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The need for an inclusion of construction health and safety into quantity surveying education in Nigeria

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ABSTRACT

Despite the institution of explicit health and safety (H&S) practices in construction, there continue to be exceedingly high rates of fatalities and injuries cases. This study aimed at exploring the need for an inclusion of construction health and safety (H&S) into quantity surveying education in Nigerian. Questionnaire survey was then structured from literature and administered to students and lecturers in the quantity surveying departments at the Polytechnics and Universities within the South-West Geopolitical zone of Nigeria. Interviews were conducted with lecturers and registered practicing quantity surveyors in order to validate the findings. Data was electronically manipulated using MS Excel. Results of the survey with students revealed that construction H&S is not offered as a

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course module, but as integral parts of other courses. Interviews conducted with lecturers and practicing quantity surveyors indicated that there is an urgent need to include construction H&S into quantity surveying curriculum. Education of future professionals and managers is fundamental to drive the desired cultural change required to improve construction H&S performance.

Keywords: Construction, Education, Health and Safety, Quantity Surveying

1. INTRODUCTION

Construction sites remain one of the most dangerous and hazardous workplaces, due to the high number of reported cases of injuries and fatalities (Bust, Gibb and Pink, 2008; Fewings, 2010). According to the International Labour organization (ILO, 2011), the risk of injuries and fatalities in construction is 7-10 times than that in other industries. Construction accidents and incidents cost national economies over 5% of their gross domestic product (GDP) (ILO, 2011). The discovery that construction workers are often at risk of an accident, ill health and fatality at work when compared to manufacturing-based industries is a cause for concern to individuals, stakeholders and governments (Kheni, 2008,Towey, 2012). Recent Reports on incessant building collapse in Nigeria by the Guardian Newspaper, February (2016) puts construction site accidents as the highest among all industrial sectors, resulting in a second of all work fatalities after transportation. The World Health Organization (WHO, 2010) maintains that it is a right for every working man or woman to return home without harm after a day work.

Construction site workers are exposed to various hazards when working at heights, under water and with hazardous chemical substances (Coke and Sridhar, 2010). These form part of their daily routines. Despite the hazardous nature of the construction industry, construction remains an important area of employment to both skilled and unskilled workers in any nation. However, statistics over the years pertaining to construction sites fatalities and non-fatalities have shown that the industry is one of most dangerous workplace. Hinze (2006) maintains that construction site accident is preventable and should be prevented.

The nature of the construction industry and the roles of different parties involved in projects execution contributed in making H&S improvement in the industry difficult. The construction industry is complex (Ross and Williams, 2013), and the complexity is compounded by the roles of multidisciplinary and multitasked project work force. Towey (2012) contends that it is this complex nature of the industry that shapes its way of functioning and performance. Notwithstanding the above argument, proactive H&S system based on systematic education and training of all parties to construction project delivery could impact positively on H&S improvement in the industry.

The Health, Safety and Executive(HSE)(2011) and WHO (2010) recognized that education and training play a key role in fostering a workplace H&S culture, creates awareness and behavioural change among designers. The HSE (2010) further affirms that it is necessary to develop a 'safety-first mindset' among students long before they get into the workplace in order to be adequately prepared for their future H&S roles. To this end, an inclusion of construction H&S course module into quantity surveying education is identified as one of the tools for achieving the cultural change required in the industry. Quantity surveyor as the cost experts in the construction industry could use his knowledge of construction H&S to advice clients, architects and consulting engineers on their design implications relative project H&S.

Much has been researched on H&S management and causes of construction site accidents in Nigeria, but no research has been conducted that explores the need for an inclusion of construction H&S course module into quantity surveying education. However, the key proposition of this paper is that an inclusion of construction H&S course module into the quantity surveying education in Nigeria could empower the further professionals and managers towards their future H&S critical roles.

Aim and objectives of the study

The aim of the study was to determine whether construction H&S is included as a course module into quantity surveying curriculum both at the polytechnics and universities education in Nigerian and make recommends for its inclusion. In this regard, the specific objectives of the study include:

- To determine whether construction H&S is one of the course module in quantity surveying programmes at both the polytechnics and universities in Nigeria,
- To determine students' awareness level of their H&S roles in the construction industry, and
- To highlight the importance of quantity surveyor's H&S roles in construction projects delivery.

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2. MOTIVATION

Economic and legal reasons are two major motivating factors for employers to invest in workers' H&S. Beside the economic and legal issues, employers irrespective of company's size have moral and cooperate obligation to maintain free accidents worksite. Roughly, 2-5 persons die on construction sites every day (ILO, 2010). In fact, the human costs of construction site accidents are unquantifiable. According to WHO (2010), there were about 4.8 million work-related accidents that resulted in more than three days absence from work amounting to about $167 million US dollar lost. Thus, the cost implications of construction site accidents to employers and national economy cannot be over emphasised.

Hinze (2006) describes construction site accidents as the cancer of construction. The overall costs of construction accidents and ill health to workers and their families and employers are very huge and unacceptable. On the national scale, the estimated costs of construction accidents and ill health can be as high as 7-10% of a country's gross national product (GDP) (HSE, 2011). In reality, no one can really estimate the total costs of accidents in monetary terms because of the multitude of indirect costs which are difficult to measure besides the more obvious direct costs.

2.1. Legislation

There is a legal requirement on all employers, designers, employees and contractors to comply with the provisions as layout under the Health, safety and Welfare legislation of any country. The Health, Safety and Welfare regulations and edicts must be adhered to all the parties involved in construction projects execution. For instance, in the United Kingdom (UK) construction industry, the introduction of Construction (Designs and Management) (CDM) Regulations (2007) placed significant emphasis on the planning and designing of construction projects to ensure that risks and hazards in construction are eliminated or reduced from the source (HSE, 2011). In addition, the CDM Regulations according to the HSE (2011), mandate clients and designers to be fully involved in projects H&S from the design stage to completion. Interestingly, employers in today's market have higher expectation from graduates to be familiar with H&S legislation, particularly the requirements associated with their job specification (Gambatese, 2008). Therefore, promotion of H&S through education not only equips students with H&S requirements, but also an appropriate tools and ethos in all sectors of the economy.

Regrettably, Nigeria and some other Sub-Sahara Africa countries do not have comprehensive legislation on Safety, Health and Welfare regulations as obtained in the UK and United States of America (USA). According to Idoro (2004), Nigeria lacks statutory regulations on H&S and that the existing legislation that serves as a point of reference is either British or American. This scenario is a serious challenge to effective H&S management in the developing countries like Nigeria.

2.2. Quantity surveying and programme accreditation in Nigeria

Quantity Surveyor is a professional consultant appointed by the client to advise him (clients), architects and engineers on all financial and contractual matters arising from the earliest commencement of a construction project to completion (Yakubu, 2013). The Nigerian Institute of Quantity Surveyor (NIQS) (2015) defines the profession as being responsible for total cost and procurement management, for the achievement of client's objectives in all types of capital projects and developments. Ashworth and Hogg (2007) described quantity surveying as the profession concerned with the prudent management of resources of the construction industry for the best advantage of the society, by providing, amongst others, the financial management for projects and cost consultancy services to both clients and contractors during the whole construction process.

However, this noble profession is relatively new, it dated back to 1785 in England, but it has gained prominence because of its important roles in the construction industry. Currently, there are about 34 universities and polytechnics in Nigeria offering quantity surveying at degree and higher national diploma levels. The National University Commission (NUC) of Nigeria is responsible for benchmarking minimum academic standards for undergraduate students, while the National Board of Technical Education (NBTE) is for the Polytechnics.

Review of the NUC Regulatory Policy on Minimum Academic Standard for Quantity Surveying Undergraduate Programme in Nigeria Universities (NUC, 2010) revealed that construction H&S is not among one of the core courses. Also, a similar review was conducted on Regulatory Policy for Maintaining Quality Standard on Technical Education in Nigerian Polytechnics showed absence of construction H&S among the courses approved by the (NBTE, 2010) for Quantity Surveying programmes. This is in contrasts to what are obtained in the Western World like UK, US, Japan and Germany. Regrettably, no research has been conducted to determine the extent construction H&S is included into construction-related programmes including quantity surveying in Nigeria.

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Further researches were conducted on international journals specifically on UK and South Africa to found the extent construction H&S is included into construction-related disciplines at the universities and colleges. Findings from the literature survey revealed that in the UK, all construction-related disciplines such as architecture, civil engineering, construction management, quantity surveying and building economics offers construction H&S as a course module at their third year in the universities and colleges. In the South Africa, it was the same. All construction-related programmes both at the undergraduate and Master degree levels offered construction H&S course as a course module.

A research conducted by the HSE(2008) in collaboration with the Institute of Occupational Safety and Health (IOSH) of the UK reported that an inclusion of construction H&S course module into construction-related programmmes is not only a cultural revolution but also an ethos and innovation towards H&S improvement in the industry. Gambatese (2008) pointed out that construction H&S education should be viewed as a tool that will assist in achieving substantial cultural change in favour of safe design among future construction professionals and managers in the industry.

2.3. The need to incorporate construction H&S into quantity surveying education in Nigeria

The roles of quantity surveyors in this 21st century is becoming more dynamic and challenging, which call for critical review of their course contents in order to contribute effectively to the construction industry H&S performance. In line with this, Jagboro (2016) stated that quantity surveyors roles are becoming more vital in all sectors of the economy particularly for the attainment of sustainable national development goals to include health, safety and welfare of the workforce than when it was originally established in England in 1785.

Building and maintaining workplace H&S culture required involvement of the Universities and Polytechnics and other stakeholders such as the various professionals bodies. Scholars and researchers amongst (Smallwood, 2008 and Gambatese, 2008) hold the opinion that H&S education and training are the important tools and ethos to increase general awareness, knowledge and understanding of the concepts of hazards and risks and how they may be prevented and controlled in any working environment. Therefore, incorporating construction H&S into the quantity surveying education in Nigeria should be a right step in the right direction. Quantity Surveyors as the construction cost experts in the industry will be better equipped if construction H&S is included into their education. In addition, they will become more competent to advice the clients, architects and consulting engineers on the implications of their design decisions relative to projects H&S. The HSE (2010) maintains that a preventative H&S culture should be one that incorporates H&S into the educational system of the future professionals and managers in the industry

Research conducted in South Africa by Smallwood (2008) on the need for inclusion of construction H&S course into Architectural curriculum concluded that not only does H&S is important to architectural students, but also to other built environment programmes such as building, construction management and quantity surveying. He further stated that not only they need an appreciation of construction H&S in their formative stage, but it is also an essential tools and ethos for overall construction H&S improvement. In support of the need to include construction H&S courses into all the construction-related programmes including quantity surveying at the universities and colleges, the European Agency for Safety, Health and Welfare at Work (2010) states that occupational H&S has become an integral part of business management and that all future managers and professionals need relevant H&S education. Arguably, quantity surveying students who are future professionals and managers in the construction industry need to have appreciation of both national and international H&S laws and regulations during their undergraduate studies.

The need to incorporate construction H&S course into quantity surveying education in Nigeria is further demonstrated in the report "An Examination of Duty Holder Responsibilities: Fatal Construction Accidents 1997–2002" in the UK construction industry (HSE, 2010). The report noted that the HSE made over 200 visits to design offices in 2008/09 and concluded that: designers including quantity surveyors had an inadequate understanding of construction safety, health and welfare. The report further stated that the majority of designers were unaware of the 'General Principles of Prevention' and that only 12% of designers had H&S qualification. This above findings corroborated the call for an inclusion of construction H&S as a course module into quantity surveying education in Nigeria.

2.4. Effect of poor construction H&S management

Okorie (2014) point out that one of the major effects of poor H&S management could be visible through continuous absenteeism and low production. It has been argued that poor construction H&S can devastate contractors' profit margin (Hinze, 2006). On the national scale, the estimated costs of poor site H&S management can be as high as 7-10% of the gross national product (GDP) (ILO, 2011).

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The other potential effect is the high compensation paid to the workers or to their families. Indeed, one obvious effect of poor construction sites H&S is the human suffering caused to the workers' families, which cannot be compensated with money. There are grievous economic consequences on the families for losing their dear ones and the bread winners. Furthermore, poor site H&S management tarnishes contractors' image (Spangenberg, 2009). The tarnished image is often accompanied with adverse publicity, which results in contractors being less attractive to prospective clients.

Poor construction H&S management may lead to long legal disputes and litigation that probably end with huge claims that is paid to workers or their families. Given the economic and social implications of poor construction H&S on workers, their families, contractors and governments, there is an urgent need to include construction H&S course module into quantity surveying education in Nigeria, considering the important roles of quantity surveyors in construction projects delivery.

3. RESEARCH METHODOLOGY

To achieve the objectives of this study, a field survey involving both students and lecturers in the two selected Universities and three Polytechnics in the South-West Geopolitical zone of Nigeria was conducted. The sample was selected from the Universities and Polytechnics offering degree and higher national diploma in quantity surveying. Questionnaires were distributed to 400-500 levels of University undergraduate students, third and fourth levels of Higher National Diploma (HND1-HND2) Polytechnics students and lecturers of the selected institutions. The main purpose of the questionnaire was to determine respondents' perceptions on the need for an inclusion of construction H&S course module into the quantity surveying curriculum. One hundred and fifty (150) questionnaires were distributed, eighty (80) were returned, and this resulted in a response rate of 53%. For the eighty completed and returned questionnaires, fifty (50) from both the Polytechnic and University students, while thirty (30) questionnaires from lecturers of the selected Polytechnic and University. The response rate achieved for this research is similar to that achieved in other surveys (Sutrisna, 2009; Collins, 2008). It could be inferred from Sutrisna (2009) and Dainty (2008) that performing a statistical analysis in survey within the response rate equal to or above the threshold of thirty (30) is acceptable. Thus 53% response rate achieved in this survey provides reasonable data for analysis.

Interviews were also conducted with lecturers and practicing quantity surveyors. An interview is an interaction between two or more people to gain insight relative to problems (Leedy and Ormrod, 2010). The interviews assisted the researcher to validate the perceptions of both students and lecturers on the need for an inclusion of construction H&S into quantity surveying education.

3.1. Data analysis and interpretation of findings

The analysis of questionnaire survey shows that 37.5% of the respondents are university undergraduate students from the two universities and 62.5% from the three polytechnics. The respondents were between the age of 18 and 24 years. The students surveyed in the universities were of 400-500 levels and students from the polytechnics were third and fourth levels (HND1-HND2). In view of their levels it can be deemed they are academically qualified to comprehend the questions and their judgement can be reliable.

3.2. Factors pertaining to inclusion of construction H&S into quantity surveying education

Table 1 indicates the respondents' perception of the 'Yes", "No" and "Not sure" questions pertaining to inclusion of construction H&S course module into quantity surveying education in Nigeria. The data analysis shows that 62% of both the Polytechnics and Universities students agreed that construction H&S is not a course module, while 30% agreed that construction H&S is taught as integral parts of other courses and 8% were not sure.

Table 1 Factors pertaining to inclusion of construction H&S into quantity surveying education

	Frequency	Percent
Yes	31	62
No	15	30
Not sure	4	8
Total	**50**	**100**

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The findings of this survey supported literature review in that both the NUC and NBTE responsible for benchmarking academic standard for Universities and Polytechnics in Nigeria did not include construction H&S as one of the core courses for quantity surveying programmes.

A question was posed to find out students awareness level on Construction (Design and Management) Regulations. It was found that 75% of the students were not aware of the existence of Construction (Design and Management) Regulations and its import/significance to overall construction H&S management. However, H&S legislation and regulation such as the UK Construction (Design and Management) Regulations detail out duties and responsibilities of clients and the design team including quantity surveyor.

3.3. Statements relative to students understanding of quantity surveyors' H&S roles in construction H&S management

Table 2 indicates the extent to which the respondents rated the eight identified statements relative to quantity surveyor's H&S roles in construction H&S management in terms of a MS based upon percentage responses to a scale of a 1 (minor) to 5 (major). Given that all the MSs are above the mid-point of 3.00 and that all the statements are phrased in the negative, can be deemed that quantity surveyor could contribute significantly in construction H&S management. However, six of the eight statements have MSs >4.30 ≤ 5.00, which indicate that most quantity surveyors lack competency and knowledge with respect to construction projects H&S. The finding supported literature in that the HSE (2011) reports noted that majority of the designers lack general principle of risks prevention and qualification on H&S.

Table 2 Statements relative to students understanding of quantity surveyors' H&S roles in construction H&S management

Statement	MS	Rank
Inadequate pricing of Sections of Standard Form of Contract Clauses related to H&S	4.63	1
Failure to ensuring that contractors made adequate financial provision in tenders	4.61	2
Non-inclusion of an H&S in bills of quantities (BoQs)	4.56	3
Lack of commitment in preparation of periodic valuation certificate	4.50	4
Inadequate facilitation of financial provision for H&S in the preliminary and general section of the BoQs	4.34	5
Lack of pre-qualification of contractors on H&S	4.30	6
Poor choice of procurement system	4.15	7
Inadequate estimation of project duration	4.10	8

3.4. Advantages/importance of effective construction H&S management

Table 3 indicates the extent to which the respondents rated advantages/importance of construction H&S management in terms of a MS based upon percentage responses to scale of a 1 (not important) to 5 (very important). All MSs are above the mid-point of 3.00, which indicates that in general the students can be deemed to view all the identified factors as important as opposed to not important. The six identified factors have MSs >4.20 ≤ 5.00, which indicates that the identified statements are very important. The findings supported literature that designers including quantity surveyors could contribute significantly to construction H&S improvement (Gambatese, 2008).

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Table 3 Advantages/importance of effective construction H&S management

Factor	MS	Rank
Reduction of injuries and disease	4.58	1
Significant reduction in loss of human lives	4.54	2
Reduction of damage to plant and equipment	4.42	3
Reduction in workers absenteeism	4.41	4
Decrease in productivity and profit margin	4.35	5
Reduction in compensation paid to injured workers	4.33	6
Reduction in disputes and litigation	4.30	7
Tarnished contractors image	4.24	8

3.5. Responses from lecturers of both Polytechnics and Universities

The lecturers who responded to the questionnaire were between the age of 35 and 45 years, with an average of 7.5 years' experience. The educational background of the respondents shows that 56.5% of the respondents have Master degree while 53.5% have doctoral degree which indicates that they are well educated and experienced; therefore, their judgement can be reliable.

3.6. Factors pertaining to inclusion of construction H&S into quantity surveying education

Table 4 indicates the respondents' perception of the 'Yes", "No" and "Not sure" questions pertaining to inclusion of construction H&S course module into quantity surveying education in Nigeria. The data analysis shows that 56.7% of lecture agreed that construction H&S is not a course module, while 40%indicated that construction H&S is taught as integral parts of other courses and 3.3% were not sure.

Table 4 Factors pertaining to inclusion of construction H&S into quantity surveying education

	Frequency	Percent
Yes	17	56.7
No	12	40.0
Not sure	1	3.3
Total	**30**	**100**

The findings of this survey supported literature review in that both the NUC and NBTE responsible for benchmarking academic standard for Universities and Polytechnics in Nigeria did not include construction H&S as one of the core courses for quantity surveying programmes.

3.7. Statements relative to quantity surveyors' roles in terms of construction H&S management

Table 5 indicates the extent to which the respondents (lecturers) rated the eight identified statements relative to quantity surveyor's roles in construction H&S management in terms of a MS based upon percentage responses to a scale of 1 (minor) to 5 (major). Given that all the MSs are above the mid-point of 3.00 and that all the statements are phrased in the negative, can be deemed that quantity surveyor could contribute significantly in construction H&S management considering their important roles in the industry.

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In supported of the dynamic roles of quantity surveyors in this 21st century, Jagboro (2016) stated that quantity surveyors roles are becoming more vital in all sectors of the economy particularly for the attainment of sustainable national development goals to include health, safety and welfare of the workforce than when it was originally established in England in 1785.

Table 5 Statements relative to quantity surveyors' roles in terms of construction H&S management

Statement	MS	Rank
Inadequate pricing of Sections of Standard Form of Contract Clauses related to H&S	4.52	1
Failure to ensuring that contractors made adequate financial provision in tenders	4.50	2
Non-inclusion of an H&S in BoQ	4.48	3
Lack of commitment in preparation of interim monthly valuation certificate	4.44	4
Inadequate facilitation of financial provision for H&S in the preliminary and general section of the BoQ	4.29	5
Lack of pre-qualification of contractors on H&S	4.25	6
Poor choice of procurement system	4.18	7
Inadequate estimation of project duration	4.10	8

3.8. Advantages/importance of effective construction H&S management

Table 6 indicates the extent respondents rated the importance of effective construction H&S management in terms of a MS based upon percentage responses to scale of a 1 (not important) to 5 (very important). All MSs are above the mid-point of 3.00, which indicates that in general the respondents can be deemed to view all the identified factors as important as opposed to not important. It is notable that the eight identified factors have MSs >4.40 ≤ 5.00, which indicates that the respondents agreed that the identified factors are very important. The findings corroborated the work of Smallwood (2008) on the need for an inclusion of construction H&S into curriculum of construction-related disciples at both the Universities and Colleges.

Table 6 Advantages/importance of effective construction H&S management

Factor	MS	Rank
Reduction of injuries and disease	4.76	1
Significant reduction in loss of human lives	4.71	2
Reduction of damage to plant and equipment	4.68	3
Reduction in workers absenteeism	4.65	4
Decrease in productivity and profit margin	4.61	5
Reduction in compensation paid to injured workers	4.58	6
Reduction in disputes and litigation	4.57	7

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Tarnished contractors image	4.51	8

3.9. Interviews results

Interviews were conducted with quantity surveying practicing firms and lecturers from the two Universities and three Polytechnics offering quantity surveying programmes in the South-West Geopolitical zone of Nigeria. The interviews were undertaken to validate the questionnaire survey results. The selection of quantity surveying practicing firms and academics for the interviews took account of a number of factors including; years of existence, academic qualifications and years of experience. It is evident that academics are aware of the importance of H&S and roles quantity surveyors could play in construction H&S management.

However, there were different perceptions among lecturers on the inclusion of construction H&S as a course module andbe offered as integral parts of other courses. A lecturer from one of the prominent Universities in the South-West Geopolitical zone of Nigeria stated that "construction H&S is taught alongside with other courses such as workshop practice, fire prevention, control and equipment" In contrast, another lecturer emphatically stated that "there is a need to include construction H&S as course module into quantity surveying curriculum as obtained in the developed countries". He emphatically stated that "quantity surveyors as a construction cost experts who advise clients and architects on implications of their design decisions should have knowledge on National and International H&S legislation and regulations".

All the practicing quantity surveyors interviewed indicated that there is an urgent need to include construction H&S as a coursemodule into quantity surveying education. One of the interviewees stated "I will carry this message to the next Nigerian Institute of Quantity Surveyors (NIQS) Lagos State Branch meeting'. He stated future that 'it is high time the Nigerian quantity surveyors should be among the vanguard of construction industry H&S improvement not limiting their roles to only bills of quantities preparation. All the interviewees agreed that quantity surveyors, as financial experts in the construction industry could contribute significantly to the industry H&S performance. Literature review corroborated the views of the practicing quantity surveyors that quantity surveying students need an appreciation and understanding of construction H&S for their future H&S critical roles in the industry. The HSE (2008) affirms that incorporating construction H&S course module into construction-related programmes is necessary in order to develop a safety-first mindset among the students long before they get into the workplaces.

4. CONCLUSIONS AND RECOMMENDATIONS

The education of future professionals and managers is fundamental to drive the desired cultural change required in the construction industry H&S improvement. This is the rationale behind advocating for an inclusion of construction H&S into quantity surveying education in Nigeria which, will in turn, prepares the professionals towards their future H&S critical roles. Quantity surveying students both at the Polytechnics and Universities needs to be familiar with the Nigerian and International H&S laws and regulations and to be able to meet with the demand of their employers.

This study has revealed that construction H&S management is relevant to students of quantity surveying. However, from the research findings and interviews, it is apparent that H&S is not included as a course module but taught as integrate parts of other courses. It was also determined that many students are not aware of the Construction (Design and Management) Regulations which defines the duties and responsibilities of clients and the design team, quantity surveyor inclusive.

The recommendation are: Polytechnics and Universities in Nigeria offering quantity surveying programmes should include construction H&S as a course module and practicing quantity surveyors should include H&S among the criteria used for contractors' selection. The Nigerian Institute of Quantity Surveyors (NIQS) should include construction H&S into their continuing professional development training programmmes. The NIQS should also develop a practice manual/note relative to construction H&S management to all practicing members and students.

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