**Driving Health and Safety in Construction through Procurement Strategy**

**Bert Ediale Young, Rafiu Dimeji Seidu, Davina Nganga, Herbert Robinson and Obas John Ebohon**

*1-2 & 4-5. School of the Built Environment and Architecture, London South Bank University, 103Borough Road, London, SE1 0AA, UK.*

*3. Balfour Beatty Kilpatrick, BB Project Office, Millburn Hill Road, Coventry, CV4 7HS*

***Abstract***

***Context:*** *There is an increasing awareness of the importance of health and safety in the construction industry. However, the extent to which this is given the appropriate attention is contested, given the divergent views among key stakeholders. The contractors view clients’ as merely paying ‘lips services’ to health and safety, and they point to clients’ obsession with ‘value for money’ and the failure to understand that ‘value for money’ concept transcends beyond tender price when selecting contractors.*

***Aim:*** *The aim of this study is to explore the role of procurement strategy in improving health and safety culture in construction projects.*

***Design/methodology/approach:*** *The method adopted is based on a review of the literature and in-depth exploratory interviews with two major contractors to explore how health and safety is influenced by procurement approaches.*

***Findings:*** *Preliminary findings suggest that collaborative procurement approaches, unlike traditional procurement with conflicting objectives of key stakeholders, can dissolve hierarchical barriers and create highly connected teams with strong working relationships to promote health and safety.*

***Practical implications:*** *Health and safety should be positioned at the heart of procurement to ensure that there are adequate provisions to develop a stronger health and safety culture to facilitate the implementation of construction projects.*

***Originality/value:*** *The study argues for increasing understanding the roles of procurement strategy in ameliorating health and safety issues in construction projects, which will enable appropriate guidelines to be utilised by clients in selecting contractors for a construction project.*

**Keywords**: Procurement, health and safety, tenders, key stakeholders.

**INTRODUCTION**

Understanding the role of health and safety in construction and the factors affecting its implementation are crucial in reducing construction risk and saving lives. Health and safety is the responsibility of key stakeholders; the clients, designers, contractors and subcontractors in the construction industry where accident rates are notoriously high and unacceptable. Early studies by Tombs and Whyte (2008), reported that in a typical decade, about 1,500 people are killed on construction sites and an estimated 25,000 – 30,000 are seriously injured in the UK. In addition, another 300,000 – 400,000 suffer injuries sufficient to keep them off their normal work for at least three days (Tombs and Whyte (2008). The main causes of accidents on construction sites include falls, stepping on or striking against objects, lifting and carrying over-exertion, machinery, electricity, transport and fire and explosions. Hinze (2002), noted that the construction sector has generally accounted for nearly 20% of death from industrial workers.

The concept of designing for construction health and safety is recognised in the construction industry (Behm, 2005) and involves dealing with workers on site during the construction processes (Gambatese, 2000). Myers (2005) noted that the total number of fatalities in the US private construction sector in 2003 was 1126, which equalled 11.7 worker fatalities for every 100,000 construction workers according to the US bureau of labour statistics. Deaths, injuries and ill health causes pain, suffering and cost money. An early survey by the Health and Safety Executives (HSE) found that accidental loss represented about 8.5% of the tender price, even on construction sites with no serious reportable accidents (HSE, 2000).

Thorpe (2005) argued that despite the increase in published information on good health and safety practices such as regulations, guidance notes and bulletins, high levels of fatality and injury still persist. The construction industry employ people directly or indirectly, however, construction workers are more exposed to risk, hazard and pollution compared to other industries (Pinto et al., 2011). Significant amount of work has been put in place, but it has not had any major effect on the rate of accidental death on construction sites (HSE, 2013). The International Labour Organisation (ILO) estimated that there at least 60,000 fatal accidents a year on construction sites around the world, that is one in six of all fatal work-related accidents with an average of 100 fatalities on construction sites each year in the UK alone (Wells, 2015).

However, it is now increasingly recognised that productivity can be increased in a safe and healthy environment and there is increasing pressure to improve construction health and safety. Key stakeholders such as clients, the design team - architects, engineers, quantity surveyors, main contractors and specialist subcontractors can influence construction health and safety, directly and/or indirectly. Health and safety can be considered at the early procurement stages as other design issues for the purpose of reducing risk in construction. Professional advice on procurement strategies is of utmost importance in construction projects. To do so, however, requires extensive knowledge of procurement from pre-contract, design through the tender evaluation process to minimise health and safety risk during the construction stages. The aim of this study is to explore the role of procurement in improving health and safety practices for construction projects.

**LITERATURE REVIEW**

**Key Stakeholders and Safety Considerations**

The design defines the structures to be built and have an influence on the health and safety of both workers and end users (MacCollum, 2006). Through planning and design, many health and safety risks can be eliminated before the start of construction work. For example, handling of materials, getting the 'workface’ across sites, poor lifting of tools and equipment, long term injury as a result of repeated poor lifting practices, exposure to high levels of noise causing deafness and vibration leading to a range of problems (HSE, 2000). Working at height (WAH) is the highest risk area within the UK construction industry. Each year, approximately 50 workers are critically injured whilst carrying out tasks at height. Other risks include exposure to dust and solvents which can cause skin diseases such as dermatitis, lifting heavy and awkward loads which causes back and other injuries.

An appropriate procurement strategy can easily integrate health and safety to protect construction workers and end-users from injuries. Clients’ are becoming aware of placing safety above lowest price during tendering/procurement process. However, there is a predominant focus on the use of tender price rather than safety in selecting contractor as part of the drive to measure value for money. Watt et al. (2009) argued that selecting an appropriate contractor for a construction project is very important, as this will have a significant effect on the project life cycle. It is important to know the client’s requirement to determine which criteria influences the choice of contractors and whether cost is rated higher than other factors to be considered i.e. quality, time and safety.

In health and safety, reducing risk of accidents is the responsibilities of key stakeholders as outlined below.

**Clients:** It is the responsibility of a client to appoint competent designers. A client procuring construction work have an influential role in protecting the health and safety of construction workers by sharing information about possible risks on sites with designers, Construction Design and Management (CDM) Coordinator and to ensure that the Main Contractor makes reasonable arrangement for work safety, allowing enough time and money for each stage of the project.

**Designers:** Designers have a unique position to reduce the health and safety risks that can arise from construction work through early design decisions. They influence the choice of materials, construction methods, and the building program, demolition of a structure, then take appropriate action to eliminate the hazard such as the use of non-toxic material that reduces risk.

**Main Contractors:**Main Contractors are to manage, coordinate and plan the work during construction phase to ensure risks are properly controlled and to comply with Design and Management Regulation (CDM). Part of this plan includes providing suitable welfare facilities before work starts on site, checking other subcontractor’s risks to health and safety. It also includes coordinating to ensure good cooperation between parties involved in the project and controlling significant health risks such as contaminated land, hazardous substances, removal of asbestos, noise and vibration, and manual handling.

CDM Regulations place duties on all those who can contribute to the health and safety throughout the construction process. Clear responsibility is placed upon clients, designers, contractors together with the planning supervisor to be productive in planning, coordination and management of health and safety (Syed, 2015). The regulations focus on identifying the potential hazards to health and safety during each stage of production process together with the assessment of their risk. CDM require the production of certain documents such as the health and safety plan and the health and safety file to be developed and implemented. The health and safety responsibilities under CDM are shared; but most of it falls on the principal or main contractor.

The role performed by the clients and their representatives as well as other key stakeholders is therefore critical in driving the procurement strategy. Safety by design is a concept well known by professionals in the construction industry and govern by the ethics of professionals’ concern (CDM 2015 Regulations). And yet, it is uncommon for participants in the construction industry to consider safety at the planning stages. Safety should be considered right from the planning and design to the construction stages to ensure that tendering processes are incorporated to enhance safety. Safety issues in the UK is a collective responsibility of all the professionals involved in the construction processes, whilst the responsible person for coordinating, is the Construction (Design and Management) coordinator with a legal backing for management and collaboration with the other parties to the contract (CDM, 2015). Larsen and Whyte (2013), concur that design changes or variation in design could affect planning, which will reflect on the level of construction safety, especially when dealing with some technical projects. Despite all the legislation backing the CDM coordinator, the project manager, construction manager and site manager believe that the contract administrator or architect rank aesthetics above safety when defining construction projects.

The Construction (Design and Management) Regulations 2015, is designed to improve health and safety in the industry by helping to:

* sensibly plan the work, so the risks involved are managed from start to finish
* have the right people for the right job at the right time
* cooperate and coordinate work with others
* have the right information about the risks and how they are being managed
* communicate this information effectively to those who need to know and
* consult and engage with workers about the risks and how they are being managed

 (Health and Safety Executive, 2015).

**Safety Considerations in Procurement**

Procurement is the process of obtaining goods and services, hence it is a key stage in a construction project with activities spanning from identification to project closeout ([Ruparathna](https://ascelibrary.org/author/Ruparathna%2C%2BRajeev) et al., 2015). The criteria used in procuring building works or selecting a contractor has been the subject of extensive research using different criteria. Cost, time and quality are often considered as the predominant factors that determine project success. Earlier research carried out, revealed that cost, quality and time are the main criteria for contractors’ selection, however the finding of Lopes and Flavell (1998) suggest that no single criteria is rated above another. Other studies carried out by Watt et al., (2010) shows that quality and cost are more important among the criteria. Hatush and Skitmore (1997) noted that clients differ in their readiness to employ only those contractors who are able to meet completion dates, with some inserting acceleration clauses in the contract to speed up the completion process and using clauses on liquidation and ascertain damages to prevent any time overrun. Cost is important as the contract sum is often the main criterion for contractor’s selection especially in competitive tendering without actually considering the most economically advantageous tender (MEAT). Generally, construction procurement is a complex process, because of the skills involved in making the right choice from the available procurement options; traditional, design and build, management contracting and collaborative approaches which are discussed as follows;

**Traditional procurement:**

This approach involves developing a detailed [design](https://www.designingbuildings.co.uk/wiki/Design) and preparation of other contract documents i.e. the bill of quantities (BQ), before [tender](https://www.designingbuildings.co.uk/wiki/Tenders)ing which gives the [client](https://www.designingbuildings.co.uk/wiki/Clients) certainty on [design quality](https://www.designingbuildings.co.uk/wiki/Design_quality) and [cost](https://www.designingbuildings.co.uk/wiki/Cost) (Hughes, et. al., 2015). However, because of the requirement of producing detailed design and unpriced BQ before inviting tenders, it is time consuming. Critics argue that it creates misinterpretations of contract documents by the contractor as they are not involved in developing the design for which they are hired to construct. Such an approach does not help improve [buildability](https://www.designingbuildings.co.uk/wiki/Buildability) and often brings about legal technicalities leading to disputes often resulting in arbitrations. Also, it is considered to be a low [risk](https://www.designingbuildings.co.uk/wiki/Risk) method of contracting for the [client](https://www.designingbuildings.co.uk/wiki/Clients), as the [contractor](https://www.designingbuildings.co.uk/wiki/Contractors) takes the financial [risk](https://www.designingbuildings.co.uk/wiki/Risk) for the [construction](https://www.designingbuildings.co.uk/wiki/Construction) project.

**Design and Build:**

This is the procurement route were the main contractor is appointed to design and construct the works. The design and build contractor is responsible for the design, planning, organisation, control and construction of the works based on the employer’s requirements (Hughes, et. al., 2015). The employer provides the tenderers with the ‘Employer’s Requirements’ and the contractors respond with the ‘Contractor’s Proposals’, which include the price for the works. It provides a single point of responsibility for delivering the entire [project](https://www.designingbuildings.co.uk/wiki/Project) hence eliminating the issue of disputes arising from mis-interpretations of drawings and contractual documents. Additionally, early commencement, early price certainty and contractors’ early input which is derived from contractors experienced are the main advantages of this procurement options.

**Construction Management:**

This is a procurement option in which a number of different [trade contractors](https://www.designingbuildings.co.uk/wiki/Trade_contractors) are employed to construct the work. The [contractors](https://www.designingbuildings.co.uk/wiki/Trade_contractors) are contracted to the client but managed by the construction manager, who in turn act as an agent for the client, administering and co-ordinating the work contractors (Ashworth et al., 2013). The advantage of this procurement is the appointment of the construction manager at the early design stage to provide input based on their experiences, hence it can contribute to improving buildability, as proposals for different work packages are developed.

**Collaborative Approaches**: In the construction industry, the term collaboration is used to refer to different arrangements between parties working together. It is sometimes used interchangeably to refer to any type of situations where different parties work together to achieve a final product (Hughes et al, 2012). For example, in partnering, two or more organizations work together for the purpose of achieving specific business objectives (Bygballe et al., 2010). Other forms of collaboration include joint venture where two firms form a legal agreement to undertake a productive activity together (Morledge and Adnan, 2005).

The choice of procurement often depends on the project priorities in terms of cost, quality and time. However, consideration should be given factors that will enhance health and safety practices for construction projects. However, lack of continuity in the composition of the project teams, separation of design from the construction process with divergent objectives of the major contracting parties can often compromise health and safety. Other reasons cited include lack of integration into the project schedule, compressed work schedules, inadequate and inappropriate safety education and training programmes and lack of commitment by management for health and safety in the workplace.

**RESEARCH METHOD**

A qualitative approach was adopted using semi-structured interviews to explore how procurement strategy can drive health and safety. In-depth interviews were conducted with senior personnel in two organisations.

The first is a Regional Health and Safety Advisor working for a main contractor with a £300 million turnover. He has worked in the industry for 29 years, 10 years as an electrician on site and 19 years in a health and safety role. He visits at least two different sites every day.

The secondis a Safety, Health, Environmental and Quality Manager working across two major infrastructure sites for a main contractor and a client. He has worked in the construction industry for 29 years, with 9 years on a current infrastructure project. He visits various sites six (6) days a week.

**PRELIMINARY FINDINGS AND DISCUSSIONS**

The preliminary findings from the research are summarised as follows, based on responses from questionnaire participants and their answers to some of the questions asked:

**‘One team’ culture**

Collaboration dissolved hierarchical barriers to promote highly connected teams with strong working relationships. The Regional Health and Safety Advisor *argued as follows:* *“I would say that a strong safety culture is one that promotes a “one team” culture. Regardless of employing organisation, staff and operatives are encouraged to look after themselves as well as others on site”* He further *argued that:*

*“Sometimes people aren’t aware of the risks they are taking. There could be a training element that is lacking, and of lack of awareness. Younger and new people in the industry are likely to make more mistakes because maybe they have not gone through enough training or they are less experienced than their counterparts.”*

Teams that are highly connected in safety by the ‘one team’ culture engage more easily in behaviours such as giving feedback, speaking about safety concerns and providing innovative ideas to improve safety. The Regional Health and Safety Advisor *also argued that:*

*“The best way is to encourage mistake ownership by using a ‘concerned coach’ method in which you initially show concern for their safety and at the same time teach them how to do it better. Depending on the severity, then you make them see the consequences of their actions and how that would affect their family and those close to them. It makes workers realise what the implications of their behaviour could lead to and hence they embrace safety culture as a lifesaving tool rather than a set of rules to follow.”*

Traditionally, the construction industry stakeholders see themselves as adversaries with conflicting goals within a construction project team. This fragmentation often means inadequate systems and lack of trust between teams resulting in a poor safety culture, creating a confrontational approach which breeds lack of trust and disengages workers from following safety policies.

**Communication and openness**

When mistakes are discussed, it allows for healthy exchanges between team members, creating a learning environment leading to increased team performance and enhanced safety culture. A strong safety culture breaks communication barriers and promotes openness between leaders and workers. The Safety, Health, Environmental and Quality Manager noted the following*:*

*“Openness has improved. Where the culture was authoritarian in the past, the industry was divided. We now have safety coaches for teams on site who people can go to if they have concerns, something that we never had before”.*

In an open culture, workers have the platform and the confidence to challenge unsafe work practices amongst themselves and in their leaders. It also encourages transparency where both leaders/managers and workers can own up to mistakes, raise issues and get feedback on what is being done about issues raised. Another critical success factor is communication which is mostly hindered by blame culture and limited methods of communication.

Moving away from confrontational approaches towards relationships based on co-operation and mutual trust, it encourages collaboration between site teams noting that their ideas are shared, the result is improved quality and efficiency of the construction process, which in turn breeds strong contractor-client relationships and improved working relationships between main contractors and sub-contractors.

**Leadership**

Whilst responding to a leadership query, a response thus obtained reflects as follows;

A collaborative approach also create leaders that listens to concerns and ensure appropriate actions are taken to resolve them. They need to lead by example in implementing safety procedures they have put in place and be consistent with it. Regional Health and Safety Advisor *commented as follows “I think the most important thing is that workers expect to be listened to. And if there is an issue they expect leaders to do something about it.”* The Safety, Health, Environmental and Quality Manager *noted that “We have to do better in communicating and listening to concerns and putting them to action”*

Main contractors also face the challenge of lack of middle management involvement in site culture. The Safety, Health, Environmental and Quality Manager *commented that* *“Sometimes the middle management are brilliant people but they are so wrapped up in their specialist roles so they are not visible, for instance engineers just get on with their work without a care about the bigger picture”.*

Trust is the bedrock to collaboration and it creates an environment where workers can openly express concerns and differences in opinion to leaders and promotes more proactive attitude towards safety, prompting workers to devote greater attention to personal safety behaviours.

**Mainstreaming Health and Safety in Traditional Procurement**

Adopting the traditional procurement options can create problems in strengthening safety practices and building a safety culture. It is important for construction H&S to be explicitly considered instead of assuming that it is embedded into every item whilst computing unit rates by the estimators during tendering. It is this inadequacy in considering H&S in the tendering processes that can create tension between costs and compliance with the highest safety standards. For example, budgeting for H&S right from tendering stage (e. g for properly costed sprinkler system to be installed and operated) could prevent disasters such as the fire which destroyed Grenfell Tower in June 2017 resulting in one of the UK's worst modern disasters, with a loss of 72 lives and more than 70 more people injured (Grenfell Tower, 2018). Health and safety (H&S) should be costed as a separate entity during the design, construction, in-use through to demolition (life cycle), instead of grouping certain items under preliminaries to cover H&S during the preparation of contract documents. As an essential criteria during tender evaluation, clients may require contractors to submit with their tenders a fully costed documentations such as site-specific H&S plan (including, where appropriate, a fall protection plan), an outline of the procedures to be adopted in ensuring that H&S requirements are met by all contractors and a site safety register, recording and reporting accidents, incidents and near misses (Wells, 2015). All these requirements are designed to eliminate misunderstanding of what is required and to ensure that H&S are adequately priced and taking into account not just for pre-construction, but throughout construction, handover, and utilisation by the client.

**CONCLUSION**

The preliminary findings suggest that collaborative procurement arrangement, unlike traditional procurement with conflicting objectives of key stakeholders, can dissolve hierarchical barriers and create highly connected teams with strong working relationships to

promote health and safety. Collaboration promotes H&S through developing a ‘one team’ culture, improved communication and openness and leadership that listens to concerns and ensure appropriate actions are taken to health and safety issues at all the stages of construction; right from pre-contract, through construction to end-users. Further work is planned as part of an on-going study to explore how procurement can drive improvement in health and safety (H&S) through additional case study interviews. Further interviews will focus on how health and safety (H&S) can be factored as a pre-requisite with an explicit selection criterion in traditional procurement, design and build, construction management options to strengthen health and safety practices.

**REFERENCES**

Ashworth, A., Hogg, K. and Higgs, C. (2013). 13th ed. *Willis's practice and procedure for the quantity surveyor*. John Wiley & Sons.

Behm, M. (2005). Linking construction fatalities to the design for construction safety concept. *Safety science*, *43*(8), pp.589-611.

Bureau of Labour Statistics, a part of the U.S. Department of Labour, Construction accident facts (2006). Available from: <http://www.resource4constructionsiteaccidents.com/topics/constructionaccidentfacts.html> (Accessed on 17/03/2019)

Bygballe, L.E., Jahre, M. and Swärd, A. (2010). Partnering relationships in construction: A literature review. *Journal of purchasing and supply management*, *16*(4), pp.239-253.

CDM (2015). Available from: <http://www.hse.gov.uk/construction/cdm/2015/index.htm> (accessed 12/03/2019)

Gambatese, J.A. (2000). Owner Involvement in Construction Site Safety. Proceedings of the ASCE 2000 Construction Congress VI, Orlando, FL, USA, pp. 661–670.

Grenfell Tower: What happened (2018). Available from: <https://www.bbc.co.uk/news/uk-40301289> (Accessed 10/02/2019)

Hatush, Z. and Skitmore, M., (1997). Criteria for contractor selection. *Construction management & economics*, *15*(1), pp.19

Hinze, J. (2002) Safety incentives: do they reduce injury?Practice Periodical on Structural Design and construction, 7(2) 81-4

HSE (2000). Health and Safety in Construction HSE books, ISBN 0 7176 1143 4 page3, 91

HSE (2015) Health and safety in construction industry. Available from: <http://www.hse.gov.uk/construction/index.htm> (Accessed on 12/03/2019)

Hughes, D., Williams, T. and Ren, Z. (2012). Differing perspectives on collaboration in construction. *Construction Innovation*, *12*(3), pp.355-368.

Hughes, W., [Hillebrandt](https://www.amazon.co.uk/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&text=Patricia+M.+Hillebrandt&search-alias=books-uk&field-author=Patricia+M.+Hillebrandt&sort=relevancerank),  P. M., [Greenwood](https://www.amazon.co.uk/s/ref%3Ddp_byline_sr_book_3?ie=UTF8&text=David+Greenwood&search-alias=books-uk&field-author=David+Greenwood&sort=relevancerank), G. and [Kwawu](https://www.amazon.co.uk/s/ref%3Ddp_byline_sr_book_4?ie=UTF8&text=Wisdom+Kwawu&search-alias=books-uk&field-author=Wisdom+Kwawu&sort=relevancerank), W. (2015). Procurement in the Construction Industry. The Impact and Cost of Alternative Markets and Supply Processes. Spons Research

Larsen, G.D. and Whyte, J., (2013). Safe construction through design: perspectives from the site team. *Construction Management and Economics*, *31*(6), pp.675-690.

Lopes, M.D.S. and Flavell, R. (1998). Project appraisal—a framework to assess non-financial aspects of projects during the project life cycle. International journal of project management, 16(4), pp.223-233.

Morledge, R. and Adnan, H. (2005). The importance of trust to the success of joint venture projects. Journal of construction procurement, 11(2), pp.154-16

Myers, D. (2005)’A Review of Construction Companies’ Attitudes to Sustainability; Construction Management and Economics, 23:781-5

Pinto, A., Nunes, I. L., & Ribeiro, R. A. (2011). Occupational risk assessment in construction industry–Overview and reflection. Safety science, 49(5), 616-624.

[Ruparathna](https://ascelibrary.org/author/Ruparathna%2C%2BRajeev), R., ASCE, S. M. and [Hewage](https://ascelibrary.org/author/Hewage%2C%2BKasun), K. (2015). Review of Contemporary Construction Procurement Practices. Journal of Management in Engineering; Volume 31 Issue 3.

Syed, M. (2015). Clients CDM 2015: Construction (Design & Management) Regulations 2015

Thorpe, A. (2005), *"Investigation of the Potential for Applying Freeform Processes to Construction", 3rd International Conference on Innovation in Architecture,* Engineering and Construction (AEC) Netherlands,

Tombs, S. and Whyte, D. (2008). A crisis of enforcement: the decriminalisation of death and injury at work.

Watt, D.J., Kayis, B. and Willey, K., (2009). Identifying key factors in the evaluation of tenders for projects and services. *International Journal of Project Management*, *27*(3), pp.250-260.

Watt, D.J., Kayis, B. and Willey, K. (2010). The relative importance of tender evaluation and contractor selection criteria. *International Journal of Project Management*, *28*(1), pp.51-60.

Watt, D.J., Kayis, B. and Willey, K. (2010). The relative importance of tender evaluation and contractor selection criteria. *International Journal of Project Management*, *28*(1), pp.51-60.

Wells, J. (2015). Promoting Construction Health and Safety through Procurement: A briefing note for developing countries. Institute of Civil Engineers (ICE).