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Table of Contents: Volume 6 Number 1 June, 2016

ARTICLES

Research Articles

Journal of Construction Project Management and Innovation Vol. 6 (1): 1310-1329, 2016
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DEVELOPING A ROADMAP FOR RESOLVING CONSTRUCTION WORKFORCE CHALLENGES IN NIGERIA

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ABSTRACT

The inadequate supply of skilled workforce in the Nigerian house construction sector has continued to retard the productivity of the sector and exacerbated the housing challenges of the country. Nigeria has a large and fast-growing population of over 140 million with an estimated growth rate of 3.2%. This has engendered increased investment in shelter provision; especially by individuals and families due to fast rising housing rents mainly in the urban centres. Previous policies have not adequately addressed the realities of the skills inadequacies in the sector and there remains a paucity of empirical studies into the dynamics that impact construction workforce supply in Nigeria. The fallout of this is manifested in the difficulties faced by developers in sourcing suitably qualified and experienced workmen for house construction projects. In response to this challenge, an upsurge of migrant artisans and craftsmen from neighbouring West African nations like Togo, Benin Republic and Ghana - into Nigeria has occurred in the recent times. This development is totally unacceptable as it exacerbates the overarching socio-economic problems in Nigeria, especially the already high unemployment rate which is estimated to be 23.9%. This study investigates the inadequate training of house construction artisans in South Western Nigeria; and it does so by employing a quantitative research survey. It canvassed the opinions of professionals and employers. The study evolves interventions and develops a strategic blueprint for resolving the workforce crisis in the house construction sector.

Keywords: Artisans, House construction, Nigeria, Shortages, Strategies.

1. INTRODUCTION

The skills challenges confronting the Nigerian construction sector poses an impending danger to the sector if urgent actions are not taken to mitigate the problem. Construction employers and developers face difficulties in sourcing skilled workmen needed for site operations. The challenge has necessitated outsourcing the services of the construction artisans; a development that has rather compounded the socio-economic problems of the nation especially unemployment. As the nation continues to grapple with fast population growth and rapid urbanisation, housing problems become more acute especially in the cities as the supply cannot match with the demand.

Essentially, construction operations are still heavily dependent on manual labour

(Sanni & Alabi, 2008). Therefore, adequate mechanisms for training and supply of the needed workforce are crucial for effective housing delivery. However, there have been shortages of these workmen required for house building processes in the recent times (Agbola, 2005; Nworah, 2008). According to Adeloye (2008) there is a lack of properly structured recruitment and training scheme for the construction workmen and the system of remunerating them is not attractive to new entrants. There is therefore an urgent need to address the skills challenges in the nation's construction industry. Olaoye (2007) asserts that the training and supply mechanisms for construction workmen are largely underperforming in Nigeria.

Though many factors are responsible for acute housing problem the world over; these are entrenched in the components of the housing delivery system (Jinadu, 2004: 112). These include land; finance; human resources; building materials; government policies; construction technology, and regulatory mechanisms. This study investigates the human resources aspect with specific focus on the shortage of artisans required for house construction in Nigeria. Therefore, the objective of the study is to investigate the inadequate supply of skilled workmen into house construction sector in Nigeria; with the view to develop a comprehensive and strategic blueprint for resolving the problem.

2. FACTORS IMPACTING THE CONSTRUCTION SKILLS DEVELOPMENT IN NIGERIA

The existing literature reveals an array of factors that are jointly responsible for the shortages in construction artisans needed for adequate housing delivery. These factors are reviewed as follows:

2.1 Inadequate funding of vocational training

Adequate funding of the training of construction artisans is essential for continuous supply of the needed workforce in the industry. However, the World Bank (2004) observes that the overall expenditure on education and training at all levels as a share of both Gross Domestic Product (GDP) and total government spending in Nigeria has fallen over time. It is currently below what is obtainable in most developing nations. The government seems to pay lip service to its commitment to education and training; given the wide gap between political pronouncements and actual financial commitment to human capital development.

For instance, available data reveal that from the annual national budgets in Nigeria from year 2006 to year 2010, the total budgetary allocation to the education sector stood between 7% and 10% of the total budget (National Budget Office, 2011). While the United Nations Educational Scientific and Cultural Organisation (UNESCO) recommends that at least 26% of the national budget should be allocated to education, Aturu (2011) however observes that in Nigeria, it has always been less than 11%. Table 1 shows the comparison of education allocation as a percentage of the national budget.

The vocational subsector is relegated and given almost no attention as part of the educational sector. Collis and Hussey (2009) contend that the availability of data is a key factor in determining the successful outcome of a research study. The available data indicates that out of the total allocation for education from the national budget between years 2006 and 2010, vocational education and training only got an average 3% to 4% while the general education took over 95% each year as indicated in the Tables1and 2 below (National Budget Office, 2011).

Table 1: The education allocation as a percentage of the total annual national budget of Nigeria

Year	Education Allocation (N)	Education share of the total budget (%)
2006	166.6 Billion	8.8
2007	224.7 Billion	9.8
2008	210.4 Billion	10.
2009	216.6 Billion	8.8
2010	249.6 Billion	7.4

(Source: National Budget Office, 2011)

Table 2: Vocational education and training budgetary allocation as a percentage of the education allocation

Year	Total Education Allocation (N)	General Education Share (N)	VET Share (N)	VET share Of the total (%)
2006	166.6 Billion	161.6 Billion	5.0 Billion	3.0
2007	224.7 Billion	217.9 Billion	6.8 Billion	3.0
2008	210.4 Billion	203.4 Billion	7.0 Billion	3.3
2009	216.6 Billion	209.8 Billion	6.8 Billion	3.1
2010	249.6 Billion	240.1 Billion	9.1 Billion	3.7

Source: National Budget Office (2011)

2.2 Poor societal image

Aturu (2011) submits that there is a poor public perception of the construction artisans. Their works have been considered as careers that are only meant for the less academically endowed. The African Union (2007) submits that the jobs of construction workers and other vocational careers are left for the rural poor and the economically disadvantaged to learn a trade in Nigeria. This perception has been fuelled by the academic requirement for admission and limited prospects for further education and career development. The African Union (2007) further argues that the worst impression is sometimes created by government that the primary objective of vocational education and training is to keep the dropouts off the streets rather than project this type of training as an effective strategy to train skilled workers for employment and for sustainable livelihoods.

2.3 Inadequate physical infrastructure and obsolete training facilities

Boyi (2008) observes that the state of the infrastructure in the vocational training colleges is very poor to the extent that some of the colleges do not even have workshops to demonstrate practical lessons. Some buildings have become dilapidated and others having insufficient desks for students. In the opinion of Ekunke (2008) many of the existing structures have become deteriorated due to the protracted neglect and no recent funding has been allocated for infrastructure development in the

training colleges.

Consequently, the trainees lack the motivation to achieve their best in the training process, while the morale of the teachers is largely low. This unfavourable learning environment negatively impacts on the quality of the ultimate outcomes of the training. The assessment of the quality of training in Nigerian vocational colleges is rated as low (African Union, 2007); the training equipment is obsolete and there is a lack of instructional materials.

Many of the vocational colleges do not have workshops and even those colleges that have workshops largely lack the necessary equipment needed for meaningful training (Boyi, 2008: 5).

2.4 Inadequate policies

The vocational training colleges have been generally ineffective and largely neglected by government (Aturu, 2011). Education policies are unfavourable to the vocational segment, making no proper provision for its integration into the National Qualification Framework (NQF). With the non-flexible NQF in operation, career progression is made difficult for vocational graduates (Aturu, 2011). The situation with regards to NQF in South Africa as an example is instructive. According to the South African Qualifications Authority (SAQA, 2013) the National Qualifications Framework (NQF) is an integrated system that encourages lifelong learning by recording levels of learning achievement and recognising acquired skills and knowledge.

There are ten levels on the NQF. These levels are divided into three bands: General education and training; further education and training (which covers vocational learning) and higher education and training. Levels 1 to 4 are equivalent to grades 9 to 12 in high school or vocational training; Levels 5 to 7 are intended for college diplomas and technical qualifications, while Levels 7 to 10 are for university degrees. All learning is recognised within an integrated system of the NQF. A qualification is a formal recognition of the learning achievements. With the approval of the authority, a qualification can be registered on the NQF at a certain level. A prescribed number of credits will be awarded to the successful completion of a registered qualification (SAQA, 2013).

The National Qualifications Framework Act (NQF Act No. 67, 2008) states that the SAQA is the statutory body that oversees the development of the NQF and the monitoring of the training standards. The specific objectives of the National Qualifications Framework as provided for in the Act are to: Establish a unified / harmonised national structure for learning outcomes; Simplify access to, and the portability of furtherance within education, training and career track; Boost the quality of education and training; Fast-track and amend the unjust dichotomy and intolerance within education, training and job opportunities, and Promote the total individual development of every learner and the overall socio-economic growth of the country (NQF Act No. 67, 2008).

It is pertinent to note that there is no such statutory body as SAQA in Nigeria to harmonise all learning achievements recognised by the national constitution. The enabling policy provision to establish such an integrated national qualifications framework is absent till date. Consequently, learning takes place in a disjointed fashion and recognition of prior learning is subject to various interpretations of individual institutions. Essentially, all the components of an ideal NQF do exist within the system namely, general education (covering the primary to senior secondary school); vocational and technical education (covering the technical colleges and the

polytechnics); and higher education (from bachelor degree to doctorate).

However, these segments are not integrated into a unified system or framework that recognises all prior learning in order to make room for lifelong learning. Aturu (2011) bemoans the level of discrimination against the vocational education and training track in Nigeria noting that the qualifications are not recognised by most universities for further learning while inferior status is accorded its graduates both in terms of remunerations and appointments in the labour market. This poor image of artisans in society is one of the major challenges of artisan training in the country. In a related development, Dike (2008) argues that the protracted skills shortages in the country coupled with the growing youth restiveness and unemployment are attributable to the indifference of the policy makers to address the imbalance and faulty structure of the education sector.

There is therefore an urgent need to address the faulty, fragmented national qualifications framework via the objective engagement of the key stakeholders within the sector through appropriate reform of education policies. A reform that will make provision for an integrated and flexible NQF that unifies all the segments of the education system.

2.5 Inefficient regulatory mechanism

The government regulatory agency for the vocational and technical education in Nigeria is the National Board for Technical Education (NBTE). As stipulated by the policy establishing the NBTE (Act No.16 1985; Act No. 9 of 1993), the Board shall have among other responsibilities: To set and uphold standards in technical colleges, polytechnics and other related institutions in the country; to carry out quality assessments of programmes of all institutions under it for the suitability of awarding diplomas and certificates and for entry into the national examinations of such institutions; to set and review standards for skills as required by developments in technology and the labour market needs; to carry out periodic reviews of assessment standards for trainees and students; and to establish national certification scheme for artisans and technicians in partnership with the relevant ministries and agencies.

It must also carry out enlightenment programme to increase enrolment in vocational technical institutions and eliminate disparity between VET graduates and their university counterparts (NBTE Act No.16 1985; Act No. 9 of 1993).

However, the African Union (2007: 23) observes that VET in Nigeria is largely uncoordinated and lacks proper government regulations and interventions; this is due to operational inefficiencies of the NBTE. Programme accreditations in many technical colleges have been long overdue and the standard of training has fallen below the acceptable benchmark. In the opinion of Dike (2006) the NBTE is weak and failing in its responsibilities; it has almost neglected the technical colleges to run on their own.

The scope of operation of the NBTE may be too wide as it is responsible for all polytechnics, monotechnics and technical colleges. Over the years, many polytechnics have been added to the existing number in response to population growth from the time of NBTE policy was formulated. Consequently, the policy establishing NBTE is long overdue for reform. In a related development, the stakeholders within the Polytechnic subsector have always requested and lobbied the lawmakers for the establishment of a separate regulatory body, the National Polytechnic Commission, (NPC) to focus solely on polytechnic affairs. However, it is pertinent to note that these attempts are yet to yield any meaningful fruits in policy formulation (Aturu, 2011: 3-8).

2.6 Lack of continuous development of vocational instructors

The delivery of quality artisan training depends to a large extent on the proficiency of the instructors. The proficiency of a vocational instructor is assessed based on the sound theoretical knowledge, technical expertise and the level of pedagogical aptitude. The African Union (2007: 23) asserts that the quality of training in Nigerian vocational colleges is low; this is partly attributable to the inadequate training policy for vocational instructors as it is difficult to offer what one does not possess. Abassah (2011) laments the inadequate attention given to the training of vocational teachers in Nigeria this is due to the undue emphasis placed on general education qualifications at the expense of vocational and technical ones. Many universities do not offer courses in technical education that can help to train instructors for the vocational colleges. Those that offer such programmes are poorly patronised as young people are not attracted to such programmes.

Abassah (2011) further observes that the motivation level of VET teachers are low as they suffer poor public image, are poorly remunerated and largely remain underdeveloped as there are no provisions for in-service training and capacity building through workshops, conferences and further studies.

2.7 Inadequate curricula and textbooks

Abassah (2012) laments the dearth of relevant textbooks for instructional purposes and the poorly equipped libraries in the vocational training colleges. Arguing further Abassah (2012) maintains that the teachers' class notes mostly given to trainees as reference materials are grossly inadequate to inform and prepare the trainees for the world of work. In the opinion of Roger and Zamora (2011) the college training curricula has a weak link between the skills needed in the labour market and the content of the training offered. This is a direct result of the absence of industrial input into the training process. As a result, there is a skills mismatch and the graduates from the colleges find it difficult to access the labour market after the completion of their training (Ekunke, 2008: 31-35).

2.8 Weak recruitment strategies

Various authors have identified a number of recruitment approaches (Akintoye *et al.*, 2000; Chan & Dainty, 2007; Chan & Moehler, 2007; Morgan *et al.*, 2008) as alternative strategies for marketing training in construction sector to young people. These include, inter alia, the establishment of construction academies in high schools to activate their interest in construction; annual school tours by industry leaders to mobilise young people to enlist in construction occupations; sponsorship of construction summer camps and the offer of scholarships for prospective trainees. However, Aturu (2011: 2-3) submits that the recruitment drive for prospective trainees into the vocational technical colleges in Nigeria is low, given the poor public perception of artisans and the government discriminatory treatment of the vocational sub-sector in the scheme of things.

Thus, there is not enough motivation for the VET teachers and the other stakeholders to be actively involved in mobilisation and recruitment efforts. Aturu (2011) further submits that there is practically little or no intervention funding coming from any source as scholarships for prospective trainees. Consequently, enrolment figures remain far below the carrying capacities of most of the vocational colleges.

2.9 Inadequate teaching and learning processes

Atsumbe *et al*. (2012) posit that training process in the training colleges is

focussed mostly on the theoretical aspects of the curricula at the expense of the much needed practical aspects. This is attributable to a lack of training facilities and equipment in the colleges. Inadequate funding allocated to the colleges prevents them from acquiring cutting edge training equipment. Thus, the trainees from these colleges enter into the world of work only to discover a wide gap between their skills and labour market needs. This development accounts for the low employability of the graduates from the colleges.

The Student Industrial Work Experience Scheme (SIWES) was designed to expose trainees to a real work environment during the course of their training and prepare them for the world of work. Atsumbe (2005) notes that the SIWES has become a mere formality as most of the trainees do not find placements during the period due to poor coordination and the unwillingness of industry stakeholders.

2.10 Poor employers' participation in training

Ferranti *et al*. (2003) posits that globalisation and the attendant competitiveness in the global job market are arguably some of the critical factors that call for dedicated attention and cutting edge delivery of vocational training in any given nation in order to remain relevant. Given the impact of the recent global financial crisis which has exacerbated unemployment rate globally; it has been argued that young people are mostly affected; and that one of the major strategies to mitigate this challenge is vocational training (Werner *et al*., 2012).

The involvement of the industry in training is vital in order to keep abreast with the developments in technology and adapt the training content appropriately. Employers' participation in training is described by Clarke and Winch (2004) as educational philosophy that embeds strong theoretical underpinning from the school / college classrooms with work experience provided by the employers in the industry. However, Raidén and Dainty (2006) argue that for employers to engage in training in a competitive business climate, such effort would need support from public institutions.

Chan and Moehler (2008) opine that such involvement is only made possible through synergies among the education ministry, government and the industry.

Despite the crucial role played by vocational training in providing young people with skills for the labour market, Wolter (2012) laments the poor participation of employers in the training. The attitude derives from the substantial investment that the employers would have to commit to the training project and the fear of the apprentices moving away to other employers after the completion of the training. The foregoing scenario vividly captures the situation in Nigeria.

Dike (2008) submits that the involvement of the employers in training is almost non-existent. There are no incentives from government to motivate the employers; and the situation is exacerbated by the absence of an appropriate public institution like the Construction Industry Development Board (CIDB) as argued by Raidén and Dainty (2006: 63-79) to drive the training in the construction industry.

2.11 Weak assessment and certification processes

Within the Nigerian context each college is saddled with the task of trainees' assessment prior to certification. The assessment is largely tailored to the limit of the content of work covered within the colleges giving the various challenges; and largely lacking in the labour market requirement. However, there is a nationally coordinated examination for artisans seeking better recognition; the Trade Test I, II and III. The Trade Tests are designed for different trades at different proficiency levels. Trainees

are usually advised by the college management to go for the trade test after leaving the college.

Given the low quality of the training process and assessment, Atsumbe *et al.* (2012: 5) posit that the competencies of the trainees usually fall below labour market requirement after graduation. Consequently, many of the vocational college graduates remain unemployed years after training, adding to the poverty level in the society.

Attempts have been made in previous studies to address some aspects of the skills challenges in Nigerian construction. For instance, Uwameiye and Iyamu (2002) examined the training methodology of the local apprenticeship system in Edo and Delta states, Nigeria; Sanni and Alabi (2008) investigated the traditional apprenticeship approach of training house building artisans in Saki, Nigeria. In a related research study, Omodia (2009) looked into conceptual and methodological perspectives of manpower development in the Nigerian construction and other industries.

Dike (2008) examined the challenges confronting vocational education and training in Nigeria while Eneh (2010) investigated the declining technical and apprenticeship training in some selected industries including construction in Nigeria.

However, a review of these studies indicates some gaps that this study stands to bridge. Clearly, none of the studies developed a comprehensive blueprint that attempts to provide a holistic approach to resolving the workforce problem. Therefore, the focus of this study is to develop a comprehensive and strategic blueprint for resolving the workforce challenges. This study thus, offers some insights into the problem and also stands to enrich the literature in the area of study.

3. RESEARCH METHODOLOGY

In order to obtain robust data for gaining an in-depth understanding of the skills shortage in construction, Dainty *et al.* (2004) suggest that it is essential to canvass the opinions of key industry stakeholders. This would help to gain a comprehensive understanding of the problem and also aid the development of effective strategies for resolving it. The foregoing informed the choice of multiple target groups of key stakeholders as respondents for the study which include artisan employers and professionals.

A quantitative research survey was conducted using questionnaire survey coupled with an extensive review of literature. Simple random sampling techniques were adopted in the questionnaire survey as part of an existing data collection instrument for this study. Fellows and Liu (2003) posit that random sampling technique is a pragmatic way of collecting research data and it also ensures that the sample provides a fair representation of the population. In the event of the non-availability of the databases of the target groups in the study area as it is for this study, Leedy and Ormrod (2010) suggest a basic rule for determining a sufficient sample from a population as "the larger the sample, the better".

More specific guidelines were provided by Gay *et al.* (2009); Leedy and Ormrod (2010) for obtaining a sufficient and representative sample from a population while employing simple random sampling technique using N to represent the population size as follows:

- Where N=100 or less, sample the entire population;
- Where N= about 500, sample 50%;
- Where N= about 1500, sample 20%, and
- Where N= about 5000 or more, the sample size of 400 is adequate, the population size notwithstanding (Leedy & Ormrod, 2010: 213-214).

A five-point Likert scale was used for the design of the questionnaire employed in the study. According to Simeon (2011) pilot study is the pre-testing of research instrument. Lancaster *et al.* (2004) posit that one of the major purposes of a pilot study is to take care of all the likely problems that the respondents may encounter in completing the questionnaire, ensure ease of analysis and also help obtain information about the time it took to complete the questionnaire (Simeon, 2011). The questionnaire was given to three senior academics who also are experienced professionals in the built environment disciplines to review the structure, content, volume and ease of analysis. The feedback received from them was built into the instruments. The questionnaire was pre-tested before embarking on the main survey with two employers in order to assess the length of time taken to complete the questionnaire, the clarity of instructions and the general lay out. This input helped to refine the instrument. The questionnaires were administered to the respondents by hand given the low penetration of the internet in the study area.

The researcher made further efforts to increase the response rate as suggested by Babbie and Mouton (2005) by making telephone calls and sending electronic messages to the respondents.

A total of 450 questionnaires were distributed to employers and professionals. The employers included building contractors, government departments and institutions. The professionals included architects, civil engineers, quantity surveyors, builders and construction managers in South Western Nigeria.

3.1 Data Analysis

For the analysis of the data obtained for this research, Statistica (Version 10.0) application software for statistical analysis was employed. As earlier indicated, a five-point Likert scale was used, and the extent of the ranges of each step in the five-point Likert scale continuum was calculated by dividing the number of continuums, which is 4.00, by the 5 relative points. Therefore the ranges between the relative points equates to 0.80. The mean score was computed for each factor and the value was compared to suit the relative range it fell.

For instance strongly disagree (1 point), disagree (2 points), neutral (3 points), agree (4 points) and strongly agree (5 points). The mean score (MS) for each factor is then computed. Overall mean score (OMS) are also computed as the average of all the mean scores. The ranges relative to the mean scores are defined in the Table below.

The Mean Scores are denoted by (MS). The statistics used include frequencies, means and mean scores (MS). The mean is derived by allocating values to the ratings factors of the respondents.

Table 3: Guide for the interpretation of results

Mean score range	Meaning
MS > 1.00 ≤ 1.80	Strongly Disagree (SD)
MS > 1.80 ≤ 2.60	Disagree (D)
MS > 2.60 ≤ 3.40	Unsure (U)
MS > 3.40 ≤ 4.20	Agree (A)
MS> 4.20 ≤ 5.00	Strongly Agree (SA)

The results are presented as follows:

Table 4 indicates the responses of the professionals. Builders have 32%, they are followed by civil engineers with 26%, then the quantity surveyors which have 20%, and lastly the others with 12% which cover other allied professionals not listed. The lowest response is from construction managers (10%).

Table 4: Professionals

Professionals	No of questionnaires distributed	No of questionnaires received (Response)	Percentage contribution
Civil engineers	90	71	26
Quantity surveyors	98	54	20
Builders	102	88	32
Construction managers	88	29	10
Others	72	34	12
Total	**450**	**276**	**100**

3.1.1 Company category

Table 5 reveals the company category of the sample; it indicates that the sample investigated covers different categories. This suggests that the respondents that make up the survey sample are sourced from different areas of work, and make sufficient representation. The construction firm takes the lead with 49%, followed by consulting with 20%, and the least is from government departments with 15%.

Table 5: Company category

Category	Percentage
Construction firm	49
Consulting firm	20
Government department	15
Others	16
Total	**100**

4. FINDINGS ON STRATEGIES FOR RESOLVING THE WORKFORCE CHALLENGES

Table 6 indicates the respondents' perceptions on proposed strategies for improving employers' participation in training. It is noteworthy that all the strategies have all the mean scores within the range MS > 3.40 ≤ 4.20 and MS> 4.20 ≤ 5.00 and an overall mean score (OMS) of 4.26 for all the proposed strategies as shown in Table 6 which indicates that the respondents strongly agree / agree with the proposed strategies for improving the participation of employers in training. Most notable among the proposed strategies are the ones with the MS values of 4.26 and above, noting here that the OMS value is 4.26.

From this result the respondents can be deemed to agree with most of the proposed strategies -standardising the remunerations of artisans; providing incentives to motivate employers to participate more in training; creating more artisan training centres to accommodate more employers' sponsored trainees; and establishing investment in people initiative to mobilise employers for training to improve the

participation of employers.

Table 6: Strategies for improving the participation of employers in the artisan training

Proposed Strategies	……Response %.....						
	SD	**D**	**N**	**A**	**SA**	**M S**	**OMS**
Standardise remunerations of artisans	0.74	1.48	4.81	51.48	41.48	4.31	
Provide incentives to motivate employers to participate more in training	0.37	3.30	5.19	48.89	41.85	4.28	
Create more artisan training centres to accommodate more employers' sponsored trainees	1.11	1.85	7.78	48.89	40.37	4.26	**4.26**
Establish Investment in people initiative to mobilise employers for training	0.75	1.12	5.60	55.97	36.57	4.26	
Establish a dedicated agency for training of artisans for the industry	0.74	2.59	6.67	56.67	33.33	4.19	

Table 7 indicates the respondents' perceptions on proposed strategies for improving the Vocational Technical college training system. It is noteworthy that all the strategies have all the mean scores within the range MS > 3.40 ≤ 4.20 and MS> 4.20 ≤ 5.00; and an overall mean score (OMS) of 4.33 for all the proposed strategies as shown in Table 7 which indicates that the respondents strongly agreed / agreed with the proposed strategies for improving the Vocational Technical college system of training artisans. Most notable among the proposed strategies are the ones with the MS values of 4.36 and above, noting here that OMS value is 4.33.

From this result the respondents can be deemed to agree with the proposed strategies of - Government should provide adequate funding for the technical colleges; government should provide adequate training facilities for the colleges; Schools should engage the services of career counsellors to sensitise high school students towards construction careers; Government should create more vocational technical colleges; provide labour market information, opportunities, wage data to students via the internet, leaflets and workshops; employers and government should sponsor media campaigns to attract trainees to construction trades; and reform the policy provisions establishing NBTE as the most recommended strategies for improving the VT college system of training artisans.

Table 7: Strategies for improving the training in the colleges

Proposed Strategy	……..…Response %.....						
	SD	**D**	**N**	**A**	**SA**	**MS**	**OMS**
Government should provide adequate funding for the technical colleges	0.37	0.10	4.04	43.38	51.10	4.44	
Provide adequate training facilities for the colleges	0.37	0.37	4.04	45.22	50.00	4.44	
Schools should engage the services of career counsellors to sensitise high school students towards construction careers	1.48	2.58	8.86	45.02	42.07	4.40	
Government should create more vocational technical colleges	1.48	0.74	3.69	45.02	49.08	4.39	
Provide labour market information, opportunities, wage data to students via the internet, leaflets and workshops	0.74	0.74	4.83	46.89	46.85	4.38	
Employers and government should sponsor media campaigns to attract trainees to construction trades.	0.00	1.85	4.81	49.26	44.07	4.36	**4.33**
Reform the policy provisions establishing NBTE.	0.37	1.11	7.01	48.71	42.80	4.34	
Employers and Government should provide scholarships to attract new entrants.	0.00	0.74	5.54	46.49	47.23	4.32	
Industry leaders should engage in school tour annually to mobilise youth to enlist for construction occupations.	1.48	2.58	8.85	45.03	42.07	4.32	
Employers and other industry stakeholders should Sponsor summer construction camps for high school students.	0.74	1.11	7.38	51.29	39.48	4.28	
Education policy reforms to give recognition to vocational qualifications	0.74	0.37	6.62	56.25	36.03	4.26	
Construction academies and clubs should be established in high schools.	1.39	2.66	8.86	45.02	42.07	4.42	
Integration of vocational technical colleges into the university system	1.11	7.75	3.69	48.71	38.75	4.16	

5. DEVELOPING THE STRATEGIC BLUEPRINT

5.1 The strategic vision

The overall goal of the strategies is to reposition the artisan training system to an attractive and sustainable learning pathway with high relevance to the construction labour market needs and a suitable option for career progression.

5.1.1 The current position

The current position of the artisan training system can be summarised under the following points:

- Inadequate government policy framework on artisan training.
- Poor public image of artisans.
- Poor integration of vocational training with the general education.
- Weak recruitment efforts.
- Uncoordinated and unregulated training.
- Poor quality / standard of training.
- Poor funding from stakeholders.
- Weak employers' participation in training.

5.1.2 Artisan training best practices and results of the investigation

The development of research instruments for this study was based on improvement measures and artisan training best practice across the world identified from reviewed literature. Clues were taken from the UK, the US, Germany, New Zealand, Malaysia, India and South Africa.

Global best practice and improvement measures obtained from the results of the study suggest:

- The operation of a flexible National Qualification Framework (NQF) that integrates vocational education and training into the university system. The NQF should be based on the recognition of learning outcomes from vocational pathway and give room for career prospects and lifelong learning.
- Policy intervention to accord a good image to artisans in society by giving better recognition to vocational qualifications and promoting artisan training as a tool for economic empowerment. This would remove the poor public perception of vocational track as fit only for the less academically endowed.
- Artisan training should be made attractive through the provision of scholarships and other incentives for trainees by effective synergies between governments, employers training providers and the parents.
- A mechanism for recruitment and mobilisation of trainees from high schools and other sources to enrol in construction trades should be established. The mechanism could be in form of construction clubs, construction summer schools, media campaigns and websites advertisements.
- The policy framework for the regulation of artisan training system should be given periodic and continuous review.
- An effective and sustainable capacity building strategy for VET instructors / trainers must be established to continuously retrain, refresh

and update the artisan instructors / trainers for relevance in the industry.

- Periodic and continuous reforms of funding mechanism for artisan training system should be carried out to ensure that adequate and sustainable financial provision is made to cater for physical infrastructure, training facilities, library resources and training scholarships.
- Employers should be given incentives of tax relief and other means to encourage their participation in artisan training.
- A public institution that is dedicated to promoting and fostering public private partnership in artisan training delivery should be established.
- The orientation of youth should be changed through media campaigns from the current philosophy of indifference to skills acquisition and respect for dignity of labour.
- A functional regulatory agency for the proper coordination, standardisation and control of the traditional apprenticeship system should be established and backed up by appropriate policies.
- Skills support department should be set up in the Local Government Areas to promote skills acquisition among the youth at grassroots level.
- Effective anti-corruption policies and measures should be established to check the excesses of political office holders on the misappropriation of public funds meant for education and training.

5.1.3 Key strategic issues

The overall concern of the strategies is to transform the artisan training system into an attractive and sustainable learning pathway with high relevance to labour market needs and a suitable alternative for career progression. This would be achieved by driving greater synergies among stakeholders through a strong focus on outcomes. The stakeholders would be required to review priorities, re-assess key roles, reform key policies reallocate resources and strengthen collaboration across traditional boundaries to pursue common goals. The key strategic areas in improving the artisan training system include:

- Poor image of the artisans;
- Integration of VET with the general education;
- Coordination and regulation of the training system;
- Recognition of VET qualifications;
- Establishment of sustainable funding mechanism for artisan training system;
- Training of the trainers / Continuous Professional Development (CPD);
- Recruitment of trainees;
- Making employability a priority in the training provision, and
- Enhancing Public Private Partnership (PPP) in artisan training provision.

5.1.4 Identification of stakeholders

Essentially, there are five key stakeholders in the artisan training system. Each stakeholder has specific roles to play. The stakeholders include:

- Government;
- Employers;
- Trainers / training providers;
- Parents / guardians, and

- Trainees.

5.1.5 Roles of Stakeholders

This spells out who does what in the process of implementing the strategies. The role of each of the stakeholders in the artisan training system are identified and assigned appropriately; thus, giving clear direction and focus for maximum performance. The stakeholders involved in artisan training system and their respective roles are highlighted below:

5.1.5.1 Roles of government

In the implementation process of the strategy, the government would have to reform policies to boost the image of the artisan in society; integrate vocational education into the general education system; establish sustainable funding mechanism for artisan training; reform the policy provisions establishing NBTE for effective training coordination and regulation; develop a new policy framework to facilitate public private partnership in artisan training; establish Construction Industry Development Board (CIDB) to drive training; increase the budgetary allocation to the vocational sub-sector of education; establish an agency to regulate and standardise traditional apprenticeship training and re-orientate the youth through the media on dignity of labour.

Other roles of government are to establish a system for the continuous development of vocational trainers; provide regular leadership and management trainings for college administrators; institute measures to checkmate corrupt practice in the system; set up the Skills Acquisition Fund (SAF) for adequate funding of vocational training; improve investment in infrastructure and training facilities in the vocational colleges; establish construction academies and clubs in high schools; provide incentives to motivate employers to participate more in training; establish Investment in people initiative to mobilise employers for training; formulate a robust youth policy that will give priority to skills acquisition; establish an agency to regulate and standardise traditional apprenticeship training; sponsor media campaigns for the re-orientation of the youth on the value of vocational skills; provide scholarships and other incentives to attract young people to training and create skills support department in the Local Governments Areas to promote skills acquisition.

5.1.5.2 Roles of employers

Assigned roles of the employers in the implementation plan are to support the funding of artisan training through contribution to Skill Acquisition Fund; provide on the job training to employees; offer training platform for industrial attachment; afford artisan trainers / instructors the opportunities to update their skills; sponsor media campaigns to attract trainees to construction trades; sponsor summer construction camps for high school students; offer scholarships to attract trainees and engage in annual school tour to mobilise youth to enlist for training.

5.1.5.3 Roles of training providers

The trainers have the duty to sensitise high school students towards construction careers; establish good linkages and collaboration with the employers and the industry; continuously update their skill to remain current with the developments in the industry and collaborate with parents, guardians and the community.

5.1.5.4 Roles of parents and guardians

As a stakeholder in the system, parents and guardians have the duty to encourage their wards to enrol in artisan training; develop a new perspective about artisan training as a tool for economic empowerment; provide home support for their children to maximise the training period; and offer patriotic and persuasive support to influencing vocational training policy reforms.

5.1.5.5 Roles of trainees

The trainees are to show commitment and dedication to learning. They are to also give adequate time to learning and skills acquisition above any other domestic engagement.

5.2 Implementation plan

The implementation process would begin with the reform of key policies that have had negative impacts on artisan training from the past. The following sections discuss the implementation of the strategies.

5.2.1 Paradigm shift on the image of vocational education and training in society

Implementing an integrated artisan training strategy for a sustainable livelihood has to start from changing the philosophy and the rationale behind it as a second choice of educational pathway for drop-out students from the general education system; into a recognised and valid alternative educational pathway with lifelong learning and career prospects. The poor image of artisans and the dead-end syndrome which have been responsible for poor attraction of youth to vocational training stemmed from this philosophy of vocational education and training in Nigeria. Government policy reforms must give priority attention to changing this philosophy and thus, making vocational pathway attractive to the teeming youth in the populace. The right shift can be made first, through policy interventions, which call for political will and genuine intentions on the part of the political leaders to address the nation's socio-economic challenges especially, the high rate of youth unemployment and the attendant menaces in the society. With this paradigm shift in place, artisan training would become a viable education option with lifelong learning prospects and limitless career opportunities.

5.2.2 Effective collaboration between stakeholders

Building effective synergies between stakeholders in the artisan training system is very crucial to mitigating the challenges. Especially with regards to the involvement of the industry partners in the need analysis, design and delivery of training in order to avoid skills mismatch and ensure labour market relevance. Training curricula would have to be adapted constantly to reflect changes in skills needs and advancement in technology through a close link between the training providers and the industry practitioners.

5.2.3 Integration of vocational training with the general education

Recognition of prior learning must become embedded in all parts of the education and training system through the adoption of an outcomes-based approach for vocational qualifications. A flexible NQF should be developed that provides a link between vocational education and training and higher education. Lifelong learning opportunities that hitherto have been denied to those in the vocational track should be removed through appropriate policy interventions.

5.2.4 Capacity building for artisan instructors

A policy provision for appropriate training and continuous capacity building of trainers should be formulated. These would be achieved through the establishment of a legal framework for the continuous development of skills and competencies. For instance, a trainer from the industry setting would require some form of complementing pedagogical competencies; while instructors from school based training setting would need to build practical / industrial capacity to optimise quality of training delivery. As technology keeps changing, instructors would have to be retrained constantly to keep up with development trends in the industry to assure employability of the training graduate.

6. CONCLUSION

The central focus of this study is to investigate the problem of skilled workforce shortages in the Nigerian house construction sector; with a view of developing a strategic blueprint for mitigating the challenge.

The findings from the study indicate that the education policy framework is inadequate. The implications of this is that the vocational pathway has become a dead end and repulsive for young people in Nigerian society. This is one of the crucial factors responsible for the shortage of skilled workmen. The finding therefore suggests that there is an urgent need for policy interventions in the areas of education.

The study also found that the infrastructure and facilities for training house building artisans are grossly inadequate. In order to address the issue, findings indicate that infrastructure and training facilities should be given appropriate attention as they are very critical in the training process.

The findings from the study further indicate that funding of the training of house building artisans is poor. In terms of approaches to addressing the issue of funding, the results indicate that deliberate attention should be paid to boosting financial allocation to vocational training and monitoring of the disbursement. Findings indicate that the training of house building artisans is largely uncoordinated and lacks proper government regulation and interventions. Consequently, the findings indicate an urgent need for the reform of policy framework establishing the regulatory body for the training and renewed interventions. Though the non-availability of the databases of the target groups in the study area posed a limitation in determining the sample size. However, the researchers overcame the challenge by following appropriate guidelines provided by scholars (Gay *et al.*, 2009: 133; Leedy & Ormrod, 2010: 213-214) in such situations. This has been adequately discussed under the research methodology section.

Cleary, there is an urgent need for an intervention in order to forestall further degeneration of the situation and to make proper provision for future skills requirements in the house construction sector. In response to the complex nature of the problem, this study has developed a strategic blueprint that offers a holistic approach for repositioning the artisan training system to an attractive and sustainable learning pathway with high relevance to the house construction labour-market needs.

The focal point of the blueprint is driving greater synergies between key stakeholders in the industry. These synergies would go beyond traditional boundaries through a strong emphasis on outcomes and the pursuit of common goal. The strategic blueprint is backed up with a well-articulated implementation plan. Clearly, there is hope of resolving the construction skills crisis. This essentially is largely hung on the

timely appropriation and implementation of the solutions offered in this study.

This would help to mitigate the problem and pave way for sustainable skills supply in the Nigerian construction industry.

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CONDITION ASSESSMENT OF STUDENT HOSTEL BUILDING ON CAMPUSES OF FEDERAL UNIVERSITIES IN NORTH-CENTRAL NIGERIA

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ABSTRACT

Universities and many tertiary educational institutions in Nigeria are under pressure to preserve their built environment. The focus of this study is to assess the condition of on-campus hostel buildings at Nigerian public universities with the aim of generating information about the maintenance requirement of the buildings. Condition assessment is the most common method for measuring building performance and identifying maintenance needs of facilities. In the process, the efficiency of the current maintenance management strategies is determined. Primary data were generated with the aid of a condition survey guide and rating sheets. The results were computed in percentages and presented on bar charts. The assessment results revealed the conditions of the components within the hostel building at the three universities studied. The walls, floors and ceilings of the most of enclosed spaces such as the bedrooms, kitchens and washrooms are in various degrees of deterioration. In most of the bedrooms, there are minor cracks and worn-out finishing with evidence of inadequate routine maintenance. There are many doors and windows with major problems such as damaged locking devices or door handles. Cracked or broken window panes and door panels are common. The toilets and bathroom facilities are almost not operational and are in need of urgent major maintenance works. The building facades (ceilings, walls and floors) in the male and female hostels at university C are in good condition, signifying that the surfaces of the facades show slight soiling or discolorations or fading that affects mainly the aesthetic value of the buildings. Generally, the electrical and plumbing services at the hostels across all the universities studied are in poor conditions, some of the facilities were rated unsuitable for use.

Key words: Condition, Hostels, Universities, Components

1. INTRODUCTION

Condition assessment of buildings provides 'face value' information about the relative state of facilities. It also provides essential data for building management to priotise and plan a mitigation schedule and remedial actions in line with the core objectives of the organisation and user requirement (Loy & Coleman, 2006). Quantifying the maintenance requirements of a facility necessitates an understanding of the gap between the desired condition and the current condition of the facility (Abbott *et al.*, 2007).

Universities and many tertiary educational institutions in Nigeria are under pressure to preserve their built environment (Akinsola, *et al* 2012). Studies related to student hostels at

Nigerian public universities (Ubong, 2007; Onyike & Uche, 2010; Adewunmi *et al.*,2011; Pat-Mbano *et al.*, 2012) suggest a state of disrepair of the hostel buildings. According to Pat-Mbano, *et al.* (2012) student hostels provided at many Nigerian university are not given the desired maintenance attention, as a result, the hostels are in poor states that do not support the living and learning objectives of providing accommodation facilities besides othe academic buildings. The deterioration state in the physical conditions of students' hostels on the campuses of some institutions in Nigeria may be blamed for poor academic performance coupled with social problem such as student unrest, poor health poor academic and other negative behavioural patterns that are found in disadvantaged communities (Jolaoso, *et al* , 2012).

2. CONDITION ASSESSMENT OF BUILDINGS

Condition assessment is the most common method for measuring building performance and identifying maintenance needs of facilities. In the process, the efficiency of the current maintenance management strategies is determined (Abbott *et al*., 2007). Central to achieving the goal of creating a global framework is the development of performance measurement tools such as the condition rating instrument (Abbott *et al*., 2007). Mc Duling, *et al.*(2004) opined that the use of condition ratings is a current standard practice internationally for assessing conditions of buildings. In line with this, Loy & Coleman (2006) the global trend currently is that condition assessment tools are custom-made to suit the building type, environment and purpose of the survey.

An example of such condition rating tool is presented in Figure , which depicts the description of the conditions of components and the rating style with the aid of colours codes and numeric values assigned to each described conditions.

Condition Rating			Description
Colour Coding	Technical Terms	Layperson Terms	
5	As New	Very Good	The fabric, element or building is either new or has recently been maintained; does not exhibit any signs of deterioration.
4	Maintenance Required	Good	The fabric, element or building exhibits superficial wear and tear, minor defects, minor signs of deterioration to surface finishes and requires maintenance/servicing. It can be reinstated with routine scheduled or unscheduled maintenance/servicing.
3	Repairs Required	Fair	Significant sections or elements require repair, usually by a specialist. The fabric, element or building has been subjected to abnormal use or abuse, and its poor state of repair is beginning to affect surrounding elements. Backlog maintenance work exists.
2	Renovations Required	Poor	Substantial sections or elements have deteriorated badly, suffered structural damage and require renovations. There is a serious risk of imminent failure. The state of repair has a substantial impact on surrounding elements or creates a potential health or safety risk.
1	Replacement Required	Very Poor	The fabric, element or building has failed, is not operational or deteriorated to the extent that does not justify repairs, but should rather be replaced. The condition of the element actively contributes to the degradation of surrounding elements, or creates a safety, health or life risk.

Figure 1 Condition Ratings (Mc Duling, *et al.*, 2004)

3. RESEARCH METHODOLOGY

The study adapted the case study approach to survey the condition of hostel building facilities at Federal universities in the North- central geopolitical zone of Nigeria. There are five Federal universities within this zone, out of which three were selected for the study because they have hostels on campus and the age range of the buildings are between 30-35 years.

The condition survey instrument developed followed the concepts of Abbott, *et al.* (2007) and Straub, (2009). A pilot survey of the buildings was carried out to acertain the nature of the facilities. Major components (Ceilings, walls, floors, doors) were assessed. In addition, electrical and publumbing fittings within the hostel building surfaces were assessed. The conditions observed were described thereby informing the categories of defects. The instrument was tested for efficacy and to train research assistants for the main exercise. A rating sheets were designed and used to recording data during the condition assessment exercise. The data generated was enttered on spread sheet computed in percentages and presented on column charts.

Table 1 Condition Rating Instrument for Building Façade

component	Description of condition	Rating	Value Assigned
Ceiling	Appearance is as new, no defects, routine maintenance is adequate to uphold quality and performance.	Excellent	**5**
	Slight soiling or discolouration, only appearance affected. Minor & routine maintenance is adequate.	Satisfactory	**4**
	Soiled surfaces, few cracks or tears, due to aging or misuse, no signs of leakage from roof.	Fair	**3**
	Badly stained surfaces, broken and cracked surfaces, sagging panels & evident signs of leakage from roof.	Poor	**2**
	Unsafe & unhealthy for occupants due to severity of deterioration. Requires urgent major refurbishment to save the structure.	unsuitable	**1**
Floor	Appearance is as new, no defects, routine maintenance is adequate to preserve quality.	Excellent	**5**
	Slight or early signs of wearing due to use or aging. Minor & routine maintenance is required to improve appearance.	Satisfactory	**4**
	Worn-out finishing, minor cracks apparent, finishing due for renewal, no major defects.	Fair	**3**
	Early signs of structural defects such as major cracks, dampness, worn-out surfaces. Urgent and major repairs required to restore component.	Poor	**2**
	Severe deterioration such as major cracks and water seepage. Component is unsafe & unhealthy for occupants due to severity of damage. Requires urgent major refurbishment to save the structure.	unsuitable	**1**
Wall	Appearance is as new; no defect; routine maintenance is adequate to preserve quality.	Excellent	**5**
	Diminishing aesthetic appearance due to aging and use; no other signs of defect. Minor works such as re-decoration and routine maintenance is adequate to improve appearance.	Satisfactory	**4**
	Faded surface finishing; minor cracks that may not be connected to structural failure. Minor maintenance action and re-decoration is necessary to restore component.	Fair	**3**
	Early signs of structural defects such as major cracks, dampness, worn-out surfaces. Urgent and major repairs required to restore component.	Poor	**2**
	Severe deterioration such as major cracks; dampness and moulds on element. Unsafe & unhealthy for occupants due to severity of damage. Requires urgent major works to save the structure.	unsuitable	**1**

Doors /windows	All doors and windows satisfy all functional and aesthetic purposes and are in best operational state. Routine maintenance adequate to uphold elements	Excellent	**5**
	Some of the elements show signs of wearing of finishing due to age and use. Routine maintenance and re-decoration is adequate to restore the elements.	Satisfactory	**4**
	All or most elements are in conditions described in 'B'; in addition, slight problems are observed such as cracked or broken panes, and early operational issues with locks and hinges, that require minor repairs.	Fair	**3**
	Significant problems affecting the operation of most elements such as locking devices & difficulty of operating. Damaged door handles and broken or cracked panels.	Poor	**2**
	Completely dysfunctional and damaged elements. Unsafe for use by occupants; cannot be repaired; require complete replacement.	unsuitable	**1**
Electricals	All electrical fittings for power, lighting, fans/airconditioners are functional; their appearance is as new.	Excellent	**5**
	A few of the fittings show signs of wearing due to age and use. Facilities are not at their best operational state; space is adequately lighted; all power sockets, fans/air conditioners and control switches are operational and safe for users.	Satisfactory	**4**
	Few fittings appear good but non-operational such as dead light bulbs or tubes; faulty control switches that require minor repairs. Rooms can be lighted partially; fans/air conditioners are not fully operational.	Fair	**3**
	Poor or non-operational fans/air conditioners, power and light fittings. There are some damaged light and power fittings, with signs of overloading and misuse.	Poor	**2**
	Exposed wires from lighting and power points. Fittings appear inferior and not properly fixed. Room is dark especially at night. Unsafe conditions and connections for users/occupant.	unsuitable	**1**
Plumbing	Pipes and sanitary fittings are as new; quality not inferior; users operate with ease. Routine maintenance is adequate for preservation of the current standard.	Excellent	**5**
	Pipes and fittings still in good operational states, but showing early signs of wearing due to age and use. Minor repairs and routine maintenance works are adequate.	Satisfactory	**4**
	Pipes and fittings show minor cracks; no signs of leakage; few missing or broken seat or tank covers, shower or tap heads. Facilities can only be partially operated and used.	Fair	**3**
	Early signs of leakage of pipes and fittings due to ageing, use or poor previous maintenance work or deferred maintenance. Severe conditions of 'C' observed partial blocked sinks, basins and shower drains. Major maintenance works can restore facilities.	Poor	**2**
	Severely damaged fittings, blocked sinks, basins and shower drains. Unsafe & unhealthy. Facilities cannot be repaired. Replacement and new works required.	unsuitable	**1**

(Source: Adamu 2014**)**

4. FINDINGS AND DISCUSSION

This section presents the results of the condition assessments of hostel buildings.

4.1 University A

Figure 3 shows results of the condition survey of forty-three building spaces at the female hostel block on the main campus. The spaces considered are thirty of the student bedrooms including a porters' office and a common room; eight lavatories, three kitchens and two laundry rooms.

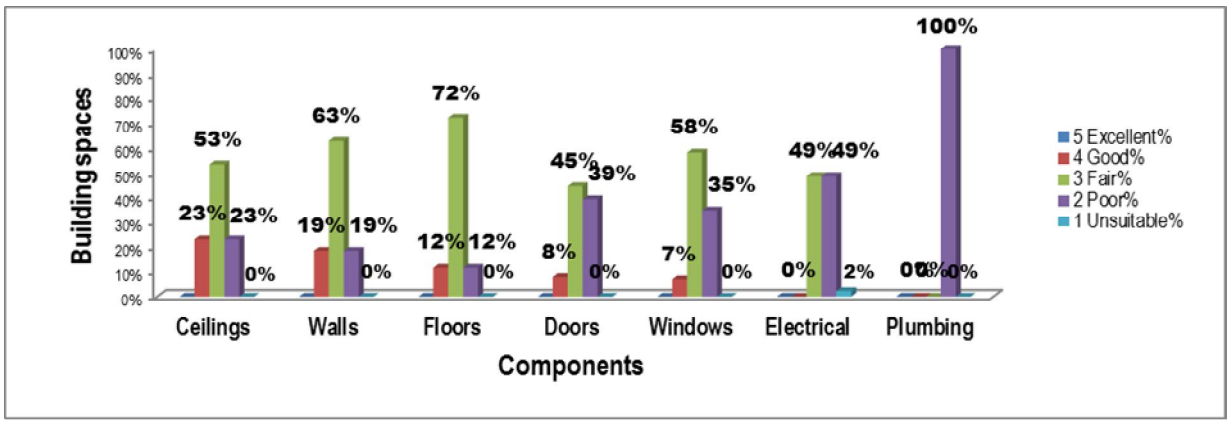

Figure 3 Conditions of rooms at a female hostel at University A

Majority of the components evaluated in the rooms were rated "fair", with a high of 72% of the floor and 63% of the walls. There is no component in an excellent condition. Some of the ceilings, walls, floors, doors and windows are in good condition (23%, 19%, and 12%, 8% and 7% respectively). Only 2% of the spaces had unsuitable electrical connections, but 49% are in poor condition. All (100%) the plumbing services of the washrooms and kitchens are in poor condition. The result implies that most of the building services (electrical and plumbing) require major maintenance actions to restore the services to functional states for student occupants.

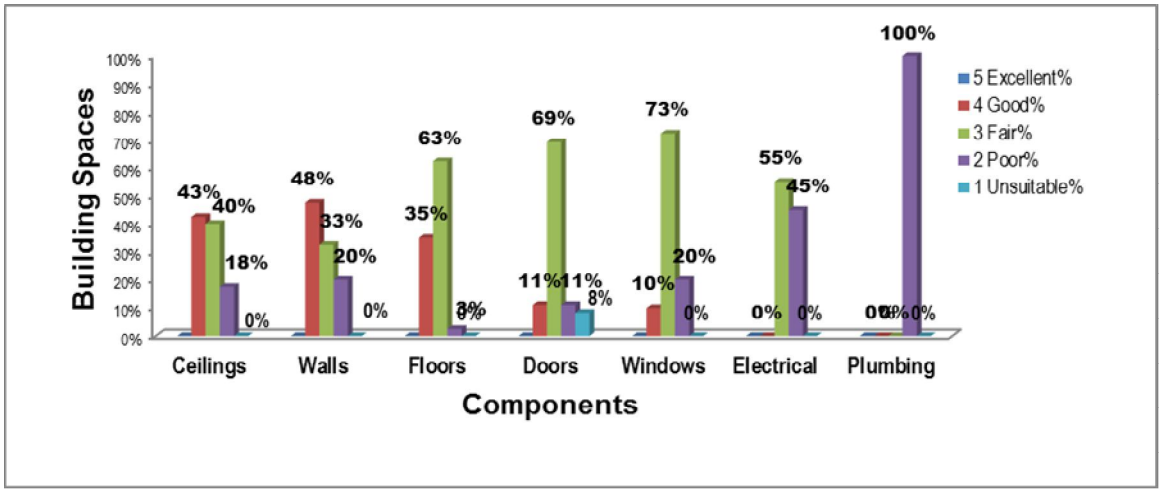

Figure 4 Physical conditions of rooms at the male hostel block at University A

The physical condition evaluation result of the male hostel block on the main campus of this university is as presented on Figure 4. A total of forty buildings spaces in the hostel were evaluated. They are twenty-eight bedrooms (including the common room and the porters' office),

eight lavatories, two kitchens and two laundries. The majority of the doors, windows and electrical fittings (over 60%) in the spaces evaluated are rated 'fair'. Notable percentages of the ceilings, walls and floors (43%, 48%, and 35%) of the spaces are in good condition. All (100%) plumbing and up to 45% of electrical services are in poor condition. Only 8% of the doors are unsuitable.

4.2 University B

A condition survey of the facilities of the two hostel blocks on the main campus of the University was carried out. Spaces/rooms that were accessible by the researcher for the condition survey are the building spaces considered in each block. Forty-four bedrooms and seven lavatories were surveyed at the female hostel block. At the male hostel block, forty-seven bedrooms and four lavatories were surveyed**.** Results of the survey are presented in Figures 5 and 6

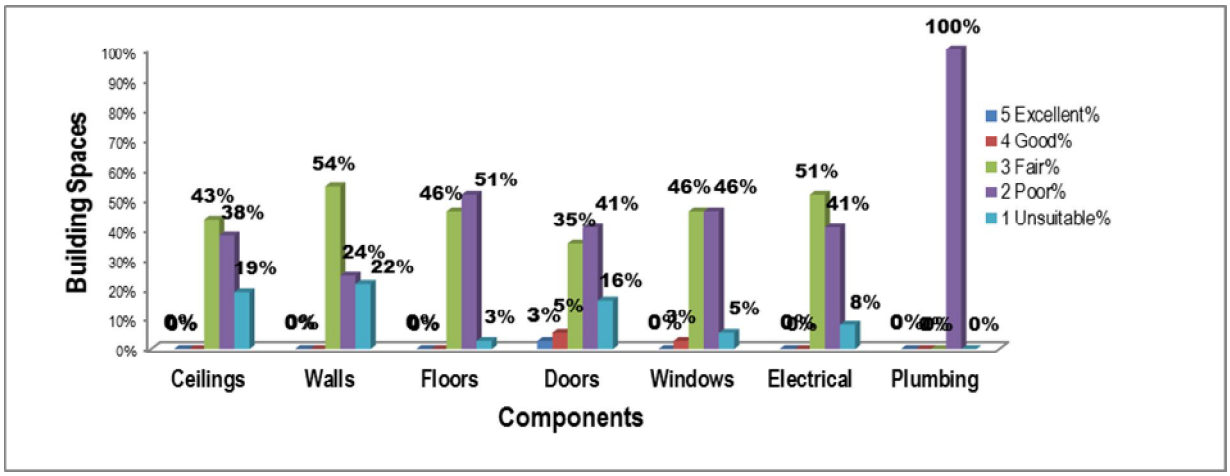

Figure 5 Condition rating of a female hostel block at University B

All components of the building are in states of disrepair, with every component at different stages of deterioration. All plumbing works, and over 50% of the floors are in poor conditions. Over 50% of the spaces surveyed in the hostel have components that are rated unsuitable for occupants. However, some rooms have percentages of the components in fair conditions. During the survey, the researcher observed that one wing of the hostel block is not as affected by dampness and algae as the other wings. The survey revealed the general state of critical structural disrepair of the hostel facilities.

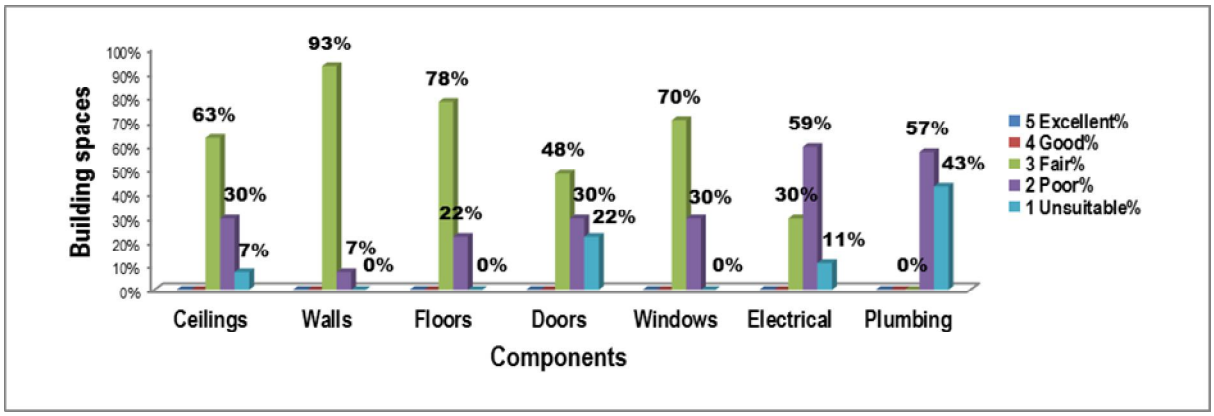

Figure 6 Condition rating of a male hostel block at Case B

Most of the ceilings, walls, floors and windows of the male hostel block evaluated are in fair conditions and up to 93% of the spaces have walls in fair condition. The majority (57%) of the plumbing services in the lavatories are in poor condition, and the other 43% are in condition unsuitable for the users. Many of the bedrooms are still in habitable condition with defects that can be attributed to aged facilities and lack of adequate maintenance.

4.3 University C

The hostel facilities provided for the male and female students on the main campus of the university were evaluated. All eighty-two bedrooms of a male hostel block, four of six general lavatories, three kitchens and three laundries were considered. At the female blocks, seventy of the bedrooms with bathrooms enclosed were evaluated. Three general kitchens and three laundries were also evaluated, and all results are presented in Figures 7 and 8.

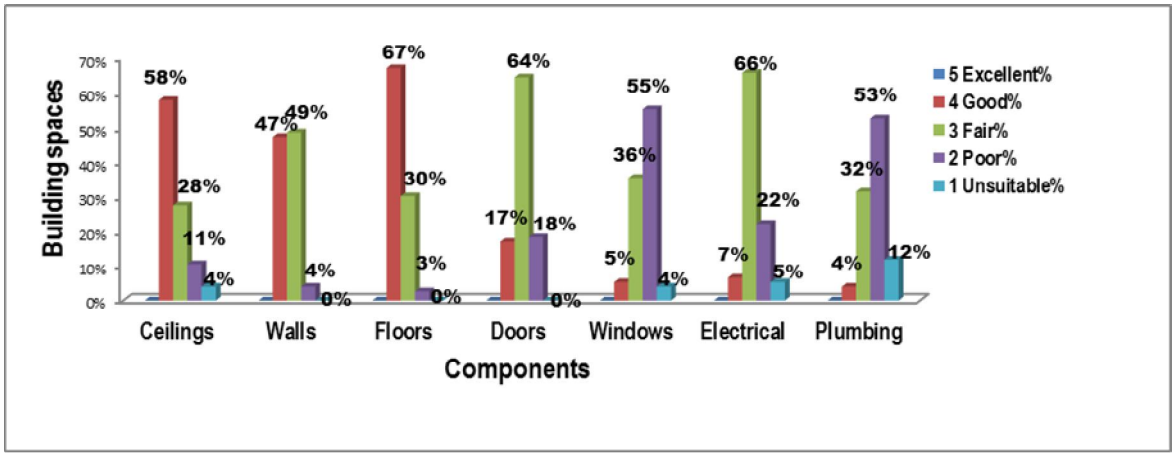

Figure 7 Condition rating results of the female hostel blocks at Case C

The results shown in Figure reveal that most of the floors (67%) and ceilings (58%) are in good condition; conditions of most electrical services (66%) and doors are fair. Conditions of the plumbing services (53%) in the hostel blocks are poor, and a notable 12% are unsuitable for use.

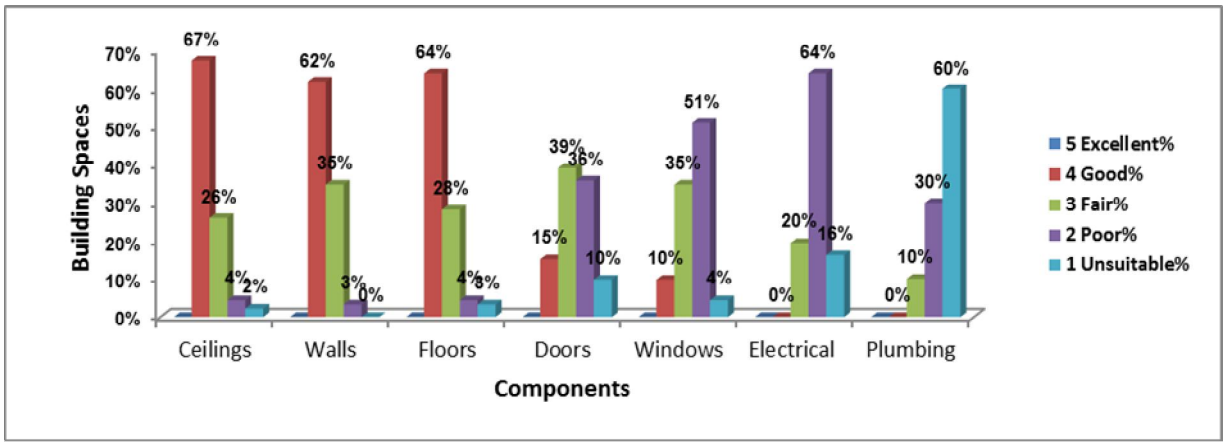

Figure 8 Condition rating of male hostel block at University C

The results on Figure 8 shows that most of the building spaces have their ceilings (67%), walls (62%) and floors (64%) in good condition. This implies that the building facades require only minor maintenance works to improve majorly the aesthetics of the buildings. However, most (64%) of the electrical services are poor and 16% are unsuitable for the occupants. Many doors (46%) and windows (55%) have major defects. 60% of the plumbing services were rated 'unsuitable' implying that the fittings are damaged beyond repairs; the facilities require replacement because they are unsafe for use by occupants of the hostels

5. CONCLUSION

The building facades (ceilings, walls and floors) in the male and female hostels at university C are in good condition, signifying that the surfaces of the facades show slight soiling or discolorations or fading that affects mainly the aesthetic value of the buildings. The conditions of the facades in university A and B revealed majority of the facades are either fair or poor, indicating the need for major maintenance actions to restore the components to suitable states. Generally, the electrical and plumbing services at the hostels across all the universities studied are in poor conditions, some of the facilities were rated unsuitable for use.

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CONSTRUCTION HEALTH AND SAFETY (H&S) PERFORMANCE IMPROVEMENT: ARE CLIENTS AND CONSULTANTS PLAYING THEIR PART?

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ABSTRACT

Performance improvement of Health and Safety (H&S) in the construction industry is invariably a result of a joint effort of the project team members. Clients and their consultants play an important role in ensuring that H&S is addressed throughout the project stages. The objective of the paper is to assess the roles of clients and consultants in improving H&S in the construction industry at the tendering and construction stages, and the pre-requisites thereto. Respondents were randomly selected from delegates of the Construction Industry Forum and data was collected using self-administered questionnaires and a review of literature. Findings indicate that with the exception of the role of ensuring that the contractor is complying with the H&S plan during construction, which is often done, other roles are fulfilled less frequently. Furthermore, it was revealed that those respondents that were more experienced in terms of H&S were more involved in H&S and contributed more to the improvement of H&S than those who were less experienced. The paper concludes that many consultants and their clients are not fully participating in H&S. The paper therefore recommends that current laws and regulations be reviewed and amended to include duties of clients and consultants, and that clients and consultants to be sensitized and empowered to fulfill their roles.

Keywords: Clients, Construction, Consultants, H&S, tendering

1. INTRODUCTION

The construction industry is regarded as an unsafe industry to work in. A number of studies (Musonda and Haupt, 2008; Msonda and Haupt, 2009; Construction Industry Development Board (cidb) 2009; Kikwasi, 2009; Okorie and Smallwood, 2010; Smallwood, 2013) have revealed deficiencies in H&S performance including lack of documenting and communicating risk, lack of H&S audits and prioritizing of H&S in site meetings, and lack of management commitment to H&S. The performance of Tanzanian construction industry in terms of construction H&S is still poor. This is reflected in the works of Kikwasi (2009), Mwombeki (2005) (cited in Kikwasi, 2009), Phoya *et al. (*2011), Phoya (2012) and Matiko (2013). The unsatisfactory performance of industry in H&S aspects is aggravated by current laws and regulations which place the responsibility of the project H&S with the contractor

and leaving clients and consultants with no obligations. Studies (Kikwasi, 2009; Phoya, 2012; and Matiko, 2013) have established that the responsibility for construction H&S lies with the main contractor, resulting in many designers, consultants and clients excluding themselves in H&S matters. One concern of this study is to determine the involvement of clients and consultants in construction H&S in the absence of laws, regulations or bylaws which stipulate their duties and responsibilities.

The dependence on contractors to improve construction H&S has an adverse impact on the performance of the industry in terms of H&S. Some countries such as South Africa through the Construction Regulations of 2003 and now 2014, and the United Kingdom through the Construction (Design and Management) Regulations of 2007 and more recently 2015, have engendered clients and consultants involvement in construction H&S. The need to involve clients and consultants in construction H&S has been stressed by Said *et al.* (2009), cidb (2009), Bhattacharjee *et al*. (2011), Niemandt and Crafford (2011), Ulang (2012) and Smallwood (2013).

Improvement of construction H&S starts at project level and is a result of a joint effort of the project team members. Efforts have been directed towards this end and can be traced to the works of Teo *et al* (2008), Smallwood (2004:2013), Choudhry *et al.* (2009), Rajendran and Gambatese (2009), Agumba and Haupt (2009), Okorie and Smallwood (2011), Bhattacharjee *et al.* (2011), Musonda and Haupt (2011), and Lingard *et al.* (2013). Collectively, these studies advocate the need for management commitment and involvement of project team members in pursuing, and hence improvement of construction H&S.

The objective of the paper is to assess the roles of clients and consultants in improving H&S in the construction industry at the tendering and construction stages. To achieve this objective, a mixed method design conducted on cross-sectional basis was employed to establish a baseline for further study on the subject matter. Data was collected through a review of literature and the administration of questionnaires, the completed versions of which were analyzed using the Statistical Package for Social Sciences (SPSS) statistical software. The study, though aimed at capturing a wide range of respondents, few responses were attained. As a result, although the findings originate from a diverse range of respondents, the findings cannot be generalized. However, the findings of the study did establish the extent of clients and consultants contributions to improving H&S in construction, which serves as a baseline for further improvement of construction H&S by all stakeholders. This paper presents previous work on the roles of clients and consultants and performance improvements in construction H&S; a description of how the research was done, analysis and discussion, and, conclusion and recommendations.

2. H&S AND THE CONSTRUCTION INDUSTRY

The construction industry has a poor record of safeguarding the H&S of people working in it, and even third parties. Several studies have assessed the state of H&S in the construction industry. Musonda and Haupt (2008) observe that H&S is not raised as an item that is very important and thus a deliverable on project; failure to realize the risk of deep excavations in collapsible soils; lack of documenting and communicating of risks; and lack of H&S audits and prioritizing of H&S during site

meetings. A pilot study conducted by Musonda and Haupt (2009) revealed that there was limited commitment to H&S, an inequitable allocation of resources to ensure H&S improvement, lack of leadership and a lack of shared value of H&S in client organizations. The cidb (2009) points out that at organizational and site level, poor construction H&S performance is attributable to a lack of management commitment, inadequate supervision, inadequate or a lack of H&S training, lack of worker involvement, personal risk appreciation and work pressures. Okorie and Smallwood (2011) conclude that the construction industry has one of the highest accident rates when compared with other industries; although, there are many causes of construction accidents, about 80% of the causes of site accidents are due to unhealthy and unsafe behaviors which can be traced back to lack of management commitment and improper acts of employees and violation of site H&S rules; construction accidents have a negative impact on the families of the deceased workers and construction firms' profitability through the direct and indirect costs of accidents; and construction accidents not only impact negatively on the families of deceased workers and construction firms, but also society at large, such as the national healthcare system. Alkilani *et al*. (2013) investigated issues in construction H&S and establish that lack of government commitment exemplified by regulation and policy and legal constraints that limit the operational efficiency of government departments responsible for H&S management were hindering the development of good H&S practice. Muiruri and Mulinge (2014) reveal challenges in the management of H&S which are inadequate personal and protective equipment, poor maintenance of personal protective gear, lack of top management support in the management of health and safety in construction sites, inadequate enforcement mechanisms, inadequate welfare facilities, absence of safety and health committees, unawareness of health and safety matters among the workers and lack of equipped first aid kits on the construction sites. Alme´n and Larsson (2014) reiterate on the importance of the following factors in terms of construction H&S: clients include requirements with respect to H&S routines and actual injury preventive measures in contracts with all those who take part in the planning and construction phase, especially the project leader and lead designer; the coordinator be appointed in the early stages of the planning and construction phase; designers should have enough construction H&S competencies to foresee the construction H&S consequences of their designs, and H&S communication should be in both oral and written forms.

The Tanzanian construction industry contributes significantly to the national economic growth through Gross Domestic Product (GDP), Gross Fixed Capital Formation, creation of employment, and industrial productivity. According to National Bureau of Standards (NBS) (2013) in volume terms, the construction industry accounted for an average of 6.8% of GDP in the 2003-2010 periods. Likewise, NBS (2013) and President's Office Planning Commission (2011) indicate that the performance of the industry in meeting the stakeholders and national expectations has been improving. However, this performance is not realized in construction H&S. Few studies conducted on this area reveal poor performance of the industry in terms of construction H&S. Kikwasi (2009) reveal that the level of implementation of H&S requirements is inadequate and conclude that the industry is performing poorly on H&S aspects. Some of the challenges highlighted (*ibid*)

include: H&S was not taken seriously by parties involved in construction projects, clients and consultants are more concerned with quality of finished work rather than H&S matters; most sites do not have safety personnel and safety equipment; construction workers are not sensitized or trained on the need to observe H&S requirements; H&S matters are not budgeted for; H&S matters are not considered at the tendering stage as result of clients expecting contractors to bear H&S associated cost during project execution, and clients and contractors assume that by not making allowance for H&S the project construction cost is reduced. Phoya (2012) reveal that site location, site configuration, procurement system and complexity of design are the main challenges hampering health and safety risk management. Matiko (2013) determines challenges arising from regulatory framework in Tanzania to include: There is no reliable mechanism for reporting and recording occupational accidents and diseases; most of these Acts apply only to large-scale projects undertaken for the purpose of commercial and industrial use; almost all Acts place all responsibilities for the promotion of OH&S on the main contractor; Some of the legislation requires the appointment of safety and health supervisors, but no qualifications have been set for this cadre; some legislation requires the compilation of a health and safety arrangement plan for a building exceeding the height of three storeys, but does not require that the plan is submitted to the authorities for approval; and inadequate enforcement of the existing legislation. Phoya *et al.* (2011) concludes that majority of the workers do not have formal training on health and safety issues.

2.1 Roles of clients and consultants in construction H&S

The dependence on contractors to improve construction H&S has an adverse impact on the performance of the industry in terms of H&S. In Tanzania, only contractors are responsible for H&S aspects of construction projects. The Contractors Act No. 17 of 1997 and its amendments of Act No. 15 of 2008 and The Occupation Health and Safety Act, 2003 both provide for the inspection of construction sites to ensure contractors' compliance to H&S provisions in their respective Acts. Moreover, the Engineers Registration Board Act No. 15 of 1997, and, The Architects and Quantity Surveyors Registration Board Act No.4 of 2010 do not adequately state the duties and responsibilities of engineers, architects or quantity surveyors in H&S aspects of the project. As a result, clients and consultants take part in construction H&S out of interest or experience. Some countries have regulations in place that prescribe clients and consultants' construction H&S responsibilities. The South African Construction Regulations of 2014 state, inter alia, the duties of the client, designer, and, principal contractor and contractors on a construction project. Similarly, the UK Construction (Design and Management) Regulations 2015 spell out the duties of the client in relation to arrangements for managing projects, information, and additional duties. In addition, the regulations stipulate duties of designers, contractors, and their additional duties and general duties of CDM co-coordinators.

Clients and consultants have roles in construction projects, which if well-articulated may contribute to improved H&S performance. Clients have a leading role as initiators of projects, and the H&S of projects may be enhanced through their involvement. Kikwasi (2009) states that clients' traditional roles in implementing H&S requirements have always been through the provision of personal protective equipment, welfare facilities, and insurance premiums. These roles have been

fulfilled by clients given that they are included in contract documents. Some studies have revealed alternative H&S roles to be assumed by clients. Said *et al.* (2009) point out that clients can achieve better project H&S performance by setting H&S objectives, selecting H&S conscious contractors, and participating in the H&S management process during construction. Ulang (2012) concludes that clients play a very important role in creating an H&S culture on any project and initiating H&S communication from the primary design development stage. The cidb (2009) emphasizes that in addition to compliance with the Construction Regulations, clients can enhance H&S performance of contractors through selecting contractors based on construction H&S practices and procedures, requiring bills of quantities to include itemized provisions for H&S, and specifying requirements for project-specific H&S management plans. Kikwasi (2009) reveals that clients' roles at the tendering and construction stages include ensuring that allowance for H&S is included in the tender documents; tender documents include a clear delineation of H&S responsibilities of the parties to the contract; the design team prepare a check list of possible hazards and ensure that it is given to the tenderers; the contract is let on the merit of H&S practices and awareness; awards are based on the responsiveness to H&S matters clause in the instruction to tenderers; a sound H&S Plan be one of the requirements for the award of contracts; they adhere to recommendations for contract award by consultants; contractors comply with the H&S plan and all requirements during construction; H&S is one of the primary agenda items of every site meeting; access to site is only granted to workers wearing the requisite personal protective equipment (PPE), and contractors prepare and update checklists of possible H&S hazards.

Architects and engineers as designers of buildings and structures have a duty to ensure their designs are healthy and safe. The concept of prevention through design (PtD) and designing for construction H&S for addressing construction worker H&S in the design of a project as advocated by Gambatese *et al*. (2008), and Bhattacharjee *et al.* (2011), and follow up thereon clearly inform of designers' responsibility for H&S in projects. Bhattacharjee *et al.* (2011) argue that considering the prolonged involvement from inception stage, architects and engineers can play an important role in identifying and mitigating potential hazards to construction workers. Ulang (2012) determines that designers contribute substantially to effective H&S communication by producing a healthy and safe design. He maintains that H&S information can be communicated during design development via meetings with project team members as well as by including notes, symbols, and highlighting to indicate hazards and risks on the drawings. The cidb (2009) argues that designers can influence H&S more through evaluating of tenders, deliberating project duration, and prequalifying or selecting contractors on H&S merits.

Quantity surveyors in their capacity as project cost experts and contract administrators have a role to play to ensure the project is delivered in a healthy and safe manner. A study conducted by Niemandt and Crafford (2011) reveal three specific H&S responsibilities for quantity surveyors which are: considering H&S through every phase of a project; suggesting to clients that contractors be pre-qualified in terms of H&S, and being able to evaluate the cost implications of H&S risks in design. They further concluded that the majority of the suggested responsibilities were ranked as important by quantity surveying professionals. The

cidb (2009) maintains that quantity surveyors can have a direct influence on construction H&S by compiling specifications that enable principal contractors to make adequate allowance for H&S and promoting bills of quantities that facilitate adequate allowance for H&S. As a matter of practice, quantity surveyors have been including H&S items in the preliminary section of the bill of quantities. However, if such an item is either not included or included, but not priced, neither the quantity surveyor nor the contractor will be responsible for the omission.

The participation of clients has yielded positive results in terms of construction H&S performance. Vadsman (2006) (cited in Kikwasi, 2009) reports that client use of "Model construction Site" where clients were involved in construction H&S of large infrastructure projects' reveals a significant decrease of working incidents and injuries in the Danish construction industry. Similarly, Said *et al.* (2009) disclose that the involvement of clients in H&S has increased in recent years and note some developments that include assignment of a client H&S representative to each project; clients participation in H&S incentive programs, weekly audits, detailed and constructive reviews of contractor H&S programmes; and inclusion of contractors on bid lists based on H&S performance.

2.2 Improvement of H&S performance in construction

Stakeholders in the construction industry need to continually improve its performance in terms of H&S. Researchers worldwide have devised various ways of improving the H&S performance of the industry. Rajendran and Gambatese (2009) developed and validated a Sustainable Construction Safety and Health (SCSH) rating system which provide an opportunity to rate projects based on the importance given to construction worker H&S, and the degree of implementation of H&S elements. They further explain that in order to optimize SCSH performance, a total of 50 elements should be implemented through the combined efforts of the project team. They listed three top elements which are: clear project H&S authority, responsibility, and accountability; employee empowerment to stop work, and contractor selection based on H&S. Bhattacharjee *et al.* (2011) evaluated nine H&S improvement approaches and determined that they all transfer the burden of responsibility to the contractors. Teo *et al.* (2008), Hinze (2005), and Lingard *et al.* (2013) measure H&S performance by using lagging indicators and leading indicators. Leading indicators assess the H&S climate in the form of management commitment, supervisory environment, workers' involvement and personal risk appreciation, work pressure, and training and level of competence. Lagging indicators are related to the end results of past projects and then primarily accident rates. Lingard *et al.* (2013) provide an update in terms of the development of a multi-level measurement method, which combines leading H&S performance indicators and H&S climate measures, which in combination with lagging indicators provide a more comprehensive analysis of H&S in the construction industry.

Choudhry *et al.* (2009) assessed H&S climate and determined that management commitment and employee involvement, and inappropriate H&S procedure and work practices were significant predictors of workers' perception of H&S performance. Okorie and Smallwood (2011) assessed the impact of rural migrant workers on construction H&S, and determined that management commitment

to H&S, competent H&S officers and provision of good drinking water contribute to an improvement in H&S. Similarly, a study conducted by Smallwood (2004) reveals that project specific plans for H&S, integration of design and construction in terms of H&S, and pre-qualification of contractors on H&S and also on quality can contribute to an improvement in construction H&S on Shell projects. Musonda and Haupt (2011) conclude that H&S performance improvement is unlikely without the improvement or change in the H&S culture. They further identify factors of culture to include leadership, involvement, procedures, commitment, communication, and competence. In addition, Agumba and Haupt (2008) determined that management commitment and involvement, training and resources, vision and policy, worker empowerment, project planning and supervision, and appointments to be the key enablers of H&S performance and an H&S culture improvement model.

2.3 Improvement of construction H&S performance and the roles of clients and consultants

Improvement of the performance of the construction industry in terms of H&S can be achieved through joint effort of the project team members namely client, consultant and the construction team (main contractor and subcontractors). Accordingly, contractors are always on site and can be instructed by either clients or consultants to comply with H&S requirements. However, consultants and client can issue instruction regarding construction H&S without relying on each other as long as they are acting within their mandate. A number of researches (Said *et al.*, 2009; cidb, 2009; Kikwasi, 2009; Bhattacharjee *et al.*, 2011; Ulang, 2012; Niemandt and Crafford, 2011) have determined roles of clients and consultants for performance improvement of construction H&S respectively. Similarly, authors such as Vadsman (2006) (cited in Kikwasi, 2009) and Said *et al.* (2009) have explained how participation of clients have yield positive results. However, these roles are to be fulfilled in isolation depending on the provision of country laws, mandate or interest. This study determines the roles that can be performed jointly by clients and consultants in the course of improving construction H&S. On the other hand, countries like South Africa and United Kingdom have regulations which prescribe duties and responsibility of clients and consultants in construction H&S, it high to determine how Tanzania is faring in the absence of such laws, regulations or bylaws.

3. RESEARCH METHODOLOGY

The study used a mixed method design which was conducted on cross–sectional basis for delegated at the time of the forum and follow up thereafter. The study population included architects, engineers, quantity surveyors, and others who were attending a Construction Industry Forum to celebrate 50 years of independence held from 5 to 7 September 2011 at Mlimani City Conference Centre in Dar es Salaam, Tanzania. The forum was organized by three regulating boards namely the Architects and Quantity Surveyors Registration Board (AQRB), Contractors Registration Board (CRB), and Engineers Registration Board (ERB).

A total of 2500 participants from all regions of the country attended the forum comprising of 826, 1050, 350 and 274 contractors, engineers, architects and quantity surveyors and others respectively. A sample size of 400 potential respondents was

estimated considering 200 from AQRB and 200 from ERB. Four hundred questionnaires were prepared and distributed to randomly selected respondents in two conference halls.

Data was collected using self-administered questionnaires and a review of literature. Out of 400 distributed questionnaires, approximately 200 were collected by the delegates which equates to approximately 100 per Board. At the end of the third day of the forum only 16 questionnaires were returned comprising of 10 from the AQRB, 6 from the ERB. As a result of the low response, the contact details of forum participants were sought from respective boards and approximately 100 respondents were contacted. 100 questionnaires were administered to identify contacts of which 32 were e-mailed and 58 were hand delivered. Out of 100 questionnaires, 13 and 25 responses were received in response to the e-mailed and hand delivered questionnaires respectively. The total number of questionnaires returned was 54, which equates to 13.5%. The questionnaires contained a list of roles to be assumed by clients and consultants in order to improve construction H&S performance extracted from various literatures. Respondents were required to indicate how they have been fulfilling these roles using a 5-Likert scale i.e. 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = always.

The collected data was analyzed using the Statistical Package for Social Sciences (SPSS) statistical programme. Descriptive statistics and an independent-sample test were used to compute the respondents' profiles, ranking of roles, the level of experience and involvement in H&S improvement, and testing the significance of the results.

4. ANALYSIS AND DISCUSSION

The analysis and discussion of the main findings in this section include the respondents' profiles, ranking of roles played by clients and consultants, and assessment of involvement of clients and consultants in H&S based on the level of their experience.

4.1 Respondents' profiles

The study sought to establish the level of participation of the intended groups namely architects, clients, engineers, and quantity surveyors. The results indicate that the level of participation of was fairly distributed in terms of architects (35%), followed by engineers (24%), quantity surveyors (22%), and clients (19%). Furthermore, the experience of respondents were sought and categorized as less experienced and experienced indicating those with less and more than five years in the industry respectively. The results show that the majority (86%) of the respondents were experienced, which implies that they have been working in their respective capacities for more than 5 years.

4.2 *Roles played by of clients and consultants in construction H&S*

Table 1 presents the roles played by clients and consultants in improving H&S performance in construction in terms of a mean score (MS) between 1.00 and 5.00.

Table 1: Roles Played by Consultants and Clients

Roles	N	Mean score	Std. Dev	Rank
Ensure the contractor is complying with the H&S plan during construction	54	3.61	1.188	1
Ensure H&S is one of the main agenda items each project site meeting	53	3.45	1.170	2
Ensure a person responsible for H&S is appointed for a project	54	3.44	1.327	3
Include provisions in the tender /contract document to cover PPEs, welfare facilities, and insurance premium	54	3.31	1.286	4
Communicate anticipated H&S risks to the contractor	54	3.15	1.089	5
Include provisions in the tender /contract document for hazard identification and risk assessment	44	3.09	1.137	6
Ensure that contractors are prequalified on H&S merits	43	2.88	1.238	7
Evaluate tenders, recommend award, and award contracts on the basis of contractors' past and likely H&S performance	54	2.87	1.374	8
Conduct H&S audits	53	2.74	1.303	9

With the exception of the role of 'ensure the contractor is complying with the H&S plan during construction', which is ranked first, and interpreted as occurring between sometimes to often / often, the remaining MSs are $> 2.60 \leq 3.40$, which indicates the occurrence is between rarely to sometimes / sometimes. This is also confirmed by Phoya (2012) that the active participation of clients and design teams in the built environment in health and safety matters in Tanzania is yet to be realized. This finding is in line with the findings of research conducted by Musonda and Haupt (2008) that designers neither had capacity nor will to address H&S in the project. However, this is aggravated by lack of laws or regulations that prescribe H&S responsibilities for clients and consultants. This is echoed by Bhattacharjee *et al.* (2011) that role of architects and engineers to impact safety in construction project has not been fully used due to lack of motivating forces (legal, contractual, economic or regulatory). Among the roles rarely performed jointly by clients and consultants at tendering stage is ensure that contractors are prequalified on H&S merits; and evaluate tenders, recommend award, and award contracts on the basis of contractors' past and likely H&S performance which reveal deficiencies in procurement process that does consider H&S matters. As part of procurement process, these roles have been advocated by Smallwood (2004), Rajendran and Gambatese (2009), cidb (2009), Kikwasi (2009) and Said *et al.* (2009). Other roles listed by respondents are valuation of H&S provisions before honoring payment certificates, making sure there is an accidents register on site; ensuring that all workers receive H&S training before they are admitted to site, and conducting of adhoc site H&S inspections.

4.3 Involvement of clients and consultants in construction H&S based on the level of their experience

Table 2 indicates the involvement of clients and consultants in construction H&S for experienced and less experienced in terms of MSs between 1.00 and 5.00.

Table 2: Respondents' Level of Experience and Construction H&S

Role	Level of Experience	N	Mean score	Std. Dev	Levine's Test for Equality of Variances	
					F-Value	Sig.
Include provisions in the tender /contract document to cover PPE, welfare facilities and insurance premium	≤ 5 years	7	3.00	1.155		
	> 5 years	42	3.48	1.311	.946	.336
Include provisions in the tender /contract document for hazard identification and risk assessment	≤ 5 years	7	3.00	.577		
	> 5 years	34	3.21	1.200	5.391	.026
Communicate anticipated H&S risks to the contractor	≤ 5 years	7	2.57	.787		
	> 5 years	42	3.31	1.047	.526	.472
Advise the client that contractors be prequalified on H&S merits	≤ 5 years	7	2.71	1.113		
	> 5 years	33	2.94	1.273	.526	.472
Evaluate tenders, recommend award and award of contracts on the basis of contractor's past and likely H&S performance	≤ 5 years	7	2.57	1.813		
	> 5 years	42	3.00	1.325	2.035	.160
Report back to the client on the H&S merits of the contractor's tender from a cost planning perspective	≤ 5 years	7	2.00	1.528		
	> 5 years	33	2.64	1.342	.004	.951
Ensure H&S is one of the main agenda item each project site meeting	≤ 5 years	7	3.43	.976		
	> 5 years	41	3.56	1.141	.004	.951
Ensure a person responsible for H&S is appointed for a project	≤ 5 years	7	3.14	1.215		
	> 5 years	42	3.62	1.306	.092	.763
Ensure the contractor is complying with the H&S plan during construction	≤ 5 years	7	3.57	.976		
	> 5 years	42	3.79	1.116	.429	.516
Conduct H&S Audit	≤ 5 years	7	2.14	1.069		
	> 5 years	41	2.90	1.319	.733	.396

The results reveal that the more experienced respondents fulfill the respective roles more frequently than the less experienced respondents as in the case of 'Ensure the contractor is complying with the H&S plan during construction' (MS = 3.79 vs. 3.57) and 'Ensure a person responsible for H&S is appointed for a project' (MS = 3.62 vs. 3.14). Furthermore, analysis using the Independent Samples Test reveals that the level of experience has a significant impact in terms of include provisions in the tender /contract document for hazard identification and risk assessment role (sig < 0.05). This implies that in the absence of laws, regulations or bylaws in Tanzania that states obligations of clients and consultants in construction H&S, they get involved in construction H&S out of experience. This is in consistence with the findings of Phoya *et al.* (2011) that there was strong correlation between one's experience and risk perception and their conclusion that increase in experience attracts more consciousness on health and risk. Similarly, Ali (2006) (cited in Phoya, 2012) found that a perception of higher risk was associated with labouring experience. The finding also supports the work of Hare *et al*. (2013) who examined pictorial aids that can communicate simple hazards and controls and found that workers with less than 5 years' experience scored lower than more experienced workers. Likewise, Nielsen (2015) reveals that inexperienced young workers and some migrant workers tend to be non-compliant because of not being aware of H&S practices. However, other works such as that of Che Hassan (2007) and Irizary (2006) (cited in Phoya 2012) reveal that as workers get experienced they tend to be confident and ignore matters of H&S. Generally experience has both positive and negative effects to construction H&S. The two cliques of findings imply that with little experience workers tend either to disregard or pay more attention to issues of H&S. Likewise with experience workers tend to be overconfident which increase H&S risks in projects or vice versa.

5. CONCLUSIONS AND RECOMMENDATIONS

Despite the need to improve construction H&S performance, it can be concluded that clients and consultants are not fully contributing to improving construction H&S. This is partly aggravated by current laws and regulations in Tanzania that do not adequately address H&S duties and responsibilities of clients and consultants in construction. However, with increased experience in the construction works, consultants and their clients are getting involved.

The improvement of construction H&S performance should be a concern of every party involved in the procurement process from the inception stage to commissioning and subsequent operation. The paper therefore recommends the following:

- A review of the Occupation Safety and Health Act of 2003 to include H&S duties and responsibilities of clients and designers;
- A review of the Engineers Registration Board Act No.15 of 1997 and its Regulations and Bylaws to include H&S duties and responsibilities of engineers;
- A review of the Architects and Quantity Surveyors Registration Board Act No.4 of 2010 and its Regulations and Bylaws to include H&S duties and responsibilities of architects and quantity surveyors, and

- Clients and consultants need to be made aware of their roles and empowered to fulfill them.

5.1 Limitation of the study

This study was mainly affected by low response from the delegates which may be attributed to many factors such as the nature of activities of the event and that questionnaires were not piloted. As a result these findings cannot be entirely generalized. However, the study forms a baseline for further research on the subject matter.

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A MINI-FACTOR HEALTH AND SAFETY COMPLIANCE: A MULTIVARIATE FACTORIAL ANALYSIS

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ABSTRACT

The construction industry employees all over the world experience serious injuries and deaths due to accidents in complex high-risk systems. These incidents have been attributed to conditions in which an employee is working or his actions that can result in human error or an unsafe action. Adherence to safety regulations features among Small and Medium-Sized Enterprises (SMEs) contractors' in Ghana were confirmed through the use of a confirmatory factor analysis. Findings from the Structural Equation Modleing (SEM) analysis confirmed that the Rio coefficient and the Cronbach's alpha coefficient on the internal consistency were over 0.70 criteria for acceptability. The influence of adherence to safety regulations features on the Health and Safety (H&S) compliance was found to be statistically significant. Hence, strong in predicting H&S compliance among SMEs contractors'. The paper makes a significance contribution towards SMEs contractors' adherence to safety regulations. The paper provides a significant insight into how H&S compliance among SMEs contractors' adherence to safety regulations could be improved.

Keywords: Adherence; safety regulations; compliance; confirmatory factor analysis; EQS 6.2 version; SEM software

1. INTRODUCTION

The Small and Medium-Sized Enterprises (SMEs) contractors' form bulk of the contractors in Ghana and provide operational flexibility to the larger firms as sub-contractors (Ofori and Toor, 2012; International Labour Organisation (ILO, 2005). There is high rate of accidents within the working environment of SMEs contractors' and these adversely have an effect on the well-being of their workers. The behaviour and compliance levels among workers of SMEs contractors might be due SMEs contractors non-comply with Health and Safety (H&S) regulations (Department of Occupational Safety and Health, DOSH, 2008). SMEs contractors are also plagued with lack of financial resources, expertise and shortage of staff. They also lack technical capacity, limited awareness of the existence of occupational safety and health standards, or how to comply with them without undermining business performance (ILO, 2005). These development have led to a significant effect on their safety regulations compliance (DOSH) (2008). They also lack equipment and capacity to train their staff due to limited resources (Ofori and Toor, 2012; ILO, 2005). Thus, it has become necessary to integrate of H&S policy into the management systems at all levels of construction industries and its effective implementation, regular education and training by both the government and the parties involved.

Adherence to safety regulations in relating to SMEs contractors H&S compliance were found to be lagging. This indicates that there is a fundamental link between theory and measurement leading to the confirmation of measures at the first stage of theory testing. It is presumed that the identified adherence to safety regulations constructs found in literature will be effective in measuring adherence to safety regulations for H&S compliance in the Ghanaian cultural context. The purpose of this paper was to carry out a confirmatory factor analysis of adherence to safety regulations features for use in H&S compliance study among Ghanaian SMEs contractors. The paper begins with an overview of a literature review on the topic in question. The adopted methodology for the study is presented, followed by the findings based on measurement model and testing of the direct influence of adherence to safety features on overall H&S compliance. Finally, conclusions are drawn and recommendations made. The paper makes a significant contribution towards adherence to safety regulations features.

2 SMEs CONTRCATORS' AND OCCUPATIOANL HEALTH AND SAFETY

Small and Medium-Sized Enterprises (SMEs) are recognized as the engines of local economy and the major source of present and future employment in all countries. In response to the demands for flexibility arising from globalization, many large companies concentrate on a few specialized core areas. Hence, the high numbers of SMEs contractors, micro-enterprises and self-employed workers (ILO, 2005) are due to outsourcing and subcontracting. Most SMEs contractors in the developing countries are not adequately covered by safety and health legislation and a large number of them operate in the informal economy beyond any coverage by the formal Occupational Safety and Health (OSH) or inspection services. SMEs contractors are also reluctant to seek advice that is relevant with H&S inspection (ILO, 2005). Hence, occupational hazards and risks are recognized to be more widespread in SMEs contractors than in large enterprises.

A report from the South African Construction Industry Development Board (CIDB, 2009a) shows that the activities in the construction industry are at high risk due to its poor H&S performance record. This is coupled with various legislative and institutional frameworks, of which the primary objective is the prevention of accidents and their consequences in terms of injury, disablement, fatality and ill health within the work environment. Weil (2007) posited that the number and severity of H&S standard violations provide one measure of the degree to which a contractors operations comply with Occupational Safety and Health Act (OSHA) standards. Research has also shown that legislation or targeted regulations can influence H&S performance of either a project, industry or a stakeholder (CIDB, 2008). Moreover, construction H&S has become one of the top ten risks (Furter, 2011).).

The Institution of Occupational of Safety and Health (IOSH, 2004) contends that it is insufficient, for example, to provide safe equipment, systems and procedures if the culture is not conducive to a healthy and safe working environment. Since, culture creates a homogeneous set of assumptions and decision premises in which compliance occurs without surveillance (Grote, 2007). Dingsdag, Biggs, Sheahan and Cipolla (2006) furtheer argued that a positive culture leads to both improved H&S as well as organisational performance. Behaviour is a product of culture just as much as accidents are a product of the prevailing culture (Wiegmann, Zhang, von Thaden, Sharma and Mitchell, 2002). Dingsdag et al. (2006) opined that "Sustained improvement in H&S would not happen without cultural change" OSH culture can be described in terms of the informal, cultural aspects of an organisation. The latter can have an impact on how OSH is perceived and dealt with, and on whether

people are aware of OSH-related issues and act in a safe and healthy way (European Occupational Safety and Health Act. EU-OSHA, 2011). 'OSH culture' - can be seen in terms of the relationship between organisational culture and OSH. OSH culture is about how an organisation's informal aspects influence OSH in a positive or negative way. This is done at two levels (Antonsen in EU-OSHA, 2011) by:

i. Setting the values and norms, and underlying beliefs and convictions, through which workers deal with or disregard risks;
ii. Influencing the conventions for (safe or unsafe, healthy or unhealthy) behaviour, interaction, and communication.

OSH culture can be assessed as part of a process of organisational improvement. It is also perceived and dealt with among workers in an organisation and whether workers are aware of OSH-related issues and act in a safe and healthy way. The knowledge and information, gained from such a cultural approach, can, in turn, be very useful in the process of changing OSH-related policies, processes, and practices step by step, adapting them to the existing local context and culture, and eventually leading to better OSH performance (EU-OSHA, 2011).

In order to achieve continuous improvement of workers' safety and health, a systematic, integrated, proactive, participative, and multiple-strategy approach towards OSH management is needed. Sound OSH management, incorporated into an organisation's overall management and business, and addressing regulatory, technical or engineering, organisational, and managerial aspects, is critical to ensure OSH excellence. Employers, business managers and OSH professionals striving for excellence in the field of occupational safety and health, the key issue is to ensure that occupational accidents and work related ill health are prevented as much as possible, and that safe and healthy behaviour among all employees is promoted (EU-OSHA , 2011). Policy formulation, implementation and monitoring are the responsibility of government and it are vital indicators that determine compliance of H&S among SMEs contractors. However, an organisation's H&S policy statement details out how it will ensure a healthy and safe work environment. Individual policies need to be developed for specific hazards and issues. Policies should be supported by procedures that provide the step-by-step instructions on how policies will be achieved. Section 2 of Health and Safety at Work (HSW) Act 1974 has indicated that if an organization employs more than five people, it must have a written H&S policy (Construction Development Management, CDM, 2007).

The first step towards the management systems approach to OSH and is reflected in the Occupational Safety and Health Convention of 1981 (No. 155). Although, the Act deals with OHS and working environment in a comprehensive manner, but it is largely a policy rather than a prescriptive instrument. The Occupational Safety and Health Convention of 1981 (No. 155) also provide priority to the formulation, implementation and periodic review of a national policy to prevent accidents and injury to health arising from or that is linked with occurrence of accident in the course of work. It also seeks to minimize, as far as possible the causes of hazards inherent in the working environment (ILO, 2005). Moreover, the scope and coverage of OSH provisions has evolved from a focus on industrial safety to one on workplace safety and health, from protection to prevention and assessment of risks. Modern standards reflect not only on collective responsibilities to workplace safety and health, but also the respective roles, rights, responsibilities and areas for cooperation of and between employers, workers and their representatives (ILO, 2005).

It is mandatory for the formulation H&S policy by the government to guide the activities of contractors' in the construction industry. The formulation of the government policy and its implementation will enable contractors' to provide safe and healthy work environment for all their employees, store their equipment, formwork and false work at a safe place. Finally, to monitor all operations of employees and insist on putting off all equipment during service. It is now the responsibility of the H&S personnel to provide general H&S advice, and also advice relating to construction H&S issues (Lingard & Rowlinson, 2005; Carpenter, 2006a) for employees. Occupational Health and Safety (OHS) is core to the successful long-term sustainability of any business and fortunately in South Africa, Health and Safety (H&S) is a legislatively compliant criterion, enforced by the OHS Act 85 of 1993 and the Department of Labour (Action Training Academy, 2014).

Health policy is best formulated through rigorous and objective assessment of data. Modern health policy poses complex legal, ethical and social questions. Hence, the goal of health policy is to protect and promote the health of individuals and the community. Government officials can accomplish this objective in ways that respect human right (Gostin, n.d.). However, official government policy making that is legally binding or least has persuasive force in law should comprise of evaluation of the relevant strengths and weaknesses of each government with respect to health policy formulation. It should also examine sources of information and influence that will help to drive policy making.

Table 1: Adherence to safety regulations conceptual variables

Latent constructs	Indicator variables
Adherence to Safety Regulations (ASR)	Adhere to warning signs and notices
	Follow safety regulations
	Adhere to company safety policies

3 METHODOLOGY

A quantitative method of data collection was used in the study. A face-to-face method of questionnaire administration was adopted among SMEs contractors in Ghana. Data collected were analysed using SEM software with EQS version 6.2. The SEM software was used to assess the factor structure of the constructs. The conceptual variables were then tested as a prior using SEM of the questionnaire survey results.

Model testing

A total of 558 samples deemed fit for the SEM analysis were finally taken through random sampling before carrying out the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). A total of 269 samples were realised for the EFA and 289 samples for CFA. CFA using EQS version 6.2 was used to test the adherence to safety regulations features (Hu and Bentler, 1999). The construct parameters used the maximum likelihood method. Consideration was given to Yuan, Lambert and Fouladi's coefficient, since psychometric data have a tendency not to be normally distributed. This means that if Yuan, Lambert and Fouladi's values showed significance deviation from normality, the Satorra-Bentlet scale statistics (robust) would be used as these have been found to perform adequate under such conditions (Bentler, 1990).

The construct validity for the variables was conducted to demonstrate the extent to which the constructs hypothetically relate to one another in order to establish the score reliability. This also referred to the test of measurement invariance (MI), factorial invariance or measurement equivalence between indicator variables. MI is an important requisite in

SEM because it attempts to verify that the factors are measuring the same underlying latent construct within the same condition. MI ensures that the attributes would relate to the same set of observations in the same way. The MI for the adherence to safety regulations features was determined based on the examination of the residual covariance matrix from CFA output results as opposed to the correlation matrix. Covariance matrix establishes the variables that adequately measure the adherence to safety constructs.

Therefore, EFA was conducted on the adherence to safety regulations indicator variables to identify which items appropriately measure the adherence to safety regulations features. Identified indicator variables with an unacceptable high residual covariance matrix greater than 2.58 were dropped after the CFA was performed. This implies that the identified indicator variables do not sufficiently measure the adherence to safety features regardless of their importance in other cultural contexts and previous studies. Bryne (2006) and Joreskog and Sorbom (1998) opined that residual covariance matrix greater than 2.58 are considered large. Therefore, in order for a variable to be described as well-fitting in measuring a construct such as adherence to safety regulations, the distribution of residual covariance matrix should be systematically and centred on zero (Bryne, 2006; Joreskog and Sorbom, 1998). This procedure was adopted as a means to ensure that the indicator variables were measuring the latent constructs. The assumption of measurement invariance is mostly tested in CFA (Meredith, 1993) in order to allow for comparison of indicator variables under the same condition. In the current paper, multi-sample CFA was used for the assessment of measurement invariance across latent variables. This procedure was adopted by several researchers (Aigbavboa and Thwala, 2013; Musonda, 2012; Reise, Widaman and Pugh, 1993).

4 FINDINGS

4.1 Measurement model for adherence to safety regulations

A total of 558 samples were analysed and the data showed three (3) indicator variables (ASR 1, ASR 2 and ASR 3) with acceptable residual covariance matrix, hence CFA was conducted. The assessment of the adherence to safety regulations model goodness-of-fit was based on the three (3) indicator variables in Table 1. The question of the number of constructs to be used is debatable (Bollen, 1998; Hayduk and Glaser, 2000). Some scholars (Bollen, 1998; Bryne, 2006; MacCallum, Browne & Sugawara, 1996) have suggested a minimum of four indicator variables. Analysis of Yuan, Lambert and Fouladi's values showed that data deviated significantly from normality (Yuan, Lambert and Fouladi = 262.0696), hence the decision to use the robust maximum likelihood method. The examination of the Bentler-Weeks structure representation for the approved construct revealed that ASR construct has three (3) dependent variables, four (4) independent variables and six (6) free parameters. The number of fixed non-zero parameters was four (4).

Table 2 shows that the sample data on ASR measurement model yield an $S - B\chi^2$ of 3249.5 with 1861 degrees of freedom. The associated p-value was determined to be 0.0000. The chi-square value advocated that the difference between the sample data and the postulated adherence to safety regulations features measurement model was significant. From these values, the chi-square value was determined to be 1.75. The normed chi-square is the procedure of dividing the chi-square by the degree of freedom. The normed values up to 3.0 or 5.0 are recommended (Kline, 2005). The ratio of $S - B\chi^2$ to the degree of freedom was lower than the lower limit value of 3.0 suggesting a good fit of the data to the construct.

Table 2: Robust fit indexes for adherence to safety regulations features construct

Fit Index	Cut-off value	Estimate	Comment
$S - B\chi^2$		3249.5	

df	0≥	1861	Good fit
CFI	0.90≥ acceptable 0.95≥ good fit	0.794	Acceptable
RMSEA	Less than 0.05 with confidence interval (CI) 0.00-0.05 "good fit"	0.051	Good fit
95%			
NFI	Greater than 0.90 "good fit"	0.629	Acceptable
NNFI	Greater than 0.80. "good fit"	0.777	Acceptable
RMSEA 95% CI		0.048: 0.054	Acceptable range

Table 2 shows the goodness-of-fit indexes. The comparative fit index (CFI) of 0.794 was found to be slightly lower than the cut-off value for good fit model. A model is said to be good fit if the CFI is above the cut-off value of 0.95 (Hu and Betler, 1999; Joreskog and Sorbom, 1998). This indicates a drop (difference of 0.156) in the CFI value, hence the model can be described to have an acceptable fit, though not well fitting. However, the robust mean square error of approximation (RMSEA) with 95 per cent confidence interval was found to be 0.051 (lower bound value = 0.054 and the upper bound value =0.048) which is within the acceptable range for a good fit model (MacCallum et al., 1996). Moreover, both the normed fit index (NFI) and non-normed fit index (NNFI) were found to be within the acceptable range of 0.629 and 0.777 respectively. Evaluation of RMSEA (95% CI), CFIs, NFIs and NNFIs indicated an acceptable fit of the measurement model, but poor for an adherence to safety regulations features factor.

4.2 Testing the direct influence of adherence to safety regulations (ASR) features on overall health and safety compliance

Determination of the internal consistency for the ASR measurement model was made possible through the examination of the Rio coefficient and the Cronbach's alpha coefficient to establish reliability. Kline (2005) posited that the desired multivariate reliability coefficient should fall between zero and 1.00. The Rio coefficient of internal consistency was found to be 0.964 which was above the minimum value of 0.79. The Cronbach's alpha was found to be above the minimum value 0.70 at 0.937. High levels of internal consistency and internal reliability were as shown in Table 3.

The examination of the magnitude of the parameter coefficients led to the determination of the construct validity. Hence, high parameter coefficients greater than 0.50 indicate a close relation between the factor and the indicator variable. Hair, Anderson, Tatham and Black (1998) opined that a parameter coefficient of 0.50 is interpreted as 25 per cent of the total variance in the indicator variable being explained by the variable (factor). In this case, a parameter coefficient has to be between 0.50 and 0.70 or greater to explain about 50 per cent of the variance in an indicator variable. Hence, the inspection of the standardized parameter coefficient shown in Table 3 shows that they were significantly high (values from 0.747 to 0.604). The minimum estimate of 0.604 suggested that the measured factor accounts for 9.540 of the Z-statistics in predicting the overall health and safety (H&S) compliance. The Z-statistics for each indicator variables by the endogenous variables revealed that the scores were significant at 5 percent level.

Table 3: Reliability and construct validity of ASR Model

Indicator Variable	Stand. Coeff. (λ)	*Z*-Stat.	R^2	Factor Loading	Sig. at 5% level?
ASR 1	0.604	8.279	0.635	0.6565	Yes
ASR 2	0.618	8.482	0.618	0.6476	Yes
ASR 3	0.618	8.468	0.618	0.6476	Yes

Cronbach's alpha = 0.937; Rio coefficient = 0.964

(Robust statistical significance at 5% level)

*** SEM analysis norm (Kline, 2005) – One variable loading per latent factor is set equal to 1.0 in order to set the metric for that factor*

**Parameter estimates are based on standardized solutions*

Moreover, the assessment of the inter-factor correlation (R^2) values for the adherence to safety regulations feature indicator measures revealed that none of the indicator value was close to the desired value of 1.00, therefore not significant in predicting the adherence to safety regulations of H&S compliance. The inter-factor correlation test of statistics (Z-stats) which functions as a Z-statistics test shows that the estimate is significantly different from zero. However, the R^2 did not significantly measure the R^2 variable. The statistical assessment of the score results showed that the influence of this factor on the R^2 variable was weak (indirect). This is not withstanding, the fact that the combined results revealed that it has a good indirect association in the prediction of the overall H&S compliance.

5 DISCUSSION OF RESULTS

Findings from the study show that adherence to safety regulations indicator variables satisfied internal reliability and the construct validity criteria. The Rio value was above the minimum value of 0.70. The construct validity criteria were justified by the magnitude and statistical significance of all parameter coefficients. The CFA analysis of the adherence to safety regulations feature indicator revealed that three indicator variables passed the test and were used for the assessment of the adherence to safety regulations measurement model goodness-of-fit. Moreover, the indicator variables were closely associated with the dependent variable. The remaining indicator variables were weak in predicting the adherence to safety regulations feature variables. This was clear in the assessment of adherence to safety regulations overall H&S compliance. Further assessment of the Z-statistics accounted for each measure by the indicator variables revealed that the scores were not significant, since none of the Z-statistics values were close to 10.00. These results suggest that the direct influence of these variables on the H&S compliance was weak (indirect).

Since the government of Ghana is responsibility for the H&S policy formulation, implementation and monitoring among contractors. The given adherence to safety regulations by contractors' are additional information to H&S compliance among their employees. This measure will serve as an important indicator that will determine contractors' compliance. Conducting a confirmatory factor analysis to confirm the factorial validity of the adherence to safety regulations features is vital because of its application in H&S study among contractors in Ghana. The analysis of confirmatory factor analysis made it possible to characterize and identify specifically the factors of adherence to safety regulations which have statistically significant influence on the SMEs contractors' in Ghana. Hence, contractors will find it important to implement and monitor the safety policy formulated by the government in relation to their established adherence to safety regulations to ensure H&S compliance. The

preceding facts indicate that that the confirmation measures should be the first stage of theory testing.

5 CONCLUSION AND RECOMMENDATION

The postulated prior was analysed using SEM software with EQS version 6.2. The SEM process was undertaken as both EFA and CFA of the prior variables. The CFA analysis revealed that three indicator variables were successful in the factorial validity test conducted. The three indicator variables were used for the assessment of the adherence to safety regulations measurement model goodness-of-fit. Further findings indicated that the Z-statistics for the three indicator variables were within the acceptable range. The robust fit indexes had an acceptable fit, while RMSEA value and the RMSEA with 95 per cent confidence interval produced an acceptable range. Moreover, the parameter estimates were statistically significant and dealt with successfully. Hence, the measurement model for adherence to safety regulations features had an adequate fit to the sample data.

The CFA result shows that only few variables were classified as predictors of adherence to safety regulations in other cultural contexts from the literature review to determine adherence to safety regulations among SMEs contractors' in Ghana. Other studies that have used different research methods on the determinants of adherence to safety regulations among SMEs contractors' are in agreement with the above view. The paper supports the theory confirmation that measurement of indicator variables should be the first stage of theory testing. The authors were of the view that the SEM software with EQS version 6.2 should be used to further improve on the variables that may be considered in the development of future H&S compliance projects. It is therefore recommended that a checklist of items defining the factors of adherence to safety regulations features should be made available to guide all contractors'. Such basic requirement should have an influence on H&S compliance.

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PREDICTING THE FUTURE OF QUANTITY SURVEYING PROFESSION IN THE CONSTRUCTION INDUSTRY

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ABSTRACT

Quantity surveying profession has changed over time to adapt to the changing and increasing requirements of project owners. In the year 2007 to 2011, the construction industry experienced economic downturn causing uncertainty in the profession. This study examined the developmental trend of the quantity surveying profession in the construction industry to determine its future. The independent variable was the current level of satisfaction of quantity surveyors while the dependent variable was the future growth of the profession. The working hypothesis was that the profession would experience future growth. A survey questionnaire via Qualtrics online survey software was administered to quantity surveyors to determine their opinion of the profession. Data collected were analyzed using SAS v9.4 statistical analysis software. The results showed a greater level of satisfaction of quantity surveyors with the current developments in the profession. Further, the current level of satisfaction with the profession strongly correlated with the chances of growth of the profession, implying a greater likelihood of future growth in the roles of quantity surveyors in the next 10-15 years. Areas such as information technology and sustainable construction would favor the growth. Thus, the hypothesis was supported. Another finding was that females tended to be fewer in the profession. Thus, it was recommended that further research be conducted focusing on gender equality and propose ways to encourage women to join the quantity surveying profession. Overall, the study concluded that quantity surveyors should improve and diversify their roles more to provide greater value to project owners as the profession seemed promising.

Keywords: Construction Industry, Predicting, Profession, Quantity Surveying

1. INTRODUCTION

The profession of quantity surveying has faced uncountable challenges in its development considering when it first came into existence. It has grown and survived the storms to an extent that today it is a notable profession in the construction industry. In providing the best value to project owners, quantity surveyors (QS) determine cost estimates of projects and ensure that construction activities are executed in a manner that satisfy the project owner's needs. Their name emanates from their role of quantifying the amount of construction resources such as materials,

labor, and equipment. They have different names in different countries. For example, United States of America (USA) sometimes call them project engineers, cost engineers/planners or estimators while other countries may call them building economists. Such titles are characteristic of some of their professional roles in construction such as planning or cost estimating of building and engineering works. Their roles may differ or get advanced in some countries such as in the Africa, Asia, and United Kingdom (UK) where they may undertake core roles in construction such as arbitration and overall construction project management.

In completing projects, quantity surveyors usually work with other construction professionals such as architects, engineers and in conjunction with project owners, governments, insurance companies, and contractors. However, the QS roles have significantly changed over the times to adapt to the changing nature of the construction industry, especially considering when it first came up in the 1820s. Part of the reason for this change was to meet the ever-changing needs of the clients and to beat the competition from other construction professionals such as architects or engineers. Similar to other professions in the construction industry, the effects of the recent economic meltdown was also evident in the quantity surveying profession in terms of job orders and development.

Some predictive studies have tried to bring hope to the construction industry. Research by the U.S. Department of Labor concluded that they expected employment of construction managers to grow by 17% from the year 2010 to 2020. As pointed out from their large-scale research, the percentage implied that about 86, 600 new jobs were expected for construction managers during this duration (Berry, 2013). This notion was reinforced by the August 2013 Jobs News Update that marked construction manager job as the third most meaningful jobs in the world (Newman, 2013). Research conducted by On Center Software (2015) concluded that construction management is turning to profitable best practices and technology to stay lean. They identified automated take-off, estimating, and project management in a cloud based format as avenues to improve productivity in construction. The outcome aligned with the research by RS Means (2015) which concluded that construction boom required better planning and estimating and that a 9.3% compound annual growth rate was expected until 2019. In addition, it aligned with Schneider (2015) that concluded on an increased employment of skilled crews and a strong demand for technological skills in the construction industry. It also stated that the Bureau of Labor Statistics projected a 2.6% compound rate in growth of construction jobs through 2022, making it the fastest growing industry in the decade (Schneider, 2015). These developments have a positive bearing on the QS profession.

From the recent research conducted up to the year 2015, it is apparent that the quantity surveying profession has not been extensively investigated to determine its present and future standing in the construction industry. Such a gap elicited and motivated an investigation of its developments in the construction industry. Specifically, the aim of this research was to examine the developmental trend of the quantity surveying profession to determine its future. The objectives were to determine the current level of satisfaction of quantity surveyors and to predict the future growth of the profession in the construction industry. The *current level of satisfaction with the profession* was the independent variable while the *future growth*

of the profession was the dependent variable. Data was collected using survey questionnaire via Qualtrics survey tool while SAS v9.4 facilitated the data analysis.

The outcome of the study would be beneficial to quantity surveyors and project owners or clients as they would be able to know the current and future status of the profession in the construction industry. If the outcome is unfavorable, the quantity surveyors may find ways to keep up and/or diversify to other core areas requiring advanced skills in construction that would eventually benefit them and their clients.

2. LITERATURE REVIEW

2.1 History of Quantity Surveying Profession

The Royal Institution of Chartered Surveyors (RICS) documentation (2014) defined quantity surveying as a client led profession where the QS respond to the client needs and that they must continue with their own skill development depending on the ever changing project owners' requirements. The quantity surveyor adheres to the Continuing Professional Development (CPD) to keep up to date with the continuous changes that occur in the construction field. The dynamics in the construction industry has made the profession to change severally along the timeline.

The profession has been in existence since 1820s and has gained international recognition through construction professional organizations such as RICS and Quantity Surveyors International (QSI). RICS and QSI are construction professional organizations for those specializing in the financial as well managerial aspects of construction and engineering works. These organizations support and protect the character, status, and interests of quantity surveyors in addition to promoting high level of good practice of its members. QSI is an international construction professional body that is specific only to quantity surveyors while RICS covers all other construction professionals and an array of other skill areas such as real estate and construction business improvement. Overall, these construction professional organizations lay down the competency requirements for quantity surveyors for the assessment of their professional competencies. These competency requirements have so far assured the survival of the profession considering when it was first conceived (Said *et al*., 2010).

During the early years of quantity surveying, the roles involved quantifying construction works that entailed measurement and valuation of building works. Over time, these roles have become narrow scoped, starting with preparation of bills of quantities (BoQ) and ended up with settlements of final accounts at the end of construction ventures (Oke *et al*., 2010; Moss, 2012). These roles have made some construction professionals to believe that QS roles could be replaced by anything capable of conducting arithmetic solutions. They have asserted that quantity surveying is of no use. Anon showed this doubt in 1889 by stating that '*the QS is not a necessity in the order of things. Any convenient and cheap method of multiplying drawings and specifications and placing copies in the hands of each estimator would answer the same purpose and get rid of the QS for good*' (Menaha *et al.*, 2011).

Despite this stance by Anon and others in the construction industry, the quantity surveying profession has been developing strategically to meet the owners' requirements of greater value in projects. Research has shown that the profession has

undergone significant changes due to changing industrial and owner demands, advancements in information technology, and higher levels of competitions in the industry especially in the international construction arena that is characterized by large construction projects and diverse professionals (Smith, 2004).

2.2 Characteristics of the Quantity Surveying Profession

The developments in the quantity surveying profession have made it to develop a defined set of skills (Thayaparan *et al*., 2011). Quantity surveyors contribute at all stages of construction projects (Mackie & Cooper, 2012; Thayaparan *et al*. 2011). Their roles include ascertaining that the budgets are reasonable, identifying areas of possible cost risks and laying out avenues for mitigation, coordinating and making final cost reports at important stages of projects, identifying potential areas for value engineering, procurement of works of contractors, negotiating project activities, and assist in agreement on terms and conditions of construction works. In addition, they help in drawing up of construction contracts and handling change orders, including settling final project accounts.

As provided by RICS, they have been expanding their roles under the optional competency requirements. The RICS's optional competencies provide areas for future career expansion as well as providing avenues for improvement when meeting the needs of clients. In essence, the competencies enhance the professional quality of quantity surveyors through intra and inter-professional reflection (Nkado & Meyer, 2001). Overall, they must adhere to the construction ethical standards as they advance professionally (Aje & Awodele, 2006). This will create more appeal to project owners as providers of value in construction projects.

Advancing quantity surveying depends on its ability to respond to the changes or adjustments in the international construction business environment. Maintaining global relevance and significant improvement require the quantity surveyors to review their work operating landscapes to capture and adjust to imminent changes in areas such as their professional ethics, practices, and overall level of expertise (Frei & Mbachu, 2010). They need to understand their own objectives and the dynamic requirements of project owners in order to explore appropriate and innovative ways to deliver the needed value diligently and effectively. In essence, they must evaluate their Strengths, Weaknesses, Opportunities and Threats (SWOT) to thrive in the wider construction industry market that is laden with high competitions from other professionals such as architects and engineers (Frei & Mbachu, 2010).

The opportunities and threats are the micro-environmental factors that can hinder or boost their abilities to execute or meet their project goals (Langford & Male, 2008). Political, Economical, Social, and Technological (PEST) model define and facilitate the identification of the many factors that operate in the construction's wider or macro-environment. Political factors such as unavailability of published rates of fees for professionals and levels of fee competitions in the construction industry have brought about greater opportunities to compete favorably with each one offering their own prices (Frei & Mbachu, 2010). Economic and market conditions including factors such as economic downturn in the construction markets are possible avenues or opportunities for future roles of quantity surveyors. Social factors such as relative uncertainty in the profession can pose a significant threat

(Frei & Mbachu, 2009). Technological factors such as Information Technology (IT) advancements and value engineering or analysis are to reshape quantity surveying business environment. These offer great opportunities for quantity surveyors to develop to higher levels both technologically and in popularity.

IT advancements in areas such as Building Information Modeling (BIM), Building Energy Modeling (BEM) and estimating software could provide quantity surveyors with ways to fortify their standing in the construction industry. This is augmented by the belief that quantity surveyors are the professionals who are better placed to handle major information in construction projects because most of the pieces of information in construction tend to revolve around construction quantities, quality improvement and cost reduction which they usually take control of in projects. However, the current opportunities may be taken over by other professionals like architects or engineers if the quantity surveyors adopt a complacent approach in construction ventures that is characterized by little or no motivation to further develop or diversify their roles (Smith, 2004). Quantity surveyors currently have adequate strengths as they have ability for strong international ties, good network of clients, and a wide range of knowledge in construction processes (Frei & Mbachu, 2010). Their roles and strength in construction give them a greater level of satisfaction with their jobs, especially before the economic recession. However, females tend to be unsatisfied because they believe that the profession is gender biased (Bowen *et al.*, 2008).

Despite the profession being dominated by males, Bowen *et al*. (2008) found quantity surveyors to be generally satisfied with their jobs from a survey conducted on quantity surveyors in the South African construction industry. The factors influencing their job satisfaction included low supervision level, participation in creativity and decision-making, personal satisfaction in work, and recognition for achievement.

3. RESEARCH METHODOLOGY

3.1 Aim, Objectives, Variables, and Working Hypothesis

The aim of this research was to examine the developmental trend of the quantity surveying profession to determine its future. The objectives were to determine the current level of satisfaction of quantity surveyors and to predict the future growth of the profession in the construction industry. The independent variable was the *current level of satisfaction with the profession* while the dependent variable was the *growth of the profession in the next 10-15 years*. The duration was considered adequate forecast period to determine the future of the profession. The working hypothesis was that the quantity surveying profession would experience future growth.

3.2 Survey Questionnaire Design and Administration

In order to meet the aim and objectives of the research, an online survey questionnaire was administered to the quantity surveyors via Qualtrics survey software. Before its administration, five people (n = 5) agreed to take part in a pilot study to test the validity and reliability of the survey items. Cronbach's alpha statistic tested the reliability. The result of the pilot survey showed a Cronbach's alpha value

of 0.85 implying that the questionnaire was reliable and that the items were well understood. Consent to conduct the research with human subjects was sought and granted by the Institution Review Board (IRB).

The questionnaire consisted of open ended and multiple-choice questions. One part of the questionnaire focused on the respondents' demographic data such as work title, number of years in construction field, project owner representative, and roles in projects. The other part required the respondents to rate their current level of satisfaction with their profession on a five (5) point Likert scale (1 = not rewarding, 2 = neutral, 3 = somewhat rewarding, 4 = rewarding, 5 = very rewarding). In addition, they were asked their opinion about the overall growth of their profession in the next 10-15 years on a similar scale (1 = not improve, 2 = neutral, 3 = somewhat improve, 4 = improve, 5 = improve highly). Finally, they were to give reasons for the growth.

The survey was sent to the membership email list-serve of QSI, an international quantity surveying professional organization that promotes the aims, objectives, and ideals of quantity surveyors worldwide. The QSI was chosen for this research since it was believed it would give a global representation of quantity surveyors. The respondents were assured of confidentiality and anonymity in their feedback. In order to improve the response rate, respondents were informed that the results would be reported in the next publication of QSI members' newsletter.

3.3 Sample Size and Data Analysis

The study employed 239 quantity surveyors who completed the survey. This sample size (n = 239) was considered adequate as required by parametric or univariate statistical analyses and tests that achieve adequate statistical power.

The quantitative data analysis utilized SAS v9.4 statistical analysis software (SAS, 2015) for both descriptive and inferential statistics. The descriptive statistical analysis results utilized the measures of central tendency and dispersion that comprised of the mean, median, mode, kurtosis, and skewness values while inferential statistics employed correlation and regression analysis as predictive indices in addition to pooled *t*-test statistics that tested for the equality of variance. The main purpose of these analyses was to determine the level of satisfaction with the current state of the profession and to provide an index of growth of the profession in future. Qualitative data themes were also identified and analyzed.

4. FINDINGS AND DISCUSSION

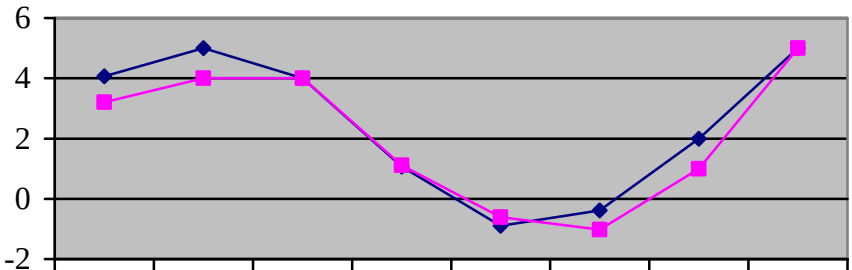
4.1 Demographics

The power of Qualtrics survey software is that it can detect and report the geographical location where a survey is taken. Thus, the results showed those who were working in construction ventures in Australia, Brazil, Colombia, Egypt, Ghana, Haiti, Japan, Kenya, London, Malaysia, Nigeria, Scotland, Seychelles, South Africa, Thailand, and USA. These countries provided a modest representation of the worldwide construction sector and market. Majority of the respondents were managing directors, presidents, chief quantity surveyors, consultants in quantity surveying, and professors in institutions of higher learning. This shows that the sample was from diverse international construction community who mostly held leadership and managerial roles in projects.

Out of those who took the survey, about 95% were males and 5% were females. This outcome is consistent with the study by Bowen *et al.* (2008) which concluded on the quantity surveying profession being male dominated. The survey results also showed that more than half (56%) of the respondents had over 15 years of experience in the quantity surveying profession and so they would be expected to provide invaluable ideas about the status of the profession. They were mainly involved in commercial construction projects (68%) and residential construction projects (53%). Out of the survey respondents, about 58% had been client/owner's representatives in construction projects. Some of their main duties entailed providing pre-contract services and preparing BoQ for tendering and tender evaluation, employer's agent, project management and scheduling, contract administration, inspection of work in progress, negotiating contracts, and contractual advice. They also engaged in cost aspects such as cost planning, budget estimating, preparing final accounts, post contract cost control, valuation, risk analysis/assessment/control, cash flow projection, financial management, value engineering, and overall advising on joint ventures. In as much as these roles are similar to their core and optional competency requirements as stated by RICS, it is evident that their roles have expanded over time to remove the negative stereotyping shown by Menaha *et al.* (2011) and Oke *et al.* (2010) where the roles would be limited and narrow scoped if not obsolete.

4.2 The Current State and Future of Quantity Surveying Profession

The survey asked the respondents about the level by which their current construction profession was rewarding and how they would rate the level of improvement of their profession in the next 10-15 years. About 35% of the respondents reported that their current profession was rewarding and very rewarding respectively. About 51% of the respondents believed that their profession would significantly improve in the next 10-15 years. Figure 1 summarizes the descriptive statistical results where the trend lines compare the satisfaction and growth variables.



	Mean	Mode	Media	Std	Skew.	Kurt.	Min.	Max.
Satisfaction	4.07	5	4	1.07	-0.9	-0.38	2	5
Growth	3.21	4	4	1.11	-0.61	-1.02	1	5

Figure 1. Descriptive Statistics of the Satisfaction and Growth of the Profession

Using a 5-point Likert scale whereby 1 = not rewarding, 2 = neutral, 3 = somewhat rewarding, 4 = rewarding, and 5 = very rewarding, an average of 4 (Mean

= 4.07) was recorded for the current status of the quantity surveying profession. This implied that the professionals tended to derive relatively good level of satisfaction from their work in the construction industry. That is, they tended to get good rewards from their work as shown by their high frequency of reporting very rewarding level (Mode = 5). Using another 5-point Likert scale (1 = not improved, 2 = neutral, 3 = somewhat improved, 4 = improved and 5 = very improved), the professionals expected the profession to experience some level of growth in the next 10-15 years as shown by mode of 4 and average of 3.21, which implied a somewhat improved profession. Both predictor variable (satisfaction) and the predicted variable (growth) showed a negatively skewed distribution implying that most scores clumped up on the upper side of the rating scale. The outcome led to the conclusion that most of the quantity surveyors were satisfied with their profession and that they believed it would sufficiently grow in future.

Pooled *t*-test statistics tested the difference in average responses between the future growth of the profession and the current level of satisfaction with the profession. The *t*-test result was $t\ (28) = 20.54$, $p < .0001$. The interpretation of *p*-value is to reject the null hypothesis (no future growth of the profession) if $p < .05$ implying that there exists a significant difference in the tested statistical statement or fail to reject the null hypothesis if $p > .05$ implying not enough evidence to reject the null hypothesis. Therefore, $p < .0001$ implied that the averages of the responses for the future growth and the level of satisfaction differed significantly and that the prediction of growth was highly dependent on the satisfaction with the profession.

Correlation and regression analyses determined the relationship and prediction level of growth of the profession from the current level of satisfaction. A correlation coefficient of 0.56 existed between the current level of satisfaction with the profession and the future growth of the profession. This index was statistically significant at $p < .05$ and was interpreted as a relatively strong positive correlation. The strong relationship implied a higher expectation of growth of the quantity surveying profession in future. Regression analysis investigated this outcome further.

Linear regression analysis predicted the future growth of the profession. In predicting the growth, coefficient of determination, R^2, estimated the amount of variance in the growth variable that was accounted for by the predictor variable (current level of satisfaction with the profession). Root Mean Square Error (RMSE) showed how far off the prediction of growth tended to be. Table 1 shows the results of the regression analysis. The y-intercept is 0.833 while the slope/gradient is 0.5833.

Table 1. Predicting the Growth of the Quantity Surveying Profession

Variable	Label	DF	Estimate	Standard Error	*t*-value	Pr > |*t*|
Intercept	Y Intercept	1	0.833	0.7006	1.19	0.2446
Satisfaction	Satisfaction with Current Profession	1	0.583	0.1667	3.50	0.0016

From Table 1, the regression coefficient (slope) for the satisfaction variable was statistically significant, [$t\ (28) = 3.50$, $p = .0016$]. This implies that the predictor variable had significant contribution to the predicted growth variable. In predicting

the growth in the next 10-15 years, R^2 value of 0.3119 was recorded. This suggested that 31.19% of the variance in growth variable was accounted for by the current level of satisfaction with the profession variable. This percentage is high enough to warrant higher level of confidence in the predictive ability. RMSE of 0.9412 was recorded implying that the prediction of growth tended to be off by 0.9412. This was in accordance with the expectation that higher R^2 tend to be associated with lower RMSE. Regression equation (1) summarizes the results in Table 1.

$$\text{Growth} = 0.833 + 0.583*(\text{Satisfaction}) \quad (1)$$

Overall, it can be deduced from the statistically significant steep slope and strong correlation coefficient that the profession would improve in future. However, this may not imply a cause-effect relationship because there could be other confounding or extraneous factors in the profession or the construction industry that might affect such strong positive relationship or growth. For example, tax breaks on new construction ventures or improvement in real estate markets may have significant implications. Such factors can make the professionals to be satisfied with the profession as well as being optimistic for its future growth.

4.3 Reasons for Future Growth of Quantity Surveying Profession

The respondents had different reasons behind their optimism for the future growth of the quantity surveying profession. These included:

- Economic improvement with more openings in areas such as sustainable design and construction.
- New regulations favoring the construction industry, e.g., improved ethical standards.
- Construction professionals preparing for the future as the construction industry is rising from economic downturn.
- Increase in the scope of quantity surveyors services in the challenging and dynamic construction industry environment.
- Wider international acceptance of British style quantity surveyor and even those project owners who put engineers as jack of all trades do realize that quantity surveyors provide far much better services than other construction professionals in meeting owner's needs.
- Current technological trends in IT that have helped in streamlining construction office practices thus reducing wastes and resulting in good use of resources and overall improvement towards profitability.
- Globalization is enabling QS to adopt best international construction practices.

Some of the aforementioned avenues that may favor future growth of the profession such as IT developments are akin to the outcome of the research by Smith (2004) which identified critical areas the QS needs to focus on to meet the dynamic owners' needs. Overall, the expectation of future awakening from the economic recession and new governmental rules that favor construction industry serve as a precursor for the future growth of the quantity surveying profession. In addition, the

current level of satisfaction with the profession (Mean = 4.07) that is highly correlated with the growth of the profession (r = 0.56), the steep slope of the regression model (0.583) depicting greater level of growth of the profession, and relatively good level of coefficient of determination (R^2 = 0.3119) support the greater chance of future growth of the profession. Therefore, the working hypothesis of the expectation of future growth of quantity surveying profession was greatly supported.

5. CONCLUSION AND RECOMMENDATION

The focus of this paper has been to analyze the developmental trend of the quantity surveying profession by determining the satisfaction level of quantity surveyors and predicting the future of the profession in the construction industry. This is because the profession recently experienced a meltdown and so it would be important to understand its current situation and growth in future. Qualtrics survey tool has been used to collect data from quantity surveyors where the results has shown that more than half of the respondents had over 15 years of experience in projects such as commercial and residential construction projects. The quantity surveyors offer many valuable roles in construction, and are satisfied with the current developments or trends in their profession. They believe that the future of the profession is promising. The future growth of the profession could be attributable to the expectations of future awakening from economic recession that could present avenues for advancements in areas such as IT and sustainable design and construction. This could widen the QS construction roles beyond preparing BoQ, representing employers in projects, and overall project management.

Overall, this study adds to the predictive and trend analysis studies involving quantity surveyors in the construction industry. It offers a rich source of information to construction professionals and project owners about the status and development of quantity surveying profession in future. The outcome of this research could positively affect the rate of recruitment and retention of the quantity surveyors in the construction industry since the profession is expected to grow. Thus, quantity surveyors would become confident in their continued service of providing greater value to their project owners or clients and need to continue expanding, improving, and diversifying their roles. They should maximize their potential in construction ventures in order to be reap greater benefits and improve relevance in construction.

In spite of the future developments, this research has shown quantity surveying profession to be male dominated from the very small percentage of female respondents (5%). This is a major limitation in this study since there is inequality of gender. It is recommended that further research be conducted focusing on gender equality that could propose ways to encourage more females to join the quantity surveying profession since its future growth would be invaluable when both males and females perform and benefit in relatively equal proportion. This study has also focused on the growth of the profession in the next 10-15 years. It would be worthwhile to conduct a stochastic study with a longer forecast period of say over 30 years since this is a typical projection period for most large-scale predictive research. Further research could also focus on differentiating growth among different professionals such as engineers, architects, and quantity surveyors. Each could be compared or expressed as a ratio of the total growth of the construction industry to

determine their individual contribution.

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MENTAL STRESS AMONG CIVIL ENGINEERING CONSTRUCTION SITE AGENTS AND FOREMEN IN THE NELSON MANDELA BAY METROPOLE

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ABSTRACT

The construction industry as a whole has been suffering from mental stress due to a range of stressors imposed on the work force, resulting in behavioural habits which are not conducive to a healthy lifestyle, physical symptoms signalling burnout, chronic stress, and depression. An empirical study was conducted among medium to large civil engineering contractors in the Nelson Mandela Bay Metropole the sample stratum including site agents and foremen. The salient findings include: using unreliable and old tools, using dirty toilet facilites, and working on an untidy site are the most significant physical stressors; limited time spent with loved ones, tight deadlines, inadequate reward system, and work-life imbalance are the most significant organisational stressors; headaches, tense muscles, and smoking cigarettes are the most significant behavioural activities and physical sensations experienced; tired, weak and no energy, restless and on edge, and irritable are the most significant sensations of stress; feeling sad or down, restlessness, and decrease / increase in appetite are the most significant symptoms of depression. The objective of the study was to ascertain what stressors are imposed on a sample of site agents and foremen in the civil engineering sector of the construction industry. Further to the aforementioned, the study intended to identify what forms of strain, as also, the degree of stress and depression experienced by the work force. It can be concluded that a vast array of stressors negatively affect the civil engineering sector of the construction industry. Subsequently resulting in stress, depression, and mental / physical strain.

Keywords: civil engineering, construction, contractors, stress

1. INTRODUCTION

Almost any occupation entails some degree of stress. Highly stressful occupations include the exceedingly demanding practise of medicine, and the life-threatening situations of the South African Police Service (Louw and Vivier, 2010; Wang *et al.*, 2011). Similarly, the construction industry is very stressful. Construction professionals have to multi-task on multiple projects, deal with

different tasks across multiple projects, and make professional judgements under conditions of uncertainty, as also, take strain from long working hours, face work / family imbalance, frustration, and burnout (Bowen *et al*., 2012). Consequently, the construction industry as a whole is facing severe occupational health challenges, most notably due to the mismanagement of stress, which in turn is coupled to financial and legislative burdens to construction firms and other stakeholders.

A study conducted among 172 construction workers in the United States of America revealed that 75% had some form of musculoskeletal disorder (MSD), and that 16% consequently suffered from mental distress and burnout (Jacobsen *et al*., 2013). The American study, along with a study conducted among Chinese construction site personnel showed that the work force is twice as stressed as the general population, and found their risk of injury increased almost twofold due to being mentally stressed (Zheng *et al*., 2010).

The construction industry is still fixated in terms of a production and profit driven mind set, leading to a neglect of the more critical aspects. Furthermore, the cultural belief in South Africa still remains that 'feeling stressed' is seen as a weakness, and that a person should be able to 'sort it out' on their own. Consequently, research findings assert that the construction industry is in dire need of a stress management intervention (Oyewobi *et al*., 2011; Jacobsen *et al*., 2013; Kim. 2013).

The objective of the study was to clarify what physical and organisational stressors are imposed on a sample of site agents and foremen in the Nelson Mandela Bay Metropole (NMBM). Further to the aforementioned, the study intended to identify what behavioural activites and physical sensations (forms of strain), as also, what sensations of stress and depression are existent among the work force. The motivation for the study was based on the fact that currently limited studies have been conducted to identify stress in the civil engineering sector of the construction industry. This was achieved through conducting a literature review and evaluation of empirical data using existing stressor / strain / stress measurement techniques obtained from contemporary theoretical models used within the construction industry.

2. LITERATURE REVIEW

2.1 The Stress Dilemma

South Africans are significantly stressed. Racial tension and political pressures have created a 'unique' context that leads to stressful events (Bowen *et al*., 2012). Furthermore, many organisations still do not understand the chronic effect of stress on employees and their organisations.

What is stress? Stress is the body's reaction to demands and changes that requires it to adapt physically, mentally, and emotionally (Werner *et al*., 2014). Stress is triggered when everyday situations are perceived as either a challenge or a threat, commonly known as the 'fight or flight' reaction. Stress is a dynamic and cognitive state and affects everyone differently. To understand stress, a person needs to understand the source of stress (stressors), and the various interrelated environmental conditions that enhance stressful situations.

The three main components of stress is stress itself, stressors, and strain. Although many tend to believe that stress is the direct result of organisational stressors, in actual fact, the 'person-environment' relationship is what depicts the existence and severity of stress. The latter two, stressors and strain, are the events encountered, and our physical, behavioural, and psychological responses respectively. Stressors imposed on an individual creates a 'source of stress', which is dependent on the organisational environment, job aspects, and the individual's own resistance to stress.

A healthy work environment is established even when demands are high, as long as control in the environment is high too, however, this needs to be further complemented by strong social support. In contrast, high work demand, poor work control, and weak social support create the ideal circumstances for the development of stress (Karasek, 1979).

2.2 Causes of Stress in Construction

A study conducted among 369 engineers registered professionally with the Engineering Council of South Africa disclosed that 16% were significantly stressed and 68% moderately stressed (Rothmann and Malan, 2006). The most significant stressors to the engineers were work / family imbalance, and too much travelling, resulting in poor mental health. However, it is notable that engineers do not perceive work overload as a significant stressor, but instead suffer due to conditions of low work control and social support. In comparison, architects, construction managers, and quantity surveyors also suffer from high levels of stress. According to Bowen *et al.* (2012), architects are significantly stressed. A sample of 269 architects were surveyed using a questionnaire, where most scored 7 and higher out of 10 on a 10 point scale. Bowen *et al.* (2012) argue that even though architects work fewer hours than other professionals, they are still the most significantly stressed due to little control over certain aspects of their work environment. Furthermore, the study conducted by Bowen *et al.* (2014) among 177 quantity surveyors reported high stress levels in 24% of the sample. Long hours, tight deadlines, work / family imbalance, and demanding work were reported. Another study conducted by Tiwary *et al.* (2013) reported analogous findings, stating that chronic energy deficiency and exhaustion was present in more than half of the study's participants pointing to possible stress / burnout. When stressed, it is common to experience periods of restlessness, coupled with bouts of energy followed by periods of acute energy deficiency (Willows, 2005). Furthermore, the prevalence of headaches among stressed construction site personnel can subsequently lead to clouded judgement and injury on site (Abbe *et al.*, 2011). There is a myriad of potential stressors affecting the construction industry. Other notable stressors include dirty and unhygienic toilet facilities, poor conditions on site, repetitive work, physically demanding work, working with concrete and other chemical products, exposure to noise and vibratory equipment, working in the elements, limited time spent with friends, communication barriers, poor career growth potential, poor H&S on site, high job demands, lack of resources, inadequate equipment, and lack of social support at work (Abrey and Smallwood, 2014; Oyewobi *et al.*, 2011; Tiwary *et al.*, 2013; Bowen *et al.*, 2012).

2.3 Outcomes of Stress

The most comprehensive study regarding depression and injury was conducted among Chinese construction site personnel, which indicated that they were more than twice as likely to be injured in comparison to the general population. Up to 16% of the sample were significantly depressed and had some form of mental disorder (Jacobsen *et al.*, 2013). Depression is one of the main outcomes of stress. The cognitive state of depression not only puts yourself, but fellow employees at risk of injury due to absent mindedness, not thinking 'clearly', or in a worst case, suicidal ideations (Goldenhar *et al.*, 2003). Oyewobi *et al*. (2011) further established in their research that typcial forms of behavioural symptoms / strains are headaches, anger, trouble sleeping, tension, back pain, sadness, stomach aches, and substance abuse.

2.4 Stress Management

Stress can only be managed or reduced, as it cannot be eliminated completely from the life of an adult (Wahab, 2010). The management of stress in the workplace is important, to prevent costly employee health benefits and claims, rising consumer costs, and also, reduced profits.

Stress is not managed in organisations, however, various recommendations have been proposed as to how stress could be managed (Oyewobi *et al.*, 2011; Wahab, 2010; Leung *et al.*, 2012). Moreover, employees resort to coping strategies representative of an unhealthy lifestyle, to alleviate their levels of stress experienced. Two typical examples are excessive smoking and drinking (Tiwary *et al*., 2013).

A study conducted among workers in the banks of Pakistan indicated poor management of stress due to a management flaw (Ali *et al*., 2013). The findings stated a need for an adequate reward system, freedom of autonomy, time off, organisational change, and reduced role conflict.

According to Oyewobi *et al*. (2011), recommendations to actively implement stress management include, *inter alia*, fair wages, support from peers, work-offloading, social support with superiors and colleagues, and promotion of recreational / social activities.

3. RESEARCH METHOD AND SAMPLE STRATUM

An exploratory empirical study was conducted among 15 medium to large civil engineering contractors extracted from the local business directories and municipal databases, taking into consideration they had a Construction Industry Development Board (cidb) grading of 5CE (civil engineering), or higher. The research design was based on a survey to collect and analyse data, and to draw conclusions regarding similarities / differences with respect to current theories. The population consisted of civil engineering construction firms' site agents and foremen employed within the NMBM. A sample size of 21 was adopted by means of a non-probability sampling procedure. The primary data collection tool was a self-administered questionnaire delivered by hand and by e-mail, which consisted of three sections. A total of 6 questionnaires were distributed per site to give a grand total of 90. Subsequently, 21 were returned and included in the analysis of the data, which equates to a response rate of 23.3%. The data were analysed by means of the Statistical Package for the Social Sciences Software for Macintosh, in order to

produce descriptive statistics in the form of mean scores (MSs) and standard deviations.

4. RESEARCH FINDINGS

Table 1 indicates the extent to which respondents experience physical stressors during their working hours, and how stressful they perceive them, in terms of percentage responses to a scale of 1 (Not at all) to 5 (Very much), and MSs between a minimum value of 1.00 and a maximum value of 5.00. The statements 'Using unreliable and old tools, 'Using dirty toilet facilities, and 'Working on an untidy site', rank as the three most significant physical stressors, which indicates that civil engineering construction site agents and foremen rate their exposure to their physical environment affecting their occupational hygiene and safety on site as frequent as opposed to infrequent.

Table 1. Extent to which physical stressors are experienced.

Physical stressor	Response (%) U	Not at all.....Very much 1	2	3	4	5	MS	SD	Rank
Using unreliable and old tools	0.0	0.0	14.3	23.8	9.5	52.4	4.00	1.10	1
Using dirty toilet facilities	0.0	0.0	14.3	23.8	9.5	52.4	4.00	1.18	2
Working on an untidy site	0.0	0.0	9.5	23.8	33.3	33.3	3.90	1.00	3
Working with poor H&S equipment	0.0	4.8	9.5	28.6	23.8	33.3	3.71	1.19	4
Not being able to wear H&S gear	0.0	19.0	9.5	19.0	19.0	33.3	3.38	1.53	5
Performing repetitive work	0.0	14.3	23.8	23.8	33.3	4.8	2.90	1.18	6
Not being able to clean yourself	4.8	23.8	14.3	19.0	9.50	28.6	2.90	1.70	7
Changing sites or job tasks	0.0	28.6	19.0	23.8	23.8	4.8	2.60	1.29	8
Working in dust, mud or dirt	0.0	23.8	28.6	33.3	14.3	0.0	2.38	1.02	9
Performing physical work	0.0	23.8	42.9	19.0	14.3	0.0	2.24	1.00	10
Noise from tools and machines	0.0	28.6	38.1	23.8	4.8	4.8	2.19	1.08	11
Working in hot weather	0.0	23.8	47.6	19.0	9.5	0.0	2.14	0.91	12
Working with concrete products	0.0	42.9	23.8	23.8	9.5	0.0	2.00	1.05	13
Use of vibratory equipment	4.8	38.1	42.9	9.50	4.8	0.0	1.71	0.90	14

(Source: The Authors)

Correct, safe and functioning tools, as also, ensuring a tidy site provides for safer work practises, which are equally as important to avert the effects of an unsatisfactory physical working environment. The findings of the study align with those emanating from the study conducted by Abrey and Smallwood (2014), which determined that poor maintenance of equipment combined with unhealthy and unsafe working conditions are the most significant stressors construction workers

experience in the NMBM. In comparison, the findings of the study align with the work of Lamari and Chi (2014), which developed a Stressor-Stress-Performance relationship, explaining a positive relationship between a poor working environment, poor workplace safety, and risk exposure relative to emotional and physical stress.

Similarly, the provision of hygienic toilet facilities is paramount, as unhygienic toilets are not only a major health risk, but also a violation of a person's human rights. This finding aligns with the work of Bowen *et al*. (2014), who state that a lack of cleanliness of female toilet amenities may be caused due to a less supportive organisational climate, and discrimination at work, which in turn manifests to stress. It is notable that the present study's target population, consisting exclusively of males, are in agreement of the aforementioned. The control over project and construction managers' physical environment is an imperative factor, which may moderate stress. Bowen *et al*. (2015) are of the opinion that relocating to new projects is a significant contributor to stress for site-based professionals. Consequently agreeing with the findings of the present study, as the lack of control over hygiene in the working environment is a significant stressor, resulting in occupational stress to employees.

Table 2 indicates the extent to which respondents experience organisational stressors during their working hours, and how stressful they perceive them in terms of percentage responses to a scale of 1 (Not at all) to 5 (Very much), and MSs between a minimum value of 1.00 and a maximum value of 5.00. It is notable that the statements 'Limited time spent with loved ones', 'Tight deadlines', 'Inadequate reward system', and 'Work-life imbalance', all have MSs > the midpoint score of 3.00, which indicates that civil engineering construction site agents and foremen rate the extent to which organisational stressors pertaining to work-life imbalance, job demand, and job support are experienced as frequent, as opposed to infrequent.

The intensity of the organisational stressors spending limited time with loved ones, coupled with work-life imbalance are significant, and have been researched by various authors in the construction industry. Consequently, the study corresponds with the findings of Bowen *et al*. (2014), who concluded that work-family imbalance was the most significant stressor observed in a sample of both male and female construction professionals. The work of Mostert (2011) highlights the importance of minimising work-home interference (WHI). According to Mostert (2011), job demands, and lack of resources lead to WHI, which in turn is strongly associated with burnout. Construction stakeholders need to take note, as social support at the workplace, as also, the home environment will assist employees to cope with stress more effectively during stressful work situations.

The organisational stressors tight deadlines and inadequate reward system pertains to the control over job demands and support in the workplace. The findings of the present study is supported by the study of Bowen *et al*. (2013), who assert that stress is significantly related to numerous demand stressors, *inter alia*, tight deadlines, among a sample of South African quantity surveyors. More notably is the fact that the stressors were significant to the independent variable of gender (affecting males more). In comparison, the stressor time management, as reported by Hamid and Afshar (2014) is an organisational stressor affecting project managers in Malaysia. The present study futher aligns with an Australian study conducted among

civil engineers, which indicated that the engineers felt rewards were not in line with their contribution to their organisations (Lingard, 2003). The Australian study asserts that job-redesign, in respect of the aforementioned, could be a preventative strategy in preventing burnout. Another study associates with the findings of the present study.

Table 2.Extent to which organisational stressors are experienced

Organisational stressor	Response (%) U	Not at all…….....….Very much 1	2	3	4	5	MS	SD	Rank
Limited time spent with loved ones	0.0	4.8	28.6	14.3	28.6	23.8	3.38	1.28	1
Tight deadlines	0.0	9.5	23.8	23.8	19.0	23.8	3.24	1.34	2
Inadequate reward system	0.0	0.0	42.9	14.3	38.1	4.8	3.05	1.02	3
Work-life imbalance	0.0	14.3	19.0	23.8	33.3	9.5	3.05	1.24	4
High job demand	0.0	14.3	28.6	19.0	28.6	9.5	2.90	1.26	5
Lack of resources	4.8	14.3	14.3	28.6	28.6	9.5	2.90	1.37	5
Communication barriers	4.8	14.3	9.5	42.9	14.3	14.3	2.90	1.37	5
Poor feedback on work done	0.0	14.3	28.6	23.8	23.8	9.5	2.86	1.24	8
Current work load	0.0	9.5	28.6	42.9	9.5	9.5	2.81	1.08	9
Poor career growth potential	4.8	14.3	33.3	14.3	14.3	19.0	2.76	1.51	10
Looking after the H&S of others	4.8	14.3	19.0	38.1	14.3	9.5	2.71	1.31	11
Low job social support	0.0	19.0	33.3	19.0	14.3	14.3	2.71	1.35	12
Poor salary / wage	0.0	23.8	23.8	23.8	14.3	14.3	2.71	1.38	13
Lack of employer commitment	0.0	23.8	23.8	38.1	4.8	9.5	2.52	1.21	14
Lack of control over job tasks	0.0	23.8	28.6	28.6	9.5	9.5	2.52	1.25	15
Low job control	0.0	23.8	28.6	28.6	14.3	4.8	2.48	1.17	16
Relationship with peers	0.0	23.8	28.6	28.6	14.3	4.8	2.48	1.17	16
Lack of social activities	0.0	23.8	33.3	23.8	9.5	9.5	2.48	1.25	16
Long work hours	0.0	28.6	23.8	23.8	19.0	4.8	2.48	1.25	16
Insufficient time off	0.0	33.3	19.0	23.8	14.3	9.5	2.48	1.36	16
Frequent travelling	0.0	33.3	28.6	14.3	14.3	9.5	2.38	1.36	21
Fear of losing my job	0.0	42.9	23.8	9.5	4.8	19.0	2.33	1.56	22
Organisational change	0.0	23.8	38.1	23.8	14.3	0.0	2.29	1.01	23
Nature of my work	4.8	19.0	42.9	23.8	0.0	9.5	2.24	1.22	24
Work atmosphere	0.0	42.9	14.3	23.8	14.3	4.8	2.24	1.30	25
Nature of business operations	4.8	19.0	38.1	28.6	9.5	0.0	2.19	1.03	26
Lack of respect from my peers	0.0	33.3	38.1	14.3	9.5	4.8	2.14	1.15	27
Inadequate employer training	0.0	33.3	33.3	23.8	9.5	0.0	2.10	1.00	28
Lack of freedom of autonomy	0.0	47.6	23.8	14.3	4.8	9.5	2.05	1.32	29
Lack of respect from my superior	19.1	14.3	19.0	38.1	9.50	0.00	2.05	1.32	29
Witnessing of injuries / accidents	0.0	42.9	28.6	19.0	4.80	4.80	2.00	1.14	31
Relationship with superior	4.8	47.6	19.0	14.3	0.00	14.3	2.00	1.48	32
Communication with supervisor	4.8	47.6	23.8	14.3	4.80	4.80	1.81	1.21	33

(Source: The Authors)

The study, conducted in the Palestine construction industry, disclosed that construction project professionals were experiencing stress due to numerous organisational stressors, *inter alia*, unfair rewards from a lack of funds, and tight budgets, to associate with the aforementioned Australian study (Enshassi *et al*., 2015). Consequently Karasek's job demand-control-support theory is strongly supported in the present study. More and more construction professionals report increasingly tighter deadlines, diminished social support at work, and a lack of

recognition of work done from their superiors. The findings reported in Table 2 follow fairly predictable lines: It is indicative that most respondents do not expect their employers to make a significant attempt to improve their work condition in terms of work life vis-à-vis personal life. Employers need to focus on leadership development, motivational team building exercises, and instruments to improve the work-home relationship.

Table 3 indicates the extent to which respondents experience behavioural activities and physical sensations of stress, in terms of percentage responses to a scale of 1 (Not at all) to 5 (Very much), and MSs between a minimum value of 1.00 and a maximum value of 5.00. It is notable that the statements 'Headaches', and 'Tense muscles' have MSs equal to the midpoint score of 3.00, which indicates that civil engineering construction site agents and foremen rate their extent to which the stressors are experienced as very much, as opposed to not at all.

The prevalence of headaches among stressed construction site personnel is significant, as it may subsequently lead to clouded judgement and injury on site (Abbe *et al*., 2011). Enshassi *et al*. (2015) assert that headaches are one of the key job stress and burnout symptoms among project managers and site engineers working in the Gaza Strip. This is notable, as it collaborates to the findings of the present study based in South Africa, which proposes that behavioural activities and physical symptoms of stress may be universal.

Another outcome of stress is tense muscles. Stress invokes constant raised shoulders and puts pressure on jaw muscles, affecting the nutrition in the muscles, resulting in constant pain (Kvarnstrom, 1997). According to Love *et al*. (2009), contractors' mental health and work stress is inferior to that of consultants, as a result of high job demands and inadequate workplace conditions on-site. Poor mental health was predicted by measuring behaviours consistent with emotional distress, which included, *inter alia*, 'facial muscle tensions' among the respondents. This finding aligns with the present study, and proposes that civil engineering site agents and foremen similarly suffer from poor mental health, more so than that of civil engineering consultants. Furthermore, a questionnaire survey conducted among medical secretaries revealed that high work demands were related to perceived stress, which in turn was related to severe muscle tension, most notably in the neck and shoulder region. This is notable, as the present study reported the head, neck, and shoulders as the anatomic regions experiencing most discomfort.

Although marginally, it is nonetheless notable that the respondents use substances to some degree to cope or deal with stress, as was noted in the work of Tiwary *et al*. (2013), which is of concern. Previous studies reporting on substance use suggest contradicting findings. According to Aitken and Crawford (2007), substance use was the least used coping strategy among project managers. In contrast, Bowen *et al*. (2014) proposed a conceptual model, in which alcohol and tobacco use (substance use) associated to the terminal outcome of occupational stress among construction professionals. In comparison to the study by Bowen *et al*. (2014), a study conducted in Nigeria revealed that based upon a sample of 105 construction workers, 9.5% reportedly smoked to alleviate their stress (Wahab, 2010).

Table 3. Extent to which behavioural and physical sensations / activities are experienced

Sensation / Activity	U	Response (%) Not at all.….....…Very much					MS	SD	Rank
		1	2	3	4	5			
Headaches	0.0	0.0	42.9	23.8	23.8	9.5	3.00	1.05	1
Tense muscles	0.0	9.5	23.8	33.3	23.8	9.5	3.00	1.14	2
Smoke cigarettes	0.0	61.9	0.0	9.50	23.8	4.8	2.10	1.48	3
Consume excessive coffee	0.0	47.6	23.8	14.3	9.5	4.8	2.00	1.22	4
Consume excessive alcohol	4.8	42.9	23.8	19.0	9.5	0.0	1.86	1.11	5
Breathlessness	0.0	71.4	9.5	9.5	4.8	4.8	1.62	1.16	6
High blood pressure	0.0	66.7	19.0	4.8	9.5	0.0	1.57	0.98	7
High cholesterol	9.5	61.9	19.0	0.0	0.0	9.5	1.48	0.87	8
Dizziness	0.0	71.4	14.3	9.5	4.8	0.0	1.48	1.29	9
Nausea	0.0	66.7	23.8	9.5	0.0	0.0	1.43	0.68	10
Trembling hands	0.0	85.7	4.8	4.8	4.8	0.0	1.29	0.78	11=
Asthma	4.8	76.2	4.8	14.3	0.0	0.0	1.29	0.78	11=
Heart disease	4.8	90.5	4.8	0.0	0.0	0.0	1.00	0.32	13
Take drugs	4.8	95.2	0.0	0.0	0.0	0.0	0.95	0.22	14=
Diabetes	4.8	95.2	0.0	0.0	0.0	0.0	0.95	0.22	14=
Epilepsy	4.8	95.2	0.0	0.0	0.0	0.0	0.95	0.22	14=

(Source: The Authors)

Table 4 indicates the extent to which respondents experience sensations of stress with statements regarding sensations experienced, and how frequently they occur, which provides an early identification of stress. The factors were presented in terms of percentage responses to a scale of 1 (Not at all) to 5 (Very much), and MSs between a minimum value of 1.00 and a maximum value of 5.00.

The first ranked statement is 'Tired, weak, or no energy', which suggests the respondents are taking strain due to their work obligations. This finding aligns with the work of Pinto *et al*. (2014), which emphasised that exhaustion, a dimension of burnout, leads to ultimate burnout. It is notable that Pinto *et al.* (2014) propose that more women than men are suffering from the chronic effects of exhaustion. Another study similarly suggested that the dimension of exhaustion explained most of the variance in a regression analysis pertaining to burnout, which reinforces the significance (Yip *et al*., 2008).

The second ranked statement 'Restless' is a notable finding, as previous work has mostly focussed on sleep disturbances among nursing and medical workers, following a different time arrangement, as opposed to the construction industry. According to Fischer *et al*. (2006), nursing staff in a medial setting suffer from stressful working conditions due to myriad of work-related stressors, *inter alia*, shift work, poor lighting, lifting objects, and verbal abuse. The work conditions of nursing staff share similarities with those of employees in the construction industry. Bowen *et al*. (2014) assert that limited research has been conducted regarding the strain variable of sleep disturbance, and its effect on construction project consultants, which consequently reinforces its importance within in the civil engineering sector of the construction industry, which remains largely undocumented.

The third ranked statement 'Irritable' similarly is notable, as the respondents are of the opinion that work is interfering with their family life. This finding aligns with the work of Leung *et al*. (2009), who suggest that construction project managers in Hong Kong are taking strain as a result of a poor work and home environment, which in turn causes irritation, coupled with interpersonal stressors among project stakeholders. Another study among women professionals suggest that work pressures is causing a spill over effect, which results in feeling irritable at home (Sirajunisa and Panchanatham, 2010).

Table 4. Extent to which Common Sensations of Stress are Experienced

Sensation	Response (%) U	Not at all…….....Very much 1	2	3	4	5	MS	SD	Rank
Tired, weak, or no energy	0.0	23.8	28.6	19.0	9.5	19.0	2.71	1.45	1
Restless	0.0	28.6	14.3	23.8	33.3	0.0	2.62	1.24	2
Irritable	0.0	23.8	23.8	28.6	23.8	0.0	2.52	1.12	3
Wake up during the night	0.0	33.3	14.3	33.3	9.5	9.5	2.48	1.33	4
Difficulty in sleeping	0.0	33.3	28.6	4.8	23.8	9.5	2.48	1.44	5
Tension	0.0	19.0	28.6	42.9	9.5	0.0	2.43	0.93	6
Difficulty in concentrating	0.0	23.8	38.1	28.6	9.5	0.0	2.24	0.94	7
Anxiety	0.0	38.1	19.0	33.3	9.5	0.0	2.14	1.06	8
Sleep excessively	0.0	47.6	19.0	23.8	4.8	4.80	2.00	1.18	9

(Source: The Authors)

Table 5 indicates the extent to which respondents experience sensations linked to depression. The factors were presented in terms of percentage responses to a scale of 1 (Not at all) to 5 (Very much), and MSs between a minimum value of 1.00 and a maximum value of 5.00.

The first ranked statement 'Sad or down' is a significant finding. According to Abbe *et al*. (2011), the psychological feeling of sadness was a significant overall experience among a sample of construction workers. Furthermore, Abbe *et al*. (2011) proclaimed that sadness was significantly positively correlated to increased work experience, and insomnia. Also, injury outcomes were significantly correlated to headaches and sadness. The prevalence of sadness, insomnia, and headaches align with the findings of the present study, however, it must be noted that close to fifty percent of the present study's respondents have less than three years' experience. This is noteworthy, as the feeling of sadness would hence have been expected to be to a lesser extent. The work of Haynes and Love (2004) disclose a noteworthy finding. According to Haynes and Love (2004), avoidance coping, which is an emotion-focused coping method, causes depression among construction project managers. In contrast, active coping, which is a problem-focussed coping method, reduces depression. The prevalence of depression in the present study therefore questions which coping method is utilised, as also its effectiveness.

The second and third ranked statements are 'Restlessness', and 'Decrease / Increase in appetite'. The ranking of the statement 'Restlessness' was anticipated, as it is analogous to the statement 'Restless', as portrayed in Table 4 regarding sensations of stress. According to Leung *et al*. (2011), loss of appetite, which is a physiological outcome of stress and depression, occurs among construction project managers who engage on time-limited projects, coupled with a harsh working environment. Furthermore, Leung *et al*. (2011), assert that physiological stress, for example, loss of appetite shares a strong relationship with burnout. Additionally, physiological stress decreases organisational performance among construction project managers. These findings are notable, as it inclines that civil engineering site agents and foremen may be prone to physiological stress, as they too are working to tight deadlines as depicted in Table 2, and may be subject to burnout, consequently leading to reduced organisational performance.

Table 5. Extent to which sensations of depression are experienced

Sensation	Response (%) U	Not at all…....……Very much 1	2	3	4	5	MS	SD	Rank
Sad or down	0.0	33.3	33.3	14.3	9.5	9.5	2.29	1.31	1
Restlessness	0.0	38.1	28.6	9.5	19.0	4.8	2.24	1.30	2
Decrease / Increase in appetite	0.0	42.9	19.0	28.6	4.8	4.8	2.10	1.18	3
Don't enjoy things I used to	0.0	42.9	28.6	19.0	9.5	0.0	1.95	1.02	4
Loss of interest	0.0	38.1	38.1	19.0	4.8	0.0	1.90	0.89	5
Decrease / Increase in weight	0.0	52.4	23.8	14.3	4.8	4.8	1.86	1.15	6
Feeling worthless	0.0	57.1	19.0	19.0	4.8	0.0	1.71	0.96	7
Talk or move slowly	0.0	66.7	28.6	4.8	0.0	0.0	1.38	0.59	8
Hurt myself	0.0	85.7	9.5	4.8	0.0	0.0	1.19	0.51	9
Suicidal intentions	4.8	85.7	4.8	0.0	4.8	0.0	1.14	0.73	10

(Source: The Author)

The summary of the salient findings relative to the objectives of the study follows. Civil engineering site agents and foremen within the NMBM are exposed to dirty and unhygienic toilet facilities, which is not only a concern among female construction professionals. Furthermore, the lack of control over hygiene in the work environment is a constant stressor resulting in occupational stress. The prevalence of unreliable and old tools, and exposure to an untidy site are physical stressors among civil engineering site agents and foremen, consequently resulting in poor workplace safety, risk exposure, and emotional and physical stress.

Civil engineering site agents and foremen within the NMBM are exposed to organisational stressors, namely limited time spent with family, and work-life imbalance. Stressful conditions at work results in WHI, which in turn leads to eventual burnout. Consequently, a need exists to provide social support at the work place and home environment. Furthermore, the respondents are exposed to the organisational stressors tight deadlines and inadequate reward system, pertaining to their control over job demands and supports in the workplace. Demand stressors cause stress, primarily to male construction professionals. Similarly, an inadequate

reward system provokes stress and possible burnout, where job-redesign could perform a critical role in preventing burnout. It is notable that the respondents face high job demands, low job control, and diminished social support, which agrees with the construction industry as whole when considering, *inter alia*, construction professionals, project managers, and engineers.

Civil engineering site agents and foremen within the NMBM portray behavioural activities and physical sensations of stress, namely tense muscles, headaches, and smoking cigarettes. The respondents have poor mental health, in contrast to that of consultants, which is explained by the prevalence of muscle tension. Stress due to high work demands causes tension of the face, neck, and shoulder muscles. The respondents suffer from headaches due to work stress, which may lead to clouded judgement and possible injury on site. Furthermore, headaches are a key symptom of burnout. The respondents'coping strategies are unsupportive of a healthy lifestyle, as the respondents exclusively use substances to relieve stress. Although substance use may be a terminal outcome of stress, it is not always adopted as conventional stress management tool.

Civil engineering site agents and foremen within the NMBM experience sensations of stress in the form of feeling tired, weak and no energy, feeling restless, and feeling irritable. The respondents are facing exhaustion due to their work obligations, which exposes them to a greater risk of developing burnout. Although females seemingly suffer more from exhaustion, male respondents in the present study similarly suffer from its effects. The respondents are feeling restless, which proposes that they are suffering from strain in the form of sleep disturbances, although further research is warranted in this regard. The respondents are also of the opinion that work is interfering with their family life, causing irritation, which may lead to interpersonal problems among project stakeholders.

Civil engineering site agents and foremen within the NMBM experience sensations of depression in the form of feeling sad or down, feeling restless, and experiencing a decrease / increase in appetite. Although sadness is expected to increase with years' experience, it is prevalent among the lesser experienced respondents in the present study. Furthermore, the feeling of sadness is related to insomnia, and injury, which is also existent in the present study. Additionally, the respondents may be utilising avoidance coping, as opposed to problem-focussed coping, due to feeling sad or depressed. The respondents are experiencing a decrease / increase in appetite, which is a physiological outcome of stress and depression, and indicative of potential burnout. Furthermore, physiological stress eventually affects organisational performance.

It is notable that the physical stressors have the greatest bearing on the respondents, followed orderly by the organisational stressors, behavioural and physical strains, symptoms of stress, and symptoms of depression. The unique stressors that have been revealed in the present study, in their physical and organisational form, are causing the respondents to experience mental stress. This is proven by the actuality that the respondents are suffering from physiological strains such as tense muscles, headaches, feeling tired, weak with no energy, restlessness, and feeling irritable. In spite of adopting coping mechanisms that are effective, the respondents are utilising smoking and possibly engaging in avoidance based coping

mechanisms in order to deal with stress. Furthermore, the lack of effective stress management strategy renders the respondents prone to burnout and injury on site.

5. CONCLUSIONS, RECOMMENDATIONS AND FUTURE RESEARCH

This study is based on the experience of stress in the civil engineering sector of the construction industry, specifically focussing on contractors' site agents and foremen operating in the NMBM, and the specific stressors that affect them vis-à-vis the prevalence of symptoms of strains, stress, and depression.

Civil engineering site agents and foremen are exposed to unsuitable and unhealthy physical working conditions, which is a concern to both males and females. They are also exposed to organisational stressors, which portrays a strong link to Karasek's job demand-control-support theory of stress. The respondents are showing signs of strain in the form of tense muscles, headaches, and behavioural patterns, such as smoking of cigarettes. Furthermore, the respondents are reporting initial symptoms of stress and depression in the form of feeling tired, weak, with no energy, feeling restless, and feeling irritable, feeling sad, and experiencing a decrease / increase in appetite.

A literature review supported the study by affirming that high job demands, low job control, and low social support are major contributors to stressed employees in the construction industry. Most construction professionals long for more time spent with family and friends, are often exposed to environments where they have little control over what is transpiring, and struggle with increasingly more demanding job requirements, in a fast tracked construction industry. Although physical health is of acceptable quality in terms of international health standards, early warning signs point to possible forthcoming problems, as depicted in the findings. This may all lead to eventual burnout, affecting physical health, or in worst case cause a fatality to take place on site.

The realisation of the importance of stress management in the civil engineering sector of the construction industry by government stakeholders, as also, councils, private organisations, and construction boards is of utmost importance. Policies and legislation need to be revisited, to include the wellbeing of employees in the civil engineering sector of the construction industry with regards to stress. Various legislative acts need to be revisited, typical examples include the Occupational Health and Safety Act (OH&S), Compensation for Occupational Injuries and Diseases Act (COID) and the Construction Regulations.

Tender documents prepared by engineering consultants, who are registered by professional bodies should allow for not only H&S and risk assessment, but also for stress management and employee wellness interventions in the contractual requirements and bill of quantities sections. Private organisations are to endeavour to provide employee training with regards to not only creating internal coping strategies to deal with stress, but also how to manage stress more effectively at home and at work setting – a situation is only as stressful as you perceive it to be.

Furthermore, future research should aim to investigate the stress effect of dirty and unhygienic toilet facilities among males and females, to evaluate whether significant gender differences exist. The effects of a poor working environment relative to emotional and physical stress similarly needs to be further investigated in

the current setting. The level of WHI in the civil engineering sector of the construction industry is of significance, as the industry is transient in nature, which will develop burnout to various intensities. The existence of muscle tension, most notably in the face, neck, and shoulders is mostly documented in a medical setting. Consequently, future research should identify its severity and relationship to mental stress and burnout in the construction industry. The prevalence of headaches needs to be better understood, to determine how it provokes clouded judgement, and subsequent injury among site based staff. The prevalence of exhaustion, which is theorised to be predominantly associated to females, needs to be further investigated regarding male employees in the civil engineering sector of the construction industry. Future research needs to investigate what coping strategy is primarily used by civil engineering employees, the degree of insomnia and disturbances to sleep patterns experienced, and the degree of irritation experienced by construction professionals. The relationship between the variables level of work experience, sadness, insomnia, headaches, injury, and stress opens an interesting field for future research. Similarly, the relationship between the physiological outcome of loss of appetite, mental stress, depression, and its burnout effect needs to be explored vis-à-vis the civil engineering sector of the construction industry.

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THE IMPACTS OF THE DEMOGRAPHIC CHARACTERISTICS OF RESIDENTS ON THE PERCEPTION OF QUALITY OF OFF-CAMPUS STUDENT ACCOMMODATION IN SOUTH-SOUTH, NIGERIA

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ABSTRACT

This study presents the findings of the evaluation of the impacts of the demographic characteristics of residents on the perception of quality of off-campus accommodation. It is limited to students who are currently residing in privately developed off-campus accommodation in selected universities, towns and cities in South-South, Nigeria. The data for this study were gathered between June and August, 2014 with the used of self-study structured questionnaire. A total of 520 respondents participated in the survey. The findings of the study revealed that though the demographic characteristics of students are essential in the determination of perception of quality of attributes of housing, the degree of influence differs among gender, age groups, income levels and the years of study of students. The influence of age, gender, income and year of study on the perception of quality of off-campus accommodation were also found to be statistically significant. The main implication of these findings is that investors in the student housing market can segment the development of off-campus accommodation to serve a selected demographic group(s).

Keywords: demographic characteristics, quality, student housing

1. INTRODUCTION

Housing is designed and developed to provide and support the needs and requirements of residents (Pullan, 2012; Oppewal *et al.*, 2005). Therefore, investors in housing as well as dwelling owners incorporate components with varied quality that are capable of providing the required users' needs. However, investors are faced with the challenge of determining the quality of component that is by residents as

this is influenced by demographic characteristics and geographical locations (Abdullah, *et al*, 2013; Akingbohungbe & Akinluyi, 2012). Thus, the demographic characteristics of residents are critical in the formation of needs and requirements by residents. Thus, to a large extent, the understanding of the moderating influence of the characteristics of residents on the perception of quality of housing is important to residential development. A series of studies were undertaken to explore the influence of the demographic characteristics of residents in different residential sectors, for example; social housing (Vera-Toscano & Ateca-Amestoy, 2007), workers housing (Morrison, 2003) and students (Amole, 2005; Amole, 2009) among others. The findings of specific study were difficult to generalise and apply to other residential sectors because of the differences in the demographic characteristics of the occupants. In addition, these findings were also found to vary from one geographical location to another. Thus, this study is focused on understanding how the perception of quality of off-campus housing is influenced by the demographic characteristics of students in tertiary institutions in South-South, Nigeria.

Student housing facilities (SHFs) are important aspects of institutional infrastructural facilities and are used as places of accommodation for students while undergoing academic training. SHFs exist either as on-campus accommodation or off-campus accommodation (Akingbohungbe & Akinluyi, 2012). On-campus accommodation are built within the boundary of tertiary institutions while off-campus are located outside the campus precinct and are mostly owned and managed by private investors. Within this category of housing, most of the studies were on-campus accommodation (Amole, 2009; Khozaei *et al.*, 2010) with few that are particular to off-campus accommodation (Akingbohungbe & Akinluyi, 2012).

The need for an increased emphasis on the study of the impacts of the demographic characteristics on the perception of quality of off-campus housing is advocated as current trend has revealed that the majority of students in tertiary institutions worldwide now reside in privately developed off-campus accommodation (Fields, 2011). This study is relevant as the findings of this research are needed by off-campus housing investors that intend to cater for the residential needs of specific demographic group(s) such as age groups, gender, income levels and years of academic study.

In carrying out this study, self-study questionnaire were administered to students who are currently residing in an off-campus accommodation in seven universities towns in the study area. The survey instrument is comprised of two sections; section on the demographic characteristics of respondents and another that dwells on the perception of quality of off-campus housing based on a 7-point semantic scale. The SPSS 16 was used to generate the results from data obtained from field survey. The analyses of interest include the summary statistics, t-test and the ANOVA.

The findings revealed that though the demographic characteristics of students are essential in the determination of perception of quality of housing, the degree of influence differs among the gender, age, income level and the year of study of students. The influence of age, gender, income and year of study on the perception of quality of off-campus accommodation were found to be statistically significant. In addition, the interaction between two demographic variables were statistically significant. The key implication of these findings is that investors in the student

housing market could segment the development of off-campus accommodation by offering different quality attributes to serve a selected demographic group(s).

2. LITERATURE REVIEW

Different categories of off-campus housing exist in the market and each is composed of distinct components that serve a function(s) either individually or in combination with other attributes (Coulombel, 2011). The degree of quality of components in particular and housing in general is evidenced in how the safety, comfort, health and security of the occupants is assured (Ibem *et al*., 2013). The quality of housing is defined by the design and housing configuration, material used in construction, the environment in which the residence is located, configuration of rooms, building components and amenities and the residential environment. Investors in housing develop to attract residents, however, the demographic characteristics of students play considerable roles in student housing facilities (SHFs) development and utilization has received considerable attention from researchers (Najib *et al.*, 2012; Kaya & Ertrip, 2001). These studies reported that the perceptions of quality or performance of SHFs attributes are influenced by the demographic characteristics of students (Macintyre, 2010; Najib *et al*., 2012). Important demographic characteristics of students that act as intervening or moderating variables in the perception of quality and performance attributes of student housing include the gender, marital status, income level and years of study of students (Oppewal *et al.*, 2005). The general perception of quality of housing is formed by residents from experiences gained from the used of individual attributes that make up the residential environment. Therefore, the following sections discuss the preference for different form of attributes based on their demographic characteristics.

2.1 Gender

The relationship between gender and perception of residential quality and performance is well reported in the literature on on-campus SHFs (Oppewal *et al*., 2005). Li *et al.*, (2005) reported that female students were more contented with the quality of attributes of SHFs than their male counterparts. In a study in Turkey, Kaya and Etrip (2001) reported that between gender and privacy, female students preferred accommodation with shared facilities while male students preferred exclusive access to residential amenities. Similar studies in Malaysia by Khozaei *et al*. (2010) also supported this view. However, in a study in Nigeria, Amole (2005) reported contrary results that male students prefer shared accommodation while female students prefer a room with personal amenities. A variety of reasons was attributed to this inconsistency. Meir (2007) suggested that the use of a space influences perception of fulfilment of needs. For example, a high degree of privacy is required in spaces that are used for study, sleep or relaxation, whereas, less consideration is given to privacy in a space that is used for social interaction. In a related study, Kaya and

Etrip (2001) reported that female students experience a higher level of discomfort in a smaller space than their male counterpart.

2.2 Economic status

The economic status of student plays an important role in residential choice. Thomsen and Eikemo (2010) reported that access to better quality SHFs is a function of the amount of money at the disposal of the student. Mostly, students in tertiary institutions are funded with money received from relatives, earned savings, loans, grants and salary from a part-time job. Wealthy students or those who work part-time jobs have access to money to pay high rent and live in high-quality off-campus residences (Petruzzellis *et al.*, 2006). Also, students who are financially buoyant could also adjust the unsatisfactory housing elements in order to improve housing quality (Frank & Enkawa, 2009).

2.3 Study years

Experience with housing attributes influences the perception of quality as well and is gained either from home or while on campus. As the student progresses academically, more interaction with housing is gained. New students combine previous experience iparental home experience and present residence, whereas for returning students, it includes both parental home experiences and past campus SHFs experiences (Fourbert *et al.*, 1998:41; Thomsen, 2007:577). These studies observed that privacy or relationships that exist in homes are critical in the determination of satisfaction with SHFs by students.

3. RESEARCH METHODOLOGY

Both secondary and primary data were sourced and used in this study. A review of relevant literature was conducted to identify the demographic characteristics of students that are relevant for the study. The survey method was adopted to collect the data from respondents employed a structured questionnaire which was comprised of two sections; namely, demographic characteristics of respondents and the perception of quality of off-campus accommodation. A total of 520 questionnaires were retrieved from respondents out of 790 that were personally administered to respondents in their various off-campus residences, academic departments by the researcher or trained field workers. A return rate of 66%, which is higher than the minimum 40% limit specified by Moser and Kalton (1993) was considered as adequate for valid results. In addition, in order to achieve good sample representations and spread, purposive sampling was adopted to select a total of seven tertiary institutions out of the existing 17 institutions in the geopolitical region of South-South, Nigeria. Furthermore, for ease of access to study subjects, the convenience sampling method was adopted to select participants of the survey.

In developing the survey instrument, the perception of quality of off-campus accommodation was elicited with the use of a 7-point semantic scale with 1 (very low quality) and 7 (very high quality). However, in the interpretation of results, a

rating of between 1 and 3 was classified as low quality, 4 as moderate quality and between 5 and 7 was qualified as high quality. The analysis conducted on the data includes the summary statistics and the ANOVA.

A one-way ANOVA test was conducted to determine whether the impact of demographic characteristics of residents of SHFs on the perception of quality of off-campus SHFs is statistically significant. The variables that were subjected to ANOVA test include the age, year of study and income levels of students. For gender with two only groups, the t-test was used to test for differences in means.

The decision rule was to reject the null hypothesis if the test statistic is greater than a *p*-value of.05. Where a difference exists within a group, a *post hoc* analysis based on Tukey test was conducted to determine the groups that are significantly statistically different.

Furthermore, a two-way "between groups" ANOVA was also conducted to determine the influence of two different categorical independent variables on the perception of quality of on-campus SHFs. In this section, the main effects and joint effects of the interaction between two demographic variables on the perception of the quality of SHFs was examined and described accordingly. A two-way "between-groups" ANOVA was used to test three effects: the main effects of two individual variables and the interaction effect of combined variables. The interaction of the following demographic variables on the perception of quality were tested for statistically significant results.

i. the interaction between gender and age of students on the perception of quality of SHFs;
ii. the interaction between the gender and income level of students on the perception of quality of SHFs;
iii. the interaction between gender and year of study of students on the perception of quality of SHFs;
iv. the interaction between income of students and year of study on the perception of quality of SHFs; and
v. the interaction between income of students and age on the perception of quality of SHFs.

4. FINDINGS AND DISCUSSION

The summary of the demographic characteristics of respondents is presented in Table 1 and it shows that 55% of the respondents were male while the rest 45% were female. The majority of the respondents were between the age groups of 19-21 years (42.5%) and 22-24 years (32.4%) and the least being the group above 27 years (5%). Furthermore, more of the respondents are in the 2nd year (36.8%) and 1st year (30.8) while 20% and 12.4% are in the 3rd and 4th year respectively. Out of these students, 26.6%, 24% and 23% received between R301-R600, R601-R900 and less than R300 respectively as monthly financial stipends.

Table 1: Demographic characteristics of respondents

Demographic variables		Percent
Gender	Male	55
	Female	45
Age	Under 18 years	7.4
	19-21 years	42.5
	22-24 years	32.4
	25-27 years	12.7
	Above 27 years	5.0
Year of study	1st year	30.8
	2nd year	36.8
	3rd year	20.0
	4th year	12.4
Monthly income	< 4,500 Naira (300 Rand)	23.0
	4,501-9,000 Naira (301-600 Rand)	26.6
	9,001-13,500 Naira (601-900 Rand)	24.0
	13,501- 18,000 Naira (901-1,200 Rand)	15.6
	>18,000 Naira (1200 Rand)	10.8

4.1 Influence of demographic characteristics on the perception of quality of off-campus housing.

Respondents were asked to rate how the quality of off-campus accommodation is perceived when compared to on-campus accommodation. A 7-point semantic scale with '7' as very high quality and '1' as very low quality was used for the evaluation. Four different demographic attributes, namely, gender, age, income and years of study of students were analysed to observe their impact on perception of quality by the different groups. The results are presented in the following sections.

4.1.1 The influence of age on the perception of quality of off-campus accommodation

Five age groups were identified for the purpose of this study and the result is presented in Table 2 and it shows that in all the age groups, a higher percentage perceived that the quality of off-campus SHFs is better than on-campus. However, for the group of students between the ages of 25-27 years, the perception that off-campus accommodation is better than on-campus accommodation was lower (45%). This goes to show that the approval rating of the quality of off-campus is higher among the age groups above 27 years (66.7%), 22-24 years (66.6%) and below 18 years (61%).

Participants were divided into five age groups, Group 1: below 18 years, Group 2: 19-21 years, Group 3: 22-24 years, Group 4: 25-27 years and Group 5: above 27

years. An ANOVA test shows that there was a statistically significant difference at $p<$ 0.05 alpha level {F (4,458) = 3.08, p=0. 016}. The comparison of the *post-hoc* Tukey HSD test results indicated that the mean score of Group 3 (M=5. 10, SD=1. 64) was statistically different from Group 4 (M=4. 2; SD=1. 68) while Group 1 (M=5. 08; SD=1. 86), Group 2 (M= 4.83; SD = 1.81) and Group 5 (M=5. 21; SD= 1.91) were not statistically different. The null hypothesis is rejected and the alternative that the perception of quality of SHFs differs among age groups was accepted.

Table 2: Age and quality of off-campus

	1-3 (Low)	4 (Moderate)	5-7 (High)
Above 27 years	16.6%	16.7%	66.7%
25-27 years	31.6%	23.3%	45%
22-24 years	15.7%	17.7%	66.6%
19-21 years	20.9%	20.9%	58.%
Below 18 years	16.8%	22.2%	61%

4.1.2 Gender and the perception of quality of off-campus accommodation

The gender involved two groups; male (M=4.79; SD=1. 74) and female (m=4. 93; SD=1. 82). In all the age categories, a higher percentage of students perceived that their off-campus accommodation was better than on-campus accommodation. Between the rating of '5-7' on a 7-point semantic scale, about 45% to 67% of respondents within the age brackets in all the age rated their off-campus accommodation to be better than on-campus accommodation. The result of the independent-samples t-test supported the null hypothesis that there is no statistically significant difference {t (444) =-.829, p = 0.41} in the way male and female students perceive the quality of SHFs attributes.

Table 3: Gender and quality of off-campus

	1-3 (Low)	4 (Moderate)	5-7 (High)
Female	20%	15.6%	64%
Male	21.8%	23.5%	52%

4.1.3 Year of study and the perception of quality off-campus accommodation

The results of the cross-tabulation between years of study and perception of quality of off-campus SHFs are presented in Table 6.10. The table reveals a high evaluation score (4^{th} year (71%), 3^{rd} year (68%), 2^{nd} year (55%) and 1^{st} year (52%)) for ratings in the upper region (5-7) of the 7-point semantic scale. These could be interpreted to mean that the perception of quality increases as the student progresses academically.

Four educational levels were identified for the analysis; Group 1: 1^{st} year, Group 2:

2nd year, Group 3:3rd year, Group 4: 4th year. The impact of educational levels of students on the perception of satisfaction with the quality of SHFs at $p< 0.05$ was not significant {F (4,457) = 1.93, $p< .104$)}. Therefore, the null hypothesis is accepted that the perception of quality of residence does not differ by educational level.

Table 4: Year of study and quality of off-campus and on-campus accommodation

	1-3 (Low)	4 (Moderate)	5-7 (High)
4th Year	12.3%	14%	71%
3rd Year	15.1%	17.2%	68.8%
2nd Year	18.7%	25.5%	55%
1st Year	30.1%	18.9%	52%

4.1.4 Income and the perception of quality off-campus accommodation

The cross-tabulation of income and quality-perception is presented in Table 6.9. Likewise, between the rating for '5' to '7' on a 7-point semantic-scale, 82% and 61% of students that earn an income above R1200 and R601-R900 perceived that their off-campus accommodation was better than on-campus SHFs respectively. A high degree of support was also obtained for residents earning below R300 (56%), R301-R600 (52%) and R900-R1200 (46%). Five income groups were identified for the study; Group 1: below 300 Rand, Group 2: 301-600 Rand, Group 3: 601-900 Rand, Group 4: 901-1200 Rand and Group 5: above 1200 Rand. The impact of income levels of students on the perception of satisfaction with the quality of SHFs at $p< 0.05$ was statistically significant {F (4,382) = 4.19, $p<.002$)}. The *post-hoc* comparisons using the Tukey HSD test indicated that the mean score of Group 2 (M=4. 67, SD=1. 84), Group 3 (M=4. 70; SD=1. 54) and Group 4 (M=4. 34; SD=1. 87) were statistically different from Group 5 (M=5. 68; SD=1. 14). Group 1 (M= 4.88; SD=1. 90) did not differ significantly from other groups.

These findings signify that irrespective of income level of students, students perceived off-campus accommodation to be better than on-campus SHFs. In another vein, a higher level of perception of quality in the high income bracket indicated that preference for SHFs is connected to the proposition that wealthy students are better positioned financially to secure high-quality accommodation (Thomsen & Eikemo, 2010:273).

Table 5: Income and quality of off-campus and on-campus accommodation

	1-3 (Low)	**4 (Moderate)**	**5-7 (High)**
>R1200	-	18.2	81.8%
R900-R1200	36.1%	18%	45.9%
R601-R900	61%	22.6%	61.4%
R300-R600	26.9%	21.2%	52%
<R300	23.3%	20%	56%

4.2 *Interaction of demographic characteristics of students on the perception of quality of off-campus housing*

A two-way "between-groups" ANOVA was conducted to explore the impact of interaction between two demographic characteristics of students on the overall perception of quality of SHFs.

4.2.1 The interaction between age and gender on the perception of quality off-campus student housing

The results in Table 6.44 showed that the interaction between the gender of respondents and age of students does not have significant effects on the perception of quality of SHFs, F (4, 434), p< .194, Eta Squared = .014. The main effect of the age of students on the perception of quality of SHFs was significant, F (4,434) = 3.35, p< 0.010, Eta Squared = 0.030 (moderate). The post-hoc comparisons using the Tukey HSD test indicated that the mean for the 22-24 years group is significantly different from the 25-27 years group. However, the main effect of the impact of gender groups on the perception of overall quality of SHFs, was not statistically significant F (2,434) = .242, p< .785, Eta Squared = 0.001 (low).

4.2.2 The interaction between the age of students and income levels on the perception of quality of SHFs

A two-way between-groups ANOVA was conducted to determine the interaction between the age of students and income level on the perception of quality of SHFs. The results are presented in Table 6.45 and it is clearly shown that the interaction between the age of students and income level has no significant effects on the perception of quality of SHFs, F (15, 361) = 1.43, p< .132, Eta Squared = .056. However, there was a statistically significant main effect of income levels on the perception of quality F (4,361) = 4.45, p< .002, however the effect size was moderate (partial Eta squared =0.056). The comparison of the post-hoc Tukey HSD test revealed that the mean score for students on income level above R1200 was significantly different from students on 301-600 Rand , 601-900 Rand and 901-1200 Rand. In addition, the main effect of age of students on the perception of quality with the quality of SHFs was not significant, F (4,361) = 1.844, p< 0.120, Eta Squared = 0.02 (moderate).

4.2.3 The interaction between age and year of study on the perception of quality of SHFs

The result of the two-way "between-groups" ANOVA is presented in Table 6.46. The results show that a statistically significant effect exists in the interaction of the age of students and levels of education on the perception of quality of SHFs, F (12,

439) = 2.204, p< .011, Eta Squared = .057. The main effect of age of students on the perception of quality with the quality of SHFs was significant, F (4,439) = 3.670, p< 0.006, Eta Squared = 0.032 (moderate). The post-hoc comparisons using the Tukey HSD test indicated that the mean for the 22-24 years group was significantly different from the 25-27 years group. The results also revealed that the main effect of the year of study of students on the perception of satisfaction with the quality of SHFs at p<.05 was also significant, F (4,439) = 3.758, p< 0.005, Eta Squared = 0.033 (moderate).

Therefore, the null hypothesis that there is no statistically significant effect of the interaction of age and year of study on the perception of quality of SHFs is rejected.

4.2.4 The interaction of income of students and gender on the perception of quality of SHFs

The results of the analysis of two-way ANOVA on the interaction between the age and income of the student on the perception of quality are presented in Table 6.47. The results reveal that the interaction between income levels and gender at p<.05 have significant effects on the perception of quality of SHFs, F (4, 359) = 4.299 p< .002, Eta Squared = .046. The main effects of income of students on perception of satisfaction with the quality of SHFs were statistically significant F (4,359) = 4.695, p< 0.001, Eta Squared = 0.050 (moderate). The post-hoc comparisons using the Tukey HSD test indicated that the mean score is significant between the income group above R1200 and those within 301 to 1200 Rand income bracket. In this interaction, though, the main effect of gender was not significant, F (1,359) = .2404, p< .122, Eta Squared = 0.007 (low).

4.2.5 The interaction between the year of study of students and income level of students on the perception of quality of off-campus student housing

A two-way "between-groups" ANOVA was conducted to compare the effect of the interaction between the year of study of students and income levels of students on the perception of quality of SHFs. The results in Table 6.51 showed that the interaction between the year of study and the income level of students on the perception of quality of SHFs was statistically significant at p<.05 level F (13, 363), p< .26, Eta Squared = .065. However, in this interaction, the main effects of the level of income of students {F (4,363) = 1,603, p< 0.173, Eta Squared = 0.017 (moderate)} and years of study of students {(F (4,363) = 1.501, p< .201, Eta Squared = 0.016 (low)} were not statistically significant.

4.3 Discussion

The examination of the influence of demographic characteristics of students in the choice of housing and perception of quality of off-campus SHFs was required in order

to establish a possible segregation of the SHFs market along demographic lines. Success in the housing investment is a function of patronage. The students perceived the attributes of off-campus SHFs to be better than on-campus accommodation; thus, a high demand indicates improved prospect. However, quality housing most often goes with higher rent; thus, higher quality housing costs more than lower quality SHFs. The pattern of income of students and the distribution of students by demographic characteristics in the various housing types is important in order to determine the willingness of students to spend money on their housing.

In terms of quality, a higher percentage of female students perceived their off-campus accommodation to be better than their male counterparts; which is in agreement with the studies conducted by Li *et al*. (2005) and Khozaei *et al*. (2010:35). The result shows that higher income earners judge their residence better through the introduction of furniture and this is in agreement with the findings of Thomsen and Eikemo (2010:273) who observed that access to better quality housing is a function of the amount of money at the disposal of the residents.

There was no statistically significant difference in the perception of quality of off-campus housing on the basis of gender and years of study. However, students of different gender held different levels of perception of quality between off-campus SHFs and on-campus accommodation. The female students (64%) had a more positive perception of the quality of off-campus accommodation than did male students (52%). The perception of quality of off-campus residences was found to increase as the income of students rose and as students move to higher academic levels. A possible explanation of this trend might be that wealthy students could afford SHFs that have better attributes that are found in self-contained and shared flat with private amenities. Secondly, students with higher income could possibly acquire superior personal amenities and furniture to re-arrange their residences to meet their individual needs. The perception of higher quality by senior students could be influenced by years of experience with campus accommodation. Senior students who had adapted to the environment could easily identify SHFs types and locations that yield higher quality as most of these off-campus accommodation facilities are not advertised. In addition, students may tend to relax judgment on the quality of attributes as a result of prolonged experience with the SHFs environment. Consequently, the quality of attributes of SHFs is taken for granted.

Equally important in the results are the impacts of the interaction between pairs of demographic variables on the perception of quality. The interaction between the age of students and year of study, gender and income level, and year of study and income levels on the perception of quality were statistically significant. Investors in off-campus accommodation might consider the individual and combined effects of the demographic characteristics of students on preference and perception of quality to segment the market. These findings are indicators that a more targeted approach to off-campus development and improvement may be a worthwhile effort.

5.0 CONCLUSION AND RECOMMENDATION

The influence of the demographic characteristics of residents on the perception of quality of off-campus student housing is important to SHFs development. The findings of the study revealed that though the demographic characteristics of students are essential in the determination of perception of quality of attributes of housing, the degree of influence differs among gender, age groups, income levels and the years of study of students. The influence of age, gender, income and year of study on the perception of quality of off-campus accommodation were also found to be statistically significant. The main implication of these findings is that investors in the student housing market could segment the development of off-campus accommodation to serve a selected demographic group(s) of residents.

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