) items that are necessary to meet the client's requirements and which can be separately priced should be listed as a prime cost item in the bill of quantities, provisional sum, or in whatever other pricing mechanism is used. Contractors are required to put a price against each of these items (Wells and Hawkins, 2013).

The kind of items that could be separately priced include:

- the preparation and updating of a site-specific health and safety plan including a supervision and reporting scheme (to include subcontractors)
- provision of temporary protective works (scaffolds, hoardings)
- hiring of a qualified safety officer
- provision of safety training to workers and supervisors
- time to attend meetings of the health and safety committee
- provision of welfare facilities (water, food, housing)
- provision of personnel protective equipment
- medical examinations, first aid and emergency facilities

It is also possible (and may be considered preferable) to take the cost of meeting the client's health and safety requirements out of competition by pre-pricing the above items. This was the approach adopted in Hong Kong in 1996 under the 'Pay for Safety' scheme. The maximum payment for all safety items was set at approximately 2% of the estimated value of the contract on small projects and 1% on large projects. Items that are not delivered are not paid for (David, 2007).

Although the price paid for safety measures may seem high to some clients, in the longer term it should be off-set by lower tender prices as contractors experience savings associated with better health and safety. The main sources of savings are reduced insurance premiums, less disruption to work schedules and higher labour productivity as workers feel more secure. Benefits accruing to the financiers include lower credit risk, less likelihood of work stoppage and diminished risk to their reputation (David, 2007).

In evaluating tenders, it is important to consider whether the contractor has made adequate allowance for the items included

in the special section of the bill of quantities or alternative pricing mechanism. Particular attention should be paid (especially in multi-storey buildings) to the contractor's plan and financial provision for the design and construction of temporary support systems (e.g. scaffolding) (Wells and Hawkins, 2013).

World Bank rules require the contract to be offered to the 'lowest evaluated tender'. But if the contractor's provision for health and safety fails to meet the client's requirements, the tender could be rejected as invalid/non-conforming. This is likely to be more readily accepted if health and safety are included in the objectives of the project.

Where local procurement regulations permit, clients might consider reducing the priority given to price in tender evaluation and increasing that given to quality and work safety. A notable example comes from Singapore which in 2005 moved to a quality/cost (two envelope) system for evaluating contractors' tenders, with the contractor's record on health and safety included in the quality assessment of technical bids (Wells and Hawkins, 2013).

In addition, work safety measures are included in the specification for public works projects and construction firms are ruled out if their work safety record is unsatisfactory (David, 2007).

V. RESULTS AND DISCUSSIONS

1. DATA COLLECTION AND DISTRIBUTION

A total of Twenty-Seven (27) questionnaires were administered to the Heads of Entities of the Twenty-Nine (29) Municipal and District Assemblies in the Bono, Bono East and Ahafo Regions. Twenty-One (21) responses were received, Two (2) of the questionnaires received were not responsive and excluded in the analysis resulting in a response rate of 70.37%.

Table 4.1: Distribution and Data Collection

Questionnaire issued	No. of Responses	No. of Responses responsive	Response rate
29	21	19	70.37%

2. FAMILIARITY OF RESPONDENTS TO REGULATIONS WHICH GOVERN SPECIFIC AREAS IN CONSTRUCTION

Table 4.2 indicates the extent to which respondents are familiar with some under listed regulations governing specific areas in construction.

Table 4.2: Respondents' familiarity with regulations

Regulations	Rating				
	Not Familiar %	Quite Familiar %	Average %	Familiar %	Very Familiar %
Public Procurement Act, 2003, (Act 663)	0.00	15.79	0.00	15.79	68.42
The Labour Act, 2003, (Act 651)	26.32	5.26	5.26	31.58	31.58
Factories, Offices and Shops Act, 1970, (Act 328)	68.42	15.79	0.00	0.00	15.79
The Workmen's Compensation, 1987, (PNDCL 187)	52.63	15.79	0.00	15.79	15.79
The Insurance Act, 2006 (Act 724)	31.58	31.58	0.00	15.79	21.05

From the above table, 68.42% of the respondents rated the Public Procurement Act, 2003, (Act 663) of Ghana as a legislation they were familiar with. The next best known legislation was the Labour Act, 2003, (Act 651) with 31.58%.

68.42%, 52.63% and 31.58% of the respondents also rated the

Regulations	Rating				
	Not Familiar %	Quite Familiar %	Average %	Familiar %	Very Familiar %
Public Procurement Act, 2003, (Act 663)	0.00	15.79	0.00	15.79	68.42
The Labour Act, 2003, (Act 651)	26.32	5.26	5.26	31.58	31.58
Factories, Offices and Shops Act, 1970, (Act 328)	68.42	15.79	0.00	0.00	15.79
The Workmen's Compensation, 1987, (PNDCL 187)	52.63	15.79	0.00	15.79	15.79
The Insurance Act, 2006 (Act 724)	31.58	31.58	0.00	15.79	21.05

Factories, Offices and Shops Act, 1970, (Act 328), The Workmen's Compensation, 1987, (PNDCL 187) Act and The Insurance Act, 2006 (Act 724) respectively as regulations they were not very familiar with.

The findings of Table 4.2 therefore reveals that some of the Respondents had little or no Knowledge of the above listed Legislations that ought to inform the identification and setting of the Evaluation criteria to ensure that the best Contractor capable of achieving value for money within the safest conditions is selected.

3. ACTIVITIES INVOLVED IN DURING THE PRE-CONTRACT STAGE OF WORKS PROCUREMENT

This section sought to reveal the extent of involvement of the various respondents with activities under the pre-contract stage of works procurement.

Table 4.3 Involvement with activities under the pre-contract stage of works procurement

Activities	Rating				
	Never %	Rarely %	Average %	Often %	Always %
Planning	15.79	15.79	0.00	0.00	68.42
Tender document preparation	0.00	0.00	0.00	31.58	68.42
Tender evaluation	0.00	0.00	0.00	15.79	84.21
Average rating	5.26	5.26	0.00	15.79	73.68

Table 4.3 above indicates that 89.47% (15.79% + 73.68%) of the respondents were involved in the pre-contract stage of works procurement. From the table, Tender Documents Preparation and Tender Evaluations were activities the respondents were mostly involved in. That is all of respondents, 100% (31.58%+68.42%) were involved in Tender Document preparation and the same percentage of respondents, 100% (15.79%+84.21%) were involved in Tender Evaluations. 68.42% of the respondents involve themselves with procurement planning activities.

It can therefore be inferred from the table above that a considerable number of the Respondents have been involved in a variety of Pre-Contract Procurement Activities and can therefore provide information representative of the procurement procedures in their respective Assemblies.

4. ENTITY'S CONSIDERATION OF THE APPLICATION OF THE PROVISIONS IN REGULATIONS IN THE PREPARATION OF TENDER DOCUMENTS

Table 4.5 below highlights how effectively the procurement entities of the Assemblies ensure compliance with some listed regulations governing works procurement. From the table below, higher percentages are identified with higher levels of compliance and vice versa.

From the above table, 84.21% of the Respondents rated the Public Procurement Act, 2003, (Act 663) as a legislation their entities "very effectively" consider in Tender Document preparation. The Labour Act, 2003, (Act 651), represented by

31.55% responses is the next best regulation whose requirements are considered by procuring entities in their tender document preparation.

The Factories, Offices and Shops Act, 1970, (Act 328), the Workmen’s Compensation Law, 1987, (PNDCL 187) and the Insurance Act, 2006 (Act 724) had ratings of 68.42%, 52.63% and 36.84% respectively, representing regulations whose requirements are not effectively considered by procuring entities in their tender document preparation.

It is identified that the percentage of Heads of Entities who are familiar with the Public Procurement Act and the Labour Act as identified in Table 4.2 are almost the same as the percentage of Procurement Entities who “very effectively” consider these legislations in tender document preparation in table 4.5.

5. RESPONDENTS’ OPINION OF EMPLOYMENT OF PROCUREMENT ACT ON HEALTH AND SAFETY

The opinion of respondents was sought on how well Public Procurement Act, 2003 (Act 663) empowers procurement entities to make Health and Safety considerations at the sourcing stage of works procurement. Table 4.6 highlights the findings.

Table 4.6 - Respondents’ opinion on the Public Procurement Act, 2003, (Act 663)

PUBLIC PROCUREMENT ACT, 2003, (ACT 663) EMPOWERING PROCUREMENT ENTITIES TO MAKE HEALTH AND SAFETY CONSIDERATIONS AT THE SOURCING STAGE OF WORKS PROCUREMENT	NO. OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
Not well	2	10.53%
Quite well	17	89.47%
Averagely	0	0.00%
Well	0	0.00%
Very well	0	0.00%
TOTAL	19	100.00%

From table 4.6 above, 89.47% of the respondents believed the Public Procurement Act, 2003, (Act 667) does not extensively empower Procurement Entities to make health and safety considerations at the sourcing stage of works procurement.

6. FORMS IN WHICH HEALTH AND SAFETY CONSIDERATIONS ARE APPLIED

Table 4.8 details what items the Procurement Entities require of Tenderers to price under the preliminary section of the Bill of Quantities as identified in Table 4.8.

Table 4.8: Application of health and safety consideration

ITEM	Rating				
	Disagree %	Quite Agree %	Averagely %	Agree %	Strongly Agree %
The preparation and updating of a	63.16	21.05	0.00	0.00	15.79

site-specific health and safety plan, including a supervision and reporting scheme (to include subcontractors)					
Provision of safe construction equipment (scaffolds, hoardings)	0.00	15.79	0.00	31.58	52.63
Provision of safety training to workers and supervisors	15.79	36.84	0.00	15.79	31.58
Provision of welfare facilities (water, food, housing)	15.79	31.58	5.26	31.58	15.79
Provision of health and safety gear (helmet, boot, etc.)	15.79	15.79	0.00	21.05	47.37
Medical examinations, first aid and emergency facilities	15.79	15.79	0.00	26.32	42.11

Adnan et al (2007) asserts that analysing data on ordinal scale (e.g. Likert scale 1-5) involves the application of Importance Indices. The Importance Indices (I.I) of determining significance of items was adopted to rank the items that Procurement Entities require of Tenderers to price in the preliminary section of the Bill of Quantities. The Importance Indices is computed using (Adnan et al 2007): Importance Index is given by:

$$5 \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{(n_1 + n_2 + n_3 + n_4 + n_5)} \times 100$$

Where:

- n1 – number of respondents who answered “Disagree”.
- n2 – number of respondents who answered, “Quite disagree”.
- n3 – number of respondents who answered “Average”.
- n4 – number of respondents who answered “Agree”.
- n5 – number of respondents who answered “Strongly agree”

It is worthwhile to note that the nearer the value of importance index of the identified factor is to unity (1) or 100%, the more significant the items are and the most it is required of tenderers to price.

Here, respondents were to rate on a scale of “Disagree” to “Strongly disagree” as a way of determining which item the Procurement Entities required most of tenderers to be priced in the Preliminaries Section of Bill of Quantities. Tables 4.7 shows the percentage of the responses, and table 4.13 also shows the rankings of items the procurement entities require of tenderers to price.

Table 4.9: Results of Importance Indices showing the application of health and safety considerations

ITEM	Weighting Factors										Σ(n _i)	I. Index	Rank
	1	n	2	n	3	n	4	n	5	N			
The preparation and updating of a site-specific health and safety plan including a supervision and reporting scheme (to include subcontractors)	12	12	4	8	0	0	0	0	3	15	35	36.84	6th
Provision of safe construction equipment (scaffolds, hoardings)	0	0	3	6	0	0	6	24	10	50	80	84.21	1st
Provision of safety training to workers and supervisors	3	3	7	14	0	0	3	12	6	30	59	62.10	4th
Provision of welfare facilities (water, food, heating)	3	3	6	12	1	3	6	24	3	15	57	60.00	5th
Provision of health and safety gear (helmet, boot, etc.)	3	3	3	6	0	0	4	16	9	45	70	73.68	2nd
First aid facilities	3	3	3	6	0	0	5	20	8	40	69	72.63	3rd

From table 4.8, it was identified that the form in which the procurement entities make health and safety consideration at the sourcing stage was by requesting from tenderers to price health and safety requirements under the preliminary sections of the Bill of Quantities.

Table 4.8 indicates that the items the procuring entities mostly require of tenderers to price are the provision of safe construction equipment (scaffolds, hoardings, etc.), the Provision of health and safety gear (helmet, boot, etc.) and the provision of first aid facilities. These items that the Procuring Entities require of tenderers to price may have stemmed from the percentage of Heads of Entities who are familiar with the Labour Act as identified in table 4.2 and have indicated in table 4.5 that their Procuring entities consider the Labour Act in their tender document preparation. The Labour Act provides a general obligation for every employer to supply and maintain the health and safety of workplaces.

EVALUATION CRITERIA MOSTLY USED IN CONTRACTOR SELECTION

Table 4.10 below illustrates the evaluation criteria mostly prescribed by the procurement entities in contractor selection. Respondents were required to indicate the frequency of usage of some tabulated evaluation criteria.

Table 4.10: Evaluation Criteria used in contractor selection

Item	Rating				
	Never %	Rarely %	Average %	Often %	Always %
Annual volume of construction works of tenderer	0.00	0.00	0.00	15.79	84.21
Experience of tenderer as prime contractor in the construction in nature and complexity equivalent to the Works	0.00	0.00	0.00	0.00	100.00

Proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment	0.00	0.00	0.00	36.84	63.16
Staff holding of tenderer	0.00	0.00	0.00	0.00	100.00
Liquid assets and/or credit facilities of tenderer	0.00	0.00	0.00	16.36	83.64
Details of how safety is communicated and coordinated	47.37	52.63	0.00	0.00	0.00
Evidence of relevant safety training for staff	47.37	52.63	0.00	0.00	0.00
Experience of safety officer proposed for a project	63.16	15.79	0.00	0.00	21.05
An outline of the procedures to be adopted to ensure that health and safety requirements are met, not only by the main contractor but also by subcontractors	63.16	36.84	0.00	0.00	0.00
A system and format for recording and reporting accidents, incidents and near misses	63.16	36.84	0.00	0.00	0.00

From the table above, respondents rated the following as the most frequently prescribed evaluation criteria in contractor selection; Experience of tenderer as prime contractor in works of similar nature and complexity equivalent to the Works (100%), Staff holding of tenderer (100%), Liquid assets and/or credit facilities of tenderer (83.64%), Annual volume of construction works of tenderer (84.21%) and Ownership or Proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment (63.16%). This falls in line with the provisions in the instructions to tenderers in the Standard Tender Document issued by the Public Procurement Board.

The respondents also rated the following as evaluation criteria they rarely use in contractor selection; Experience of safety officer proposed for a project, An outline of the procedures to be adopted to ensure that health and safety requirements are met; not only by the main contractor but also by subcontractors; A system and format for recording and reporting accidents, incidents and near misses; Details of how safety is communicated and coordinated, Evidence of relevant safety training for staff (Wells and Hawkins, 2007).

It is therefore not surprising that a greater percentage of the respondents represented by 89.47% was of the opinion that the Public Procurement Act, 2003, (Act 667) does not extensively empower Procurement Entities to make health and safety considerations at the sourcing stage of works procurement.

The Act may not specifically indicate that Procuring Entities should always consider Health and Safety in their contractor selection criteria but it does give the entities the liberty of indicating what they determine should inform the contractor selection to suit the particular project requirements.

EFFECT OF HEALTH AND SAFETY CONSIDERATIONS ON PROJECT PERFORMANCE

Table 4.11 below presents the Health and Safety issues / Accidents recorded on the Project Sites of the Assemblies in the Bono, Bono East and Ahafo Regions under the GETfund Project Scheme.

Table 4.11: Health and Safety issues / accidents

Item	Rating				
	Never %	Rarely %	Averagely %	Often %	Always %
Annual volume of construction works of tenderer	0.00	0.00	0.00	15.79	84.21
Experience of tenderer as prime contractor in the construction in nature and complexity equivalent to the Works	0.00	0.00	0.00	0.00	100.00
Proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment	0.00	0.00	0.00	36.84	63.16
Staff holding of tenderer	0.00	0.00	0.00	0.00	100.00
Liquid assets and/or credit facilities of tenderer	0.00	0.00	0.00	16.36	83.64
Details of how safety is communicated and coordinated	47.37	52.63	0.00	0.00	0.00
Evidence of relevant safety training for staff	47.37	52.63	0.00	0.00	0.00
Experience of safety officer proposed for a project	63.16	15.79	0.00	0.00	21.05
An outline of the procedures to be adopted to ensure that health and safety requirements are met, not only by the main contractor but also by subcontractors	63.16	36.84	0.00	0.00	0.00
A system and format for recording and reporting accidents, incidents and near misses	63.16	36.84	0.00	0.00	0.00

From table 4.10, it can be identified that the health and safety issues that often occur at the project sites are Slips and trips, representing 47.37% of the responses; 36.84% of respondents indicated that workers often transport contaminants to homes and 31.58% also responded that Scaffolding accidents (Defective Scaffolding, Improperly Assembled Scaffolding) and Food poisoning often occur; Trench collapses and Welding accidents represented by 21.05% and 15.79% respectively also often occur. Construction site falls (roof-related falls, crane falls, scaffolding falls, falls resulting from holes in flooring, and falling objects) represented by 36.84% responses always occurs.

Among the health and safety issues that rarely occur are Crane accidents, Fires and explosions and Welding accidents.

EFFECT OF HEALTH AND SAFETY ISSUES ON PROJECT PERFORMANCE

Table 4.12: Respondents' response to how health and safety issues occur on project sites and how they affect project performance

Item	Rating				
	Not seriously %	Quite seriously %	Averagely %	Seriously %	Very seriously %
Damages to plant, equipment and completed work	15.79	31.58	0.00	15.79	36.84
Payments for settlements of injury or death claims	15.79	31.58	0.00	15.79	36.84
Legal fees for defense against claims	31.58	15.79	15.79	15.79	21.05
Costs of rescue operations and equipment	31.58	0.00	15.79	31.58	21.05
Expenditures on emergency equipment	15.79	31.58	0.00	0.00	36.84
Loss of function and operations income	15.79	0.00	31.58	21.05	31.58
Slowdowns in operations while accident causes are determined and corrective action taken	15.79	0.00	0.00	0.00	84.21
Corrective actions to prevent re-occurrence of accident	15.79	15.79	0.00	15.79	52.63
Degradation of efficiency of operations because of loss of experienced and trained personnel	15.79	0.00	15.79	52.63	15.79
Increased insurance costs	15.79	52.63	15.79	15.79	0.00
Training costs for replacements	31.58	15.79	15.79	21.05	15.79
Loss of productivity	15.79	15.79	15.79	0.00	52.63
Disruptions while investigations are being carried out by the company safety department and insurers	15.79	15.79	0.00	15.79	52.63
Medical payments	15.79	15.79	0.00	36.84	31.58
Insurance premiums	15.79	52.63	15.79	15.79	0.00
Costs of workman's compensation insurance	21.05	15.79	0.00	31.58	31.58

The Importance Index is adopted to rank the effect of health and safety on project performance.

: Importance Index is given by

$$I = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{n_1 + n_2 + n_3 + n_4 + n_5} \times 100$$

Where:

n1 – number of respondents who answered “not seriously”;

n2 – number of respondents who answered “quite seriously”;

n3– number of respondents who answered “averagely”;
 n4 – number of respondents who answered “seriously”;
 n5 – number of respondents who answered “very seriously”

It is worthwhile to note that the nearer the value of importance index is to unity (1) or 100%, the more significant it is and the greater its effect on project performance.

Here, respondents were given some ratings on a scale of “not seriously” to “very seriously” to rate as a way of determining the effect of health and safety issues or accidents on project performance. Tables 4.11 shows the percentage of the responses and table 4.13 also shows the rankings of how health and safety issues seriously affected project performance.

Table 4.13: Results of Importance Indices showing the ranking of ways the health and safety issues seriously affected project performance

ITEM	1	2	3	4	5	Σ (ni)	I. Index					
Damages to plant, equipment and completed work	3	3	6	12	0	0	3	12	7	35	62	65.26%
Payments for settlements of injury or death claims	3	3	6	12	0	0	3	12	7	35	62	65.26%
Legal fees for defence against claims	6	6	3	6	3	9	3	12	4	20	53	55.79%
Costs of rescue operations and equipment	6	6	0	0	3	9	6	24	4	20	59	62.11%
Expenditures on emergency equipment	6	6	6	12	0	0	0	0	7	35	53	55.79%
Loss of function and operations income	3	3	0	0	6	18	4	16	6	30	67	70.53%
Slowdowns in operations while accident causes are determined and corrective action taken	3	3	0	0	0	0	0	0	16	80	83	87.37%
Corrective actions to prevent re-occurrence of accident	3	3	3	6	0	0	3	12	10	50	71	74.74%
Degradation of efficiency of operations because of loss of experienced and trained personnel	3	3	0	0	3	9	10	40	3	15	67	70.53%
Increased insurance costs	3	3	10	20	3	9	3	12	0	0	44	46.32%
Training costs for replacements	6	6	3	6	3	9	4	16	3	15	52	54.74%
Loss of productivity	3	3	3	6	3	9	0	0	10	50	68	71.58%
Disruptions while investigations are being carried out by the company safety department and insurers	3	3	3	6	0	0	3	12	10	50	71	74.74%
Medical payments	3	3	3	6	0	7	28	6	30	67	70.53%	
Insurance premiums	3	3	10	20	3	9	3	12	0	0	44	46.32%
Costs of workman’s compensation insurance	4	4	3	6	0	0	6	24	6	30	64	67.37%

Table 4.14: Ranking of ways, the health and safety issues seriously affected project performance

ITEM	RANK
Slowdowns in operations while accident causes are determined	1st
Corrective actions to prevent re-occurrence of accident	2nd
Disruptions while investigations are being carried out	3rd
Degradation of efficiency of operations because of loss of experienced personnel	4th
Medical payments	4th

Costs of workman’s compensation	5th
Damages to plant, equipment and completed work	6th
Payments for settlements of injury or death claims	6th
Costs of rescue operations and equipment	7th
Legal fees for defence against claims	8th
Expenditures on emergency equipment	8th
Training costs for replacements	9th
Increased insurance costs	10th

Table 4.14 above highlights the effects of the health and safety issues identified in Table 4.10 as occurring on the project sites. The effects have been ranked from the ‘most serious (1) to ‘least serious (10).

DETERMINATION OF HOW ACCIDENTS AFFECTED PROJECT PERFORMANCE IN TERMS OF COST, TIME AND QUALITY DELIVERY

The average response rates of each of the accident effects were first calculated then the effects of the accident in terms of cost, time and quality delivery was also determined. The averages of the way the accident affected cost, time or quality delivery were then summed together and divided by their frequency. This resulted in the average response rates of how the accidents impacted cost, time and quality delivery. This is indicated in Table 4.15 below.

Table 4.15: How the effects of accidents affect Project Performance in relation to Cost, Time and Quality Delivery

Effects of Accidents	Rank	Average Rating %	Cost	Quality	Time
Slowdowns in operations while accident causes are determined and corrective action taken	1st	87.37	Increase		Delay
Corrective actions to prevent re-occurrence of accident	2nd	74.74	Increase		Delay
Disruptions while investigations are being carried out by the company	2nd	74.74			Delay
Loss of productivity	3rd	71.58			Delay
Degradation of efficiency of operations because of loss of experienced and trained personnel	4th	70.53		Reduce	
Medical payments	4th	70.53	Increase	Reduce	
Costs of workman’s compensation insurance	5th	67.37	Increase		
Damages to plant, equipment and completed work	6th	65.26	Increase		Delay

Payments for settlements of injury or death claims	6th	65.26	Increase		
Costs of rescue operations and equipment	7th	62.11	Increase		
Legal fees for defense against claims	8th	55.79	Increase		
Expenditures on emergency equipment	8th	55.79	Increase		
Training costs for replacements	9th	54.74	Increase		
Insurance premiums	10th	46.32	Increase		

In Table 4.15 above, *Slowdowns in operations while accident causes are determined* ranks as the most serious effect of accidents on the project sites. If activities slow down on a construction site more than the expected output per day, there is delay which could cause an increase in project cost.

Investigating the root cause of an accident is mostly done to prevent similar accidents in future. From Table 4.10, it has been identified that scaffold accidents is one of the accidents that occurs on the construction sites and the injuries may be as a result of construction workers either falling off the scaffolds or the scaffolds collapsing and falling on them. Scaffolding accidents occur due to improper installation, improper use of scaffold, defective materials, or objects falling off. The process of determining the cause of such accidents causes delays in the construction process and add to the cost of the project.

Corrective actions to prevent re-occurrence of accidents rank second as the most serious effect of accidents on the project sites that impacts cost and project delivery.

The goal of corrective actions is to eliminate the root cause and prevent reoccurrence. Corrective actions are directed to an event that happened in the past. When the right corrective actions are taken all root causes of the problem should be eliminated. For instance, if the root cause of food poisoning which was identified in Table 4.10 to have occurred on a project site because of workers getting drunk and consuming contaminated food, a corrective action may be to include them in a treatment program and their working privileges revoked or limited. This would then increase costs and delay progress. Again, if the root cause of the falls were attributable to bad formwork construction, the solution would be for it to be repaired. In this regard, corrective actions will slow the progress of works in the effort to redo the works and consequently add to the cost of construction.

Table 4.15 indicates that *Disruptions while investigations are being carried out* ranks third (3rd) as another effect of accidents on the project sites, which delays the construction period.

Disruptions are events that affect the construction programme. Interferences with the flow of work in the project are common disruptions (Howick, Ackermann, Eden and Williams, 2009), Howick et. al. (2009) points out that many disruptions to complex projects are planned for at the bidding stage as they may be expected to unfold during the project.

Construction accidents can also cause significant disruption in the life of the victims and their families. When an accident occurs, other employees assist the victim, carry out accident

investigations and reporting, mitigating further damages, housekeeping etc. thereby delaying time.

Degradation of efficiency in operations because of loss of experienced personnel ranks fourth as a health and safety issue that impacts project performance. This arises due to the loss of certain efficiencies of the injured worker after resuming work which affects the quality of construction work and progress.

Medical payments are also identified to impact cost, time and delivery of projects. Payment for treatment of construction accidents are mostly absorbed by the construction company thereby increasing cost of project. Medical payments are unanticipated costs to the contractor and the likelihood of the contractor compromising on the quality of construction materials and methods in order to retain anticipated profits impacts on project quality and delivery.

Costs of rescue operations - According to (Farlex, 2014) a rescue operation is a planned activity involving many people performing various actions to free others from danger such as fires, floods or confinement. From table 4.13, cost of rescue operations least affects project performance. This is in conformity with table 4.10 which identifies Fires and explosions as rarely occurring on the project sites.

Legal fees for defense against claims – These are fees paid for legal service of defending the employer against a workers' claim of having been affected by health and safety issues occurring on project site. In the instances where a worker raises a claim against the contractor, cost is incurred on legal fees against such claims. From table 4.13, payment of legal fees for defense against claims also least affects project performance. This then implies that workers mostly do not raise legal claims against employers thereby least affecting the project performance.

Expenditures on emergency equipment – An emergency according to Reverso, (2014) is an unexpected and difficult or dangerous situation, especially an accident, which happens suddenly and which requires quick action to deal with it. Emergency equipment are those intended for use in an emergency. Expenditures on emergency equipment is one of the factors also rated as least affecting project performance.

Training costs for replacement – Training has been identified as one of the most important elements of any injury and illness prevention program. It allows employees to learn their job properly, brings new ideas into the workplace, reinforces existing ideas and practices, and puts program into action. Training costs for replacement being ranked as least affecting project performance indicates that safety training programmes are mostly not organized for workers. The Factories, Offices and Shops Act, 1970, (Act 328) provides that that "No person shall be employed at any machine or in any process liable to cause bodily injury, unless he has received sufficient training in work at the machine or in the process, or is under adequate supervision by a person who has a thorough knowledge and experience of the machine or process".

Table 4.16: Rate at which accidents increased project cost

Effects of Accidents Increasing Cost	Average Rating %
Slowdowns in operations while accident causes are determined	87.37
Corrective actions to prevent re-occurrence of accident	74.74
Medical payments	70.53
Costs of workman's compensation insurance	67.37
Damages to plant, equipment and completed work	65.26
Payments for settlements of injury or death claims	65.26
Costs of rescue operations and equipment	62.11
Legal fees for defense against claims	55.79
Expenditures on emergency equipment	55.79
Training costs for replacements	54.74
Insurance premiums	46.32
Total Effect (%)	705.28%
Total Effect (No.)	11
Average Effect (%)	64.12%

Table 4.17 Rate at which accidents reduced quality of project

Effects of Accidents reducing Quality	Average Rating %
Degradation of efficiency of operations because of loss of experienced and trained personnel	70.53
Medical payments	70.53
Total Effect (%)	141.06%
Total Effect (No.)	2
Average Effect (%)	70.53%

Table 4.18 Rate at which accidents delayed project duration

Effects of Accidents Delaying Project Duration	Average Rating %
Slowdowns in operations while accident causes are determined and corrective action taken	87.37
Corrective actions to prevent re-occurrence of accident	74.74

Disruptions while investigations are being carried out by the company	74.74
Loss of productivity	71.58
Damages to plant, equipment and completed work	65.26
Total Effect (%)	373.69%
Total Effect (No.)	5
Average Effect (%)	74.74%

It is therefore identified from table 4.15 to table 4.18 that cost, quality and timely delivery of the School Under Trees (SUTs) and Emergency Intervention Projects (EIPs) have been affected by health and safety issues or accidents that have been identified in table 4.10.

CONCLUSION

MAJOR FINDINGS

1. Pricing of Health and Safety Requirements in Preliminaries and General Item
 Most of the Procurement Entities (84.21%) only required of Contractors to competitively price health and safety items in the preliminary section of the Bill of Quantities at Tender stage. The findings of the data collected and analysed revealed that Procurement Entities only required contractors to price some few health and safety items under the Preliminary Section of the Bill of Quantities during the Tender stage. Some of the items included the provision of safe construction equipment (scaffolds, hoardings, etc.), the Provision of health and safety gear (helmet, boot, etc.) and the provision of first aid facilities.

2. Less Importance Attached to Health and Safety Requirements as Evaluation Criteria
 Most of the Procurement Entities rarely set evaluation criteria on Health and Safety in the Tender Data

3. Lack of the Required Level of Education
 From analysis and observations made most of the Procurement Entity Heads, represented by 66.67% in figure 1 do not have the required level of education in the procurement field.

4. Lack of Knowledge in the Public Procurement Act and Other Health and Safety Legislations.
 Some of the Heads of Entities from observation were not very knowledgeable with the Public Procurement Act and Health and Safety legislations.

5. Effect of Health and Safety on Project Performance
 Most of the projects experienced some health and safety issues/accidents, which had an effect on project performance in terms of cost, quality and timely delivery.

The findings of data analysed and observations made also revealed that 64.12% of the School Under Trees and Emergency Intervention Project sites in the Bono, Bono East and Ahafo Regions experienced Cost Increases. The quality of works on 70.53% of the project sites were compromised while 74.74% experience project delays.

From the Data gathered and analyzed, the Cost Increases mostly occurred as a result of Slowdowns in operations, while accident causes were determined, taking corrective actions to prevent re-occurrence of accident, Paying Medical Bills etc.

Quality was compromised mainly as a result of Degradation of efficiency of operations because of loss of experienced and trained personnel.

Project Delays also were as a result of accidents causing Slowdowns and Disruptions operations while causes are determined.

In conclusion, though most of the procuring entities performed quite well in considering health and safety at the sourcing stage of works procurement, there is certainly more that could be done.

RECOMMENDATIONS

In the light of the foregoing conclusion on regarding health and safety consideration during the sourcing stage of works procurement by procuring entities in the Municipal and District Assemblies in the Bono, Bono East and Ahafo Regions, the following recommendations have been made.

1. Procurement Entities when sourcing for contractors to undertake the construction of works should also make an effort to set health and safety criteria in the Tender Data Sheet, the Health and Safety Documents contractors must submit with their tenders. The items may include Details of how safety should be communicated and coordinated, Evidence of relevant safety training for staff, Experience of safety officer proposed for a project, An outline of the procedures to be adopted to ensure that health and safety requirements are met, not only by the main contractor but also by subcontractors and a system and format for recording and reporting accidents, incidents and near misses. Failure to convince the procuring entities of their capacity to meet these requirements should be considered as reason to reject a tender which should be clearly stated in the Tender data.

2. Procurement Entities must ensure Contractors provide and make use of the Health and Safety Items required at the sourcing stage of the procurement process.

3. Heads of Entities and Procurement Officers within the assemblies should be trained to enlighten them on health and safety and procurement. Heads of Entities' qualification in the procurement field should be considered before being appointed. It is vital for the heads of entities to understand the costs of poor or non-existent health and safety consideration such as lost working days and compensation payments.

4. Appointment of the Heads of Entities should also be non-partisan. Political interference in the activities of procurement in the Municipal and District assemblies should be avoided.

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