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IMPACT OF DEMOGRAPHIC FEATURES ON HEALTH AND SAFETY PRACTICES OF CONSTRUCTION CONTRACTORS IN ABUJA, NIGERIA

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ABSTRACT
The construction sector plays a vital role in the economic development of developed and developing nations. Surprisingly, it also contributes greatly to the occupational accidents and ill-health record. To address this problem, this study set out to evaluate the impact of demographic features on the health and safety (H&S) management practices of Nigerian construction small and medium-sized enterprises (SMEs). The study explored whether these demographic features (years of experience, number of employees and age of firm) could significantly predict/influence the major H&S practices of the SMEs. The study involved the conduct of a survey using questionnaires with both closed and open-ended questions to obtain data. The data obtained were used to determine associations between independent variables identified in the literature and 46 H&S practices of SMEs which addressed five H&S core practice areas. The questionnaire was presented to 436 SMEs which were randomly sampled from the 2219 construction contractors registered with Corporate Affairs Commission (CAC) in Abuja. Factor analysis was employed to reduce the 46 H&S practices to eight major H&S practices used for further analysis. The use of hierarchical multiple regression analysis was finally employed to establish the relationship between demographic features and H&S practices of construction SMEs. It was established that all the demographic features are good, positive and significant predictors of H&S practices of construction the SMEs. It was therefore recommended that construction SMEs should lay great emphasis on training and orientation for all level of employees to address the issue of poor safety performance and poor attitude.

Keywords: *Construction, Demographic Features, Health and Safety Practices, Impact.*

1. INTRODUCTION

The importance of the construction industry in the National Development of a Nation cannot be over emphasized. This is because at least 50% of the investments in various development plans are primarily in construction. It is the next employer of labour after agriculture in developing countries, about 10% of labour force (Okeola, 2009). In developed countries, activities in the construction industry especially building and civil works are used as indices of economic growth and buoyancy or recession. The output of the industry in Nigeria, as reported by Okeola (2009), accounts for over 70% of GDP and therefore it is a stimulator of national economy. Alongside the attractiveness of the construction industry in nation building as identified above, it has also been identified as the most risky and hazardous of all industries in terms of health and safety because its activities pose serious health and safety risks to workers, users of construction facilities and the public. It has been acknowledged that 25% – 40% of fatalities in the world's occupational settings are contributed by construction (ILO, 2001, 2005a & 2005b; Murie, 2007).

Okpan and Agha (2013) added that the problem of health and safety in the workshop, sites, built facilities and the field in Nigeria cannot be overemphasized, hence, careless attitudes, overconfidence and failure to provide healthy and working safety measures and periodic health and safety seminar for the stake holders and general public triggers a high risk of accidents in construction industry. In the recent past in Nigeria, especially 2005 till date, death tolls, permanent disability and severe environmental threat had been on the increase through collapse of buildings and major operational accidents especially in Abuja, Lagos and Port Harcourt (Awodele and Ayoola, 2005; Olatunji and Aje, 2007). For instance, a study of 40 contractors in Nigeria conducted by Idoro (2011) revealed that the

accident and injury rates in Nigerian construction industry are high (in 2006 - the best safety ratios were 2 accidents per 100 workers and 5 injuries per 100 workers). This unfortunate scenario has been a monumental threat to productivity and the overall performance of construction projects in Nigeria.

Idubor and Oisamoje (2013) emphasized that all organizations have a duty of care to ensure that employees and other persons who may be affected by the company's undertakings remain safe at all times because maintaining a high standard of operational health and safety is for the benefit of all. Adeniran (2013) reported that it was with realization of the fact in the ILO declaration that "labour is not a commodity" but an essential economic factor which has to be well protected that Federal Government of Nigeria created, staffed and funded various departments in relevant Ministries, parastatals and agencies to formulate and administer policies, laws and regulations that protect the workers against illness, disease and injuries arising from employment of labour. It is said that despite this effort the cases of occupational accidents and illnesses are recorded higher annually, hence the need for an enabling framework to facilitate proper implementation and enforcement of the Occupational Health and Safety (OHS) laws and regulations.

The construction industry comprises many different participants including clients, consultants and construction businesses that perform different roles from conception to commissioning of a typical construction project (contractors). Contractors occupy a significant position and are regarded as the major players in the construction industry. Researchers regard them as one of the most important participants in the industry. This claim is borne out of the fact that contractors produce majority of construction products in Nigeria. Since contractors are responsible for executing construction projects and they employ the workers that do the jobs, as reported by Idoro (2011), they are therefore one of the parties that influence the OHS conditions of the industry. In developing countries, there are fewer large construction businesses compared with small and medium sized construction businesses (Addo-Abedi, 1999 and Kenny, 2007 cited in Kheni, 2008). Construction Small and Medium Sized Enterprises (Construction SMEs) play an important role in the economies of developing countries. The majorities of contractors in developing countries, including Nigeria, are SMEs and operate within domestic markets (Koehn *et al.*, 1995; Kheni *et al.* 2006; Idoro, 2011). These domestic construction businesses which operate within the domestic construction market are managed as family businesses, rarely employing up to 200 employees (Addo-Abedi, 1999). Due to this, most SMEs die within their first five years of existence. Another smaller percentage goes into extinction between the sixth and tenth year thus only about five to ten percent of young companies survive, thrive and grow to maturity.

As a result of the high population of the SMEs, which majority of the clients patronize in developing countries, the health and safety risks posed by their activities cannot be ignored. Kheni et al. (2007) and Kheni et al. (2008) discovered that foreign contractors operating in developing countries, especially Ghana, effectively manage health and safety whereas indigenous construction businesses have no effective arrangements in place for controlling health and safety risks because health and safety standards on sites are rarely enforced to the latter due to lack of resources for enforcement and lack of enabling environment which promotes occupational health and safety. In the light of this, Kheni (2008) recommended that the particular context of developing countries requires a holistic view of health and safety management that takes account of the contextual environments of construction SMEs in the areas of economic, legal, institutional and cultural background which are defined by organizational characteristics and the

health and safety management practices of these construction SMEs.

Nigeria being a developing nation like Ghana has its construction industry faced with similar problems as the ones identified by Kheni et al. (2007) and Kheni et al. (2008). This therefore necessitates the importance for this study to be based on the philosophy of studying the demographic features (important components of organizational characteristics) influences on health and safety performance within the contextual environment of Nigerian construction SMEs using a case study of Abuja. Abuja is the capital city of Nigeria where construction activities take place most because it experiences rapid population increase and new developmental projects daily due to rapid urbanization and rural-urban migration leading to constant increase in demand for shelter for both residential and commercial purposes.

1.1 Organizational/Demographic Characteristics of Construction SMEs

According to Chinowsky *et al.* (2007) an organization is the overall corporate entity of a company including all levels of management and staff personnel. Organizational characteristics are therefore the unique or distinguishing features which defines an organization or a corporate entity. The organizational characteristics of a construction firm are therefore the unique features which define the performance of the construction firms. Different researchers have used different parameters as organizational characteristics to define or determine the performance of construction firms.

Okafor (2007) identified four organizational characteristics in the study of the relationship between organizational characteristics and performance of Nigerian quoted companies. The four variables used by Okafor (2007) to define organizational characteristics are staff, style, skills and shared values. Duda *et al.* (2012) used five variables to define the organizational characteristics of construction firms in carrying out a survey of selected construction industry organizations in Lagos State, Nigeria. These five organizational characteristics are years of experience of firm, type of organization (consulting, contracting or client), size of organization (in terms of annual turnover and growth rate), number of employees and number of projects handled within the last five years. Odediran et al (2012 and 2013) identified five organizational characteristics in the study of the business structure of indigenous firms in the Nigerian construction industry. These organizational characteristics identified are firm's size (which was determined using annual turnover, staff strength and equipment capacity), area of specialization (which was grouped in to building, civil and industrial/heavy engineering), type of client (which was grouped in to public, federal ministries/parastatals, state ministries/parastatals, local governments, private individual/institutions, international agencies and Non Governmental Organizations), business type (which was grouped in to build only, design & build or package deal, design, build & finance and design, build & operate), project funding arrangement (which was grouped in to bank loans, retained earnings, share capital and mobilization) and years of experience of firm.

The most commonly used organizational characteristics of firms, which are demographic, were used in this study to define the distinguishing features of the Nigerian construction SMEs. These are years of experience, age of firms and number of employees.

1.2 Review of Major H & S Practices of Construction Contractors

Past research has shown that certain practices can lead to improved health and safety performance and therefore constitute good health and safety practices. These findings as summarized by Kheni (2008) and findings from the

review of literature from this study are presented in Table 1

Table 1: Summary of Researches on H&S Management Practices

Year and Authors	Summary of Research	Health and Safety Management Practices
Simonds and Sahrai (1977) cited in Kheni (2008)	Identified factors that distinguished firms with lower injury frequency rates from those with higher rates	The distinguishing factors include the following: top management involvement; higher average age of workers; longer average length of employment; adequate working space and neat environment; and higher percentage of married workers.
Laska et al. (1993) cited in Kheni (2008)	Identified zero accident techniques	Identified the following to be associated with safety success: safety training and orientations; provision of safety incentives; safety pre-task planning included in safety goals; safety person or personnel; safety policies and procedures; fire protection programme; accountability-responsibility and safety budget; alcohol-and substance-abuse programme in place; accident and near-miss investigation; and, record keeping and follow-ups.
Haselkus et al (1996) cited in Kheni (2008)	Strategies for achieving excellence in construction safety performance	Companies with lower recordable incidence rates were characterized by the following: more detailed safety programmes; * expended large percentage of revenue on safety programmes; greater safety training time; more formal safety inspections per month; and, * more safety meetings.
Gallagher (1997) cited in Kheni (2008)	Identified factors associated with improved health and safety performance	The study identified the following factors the associated with better health and safety performance: high level of top management commitment; health and safety responsibility known; supervisor involvement encouraged; active involvement of health and safety representatives who have a broad role; effective health and safety committees; planned identification of risk and hazard elimination/control emphasis; and, comprehensive approach in inspections and investigations.
Nasirin and Haddinus (the 2008) cited in Kheni (2008)	Investigated the effectiveness of safety programmes in the construction industry	Safety performance was found to be influenced by the nature of the implemented programmes. Particular elements of safety programmes found to be positively associated with safety performance included: accident investigations; jobsite inspections; job hazard analysis; safety inductions; safety record keeping; safety committees; safety incentives; and, control of subcontractors.

Source: Kheni (2008)

Table 1 (Continued)

Year and Authors	Summary of Research	Health and Safety Management Practices
Idoro (2011)	Studied the influence of mechanization on OHS performance of the Nigerian Construction Industry	Mechanization was discovered to have the tendency to worsen OHS performance of the construction industry when not properly managed. It was then recommended that stakeholders should give more attention to OHS management plan, and, hazard management plan in the use of plant and equipment on site should be given more priority.
Agwu (2012(a))	Studied the implications of integrating safety and social responsibility initiatives at the organizational level in the Nigerian construction industry	It was concluded that integrating safety and social responsibility in construction activities results in better corporate performance. The following were suggested as linking factors between safety and social responsibility: the use of ISO 26000; holding top management accountable for safety; and, communicating safety value to corporate stakeholders.
Agwu (2012(b))	Assessed the impact of employees' safety culture on organizational performance.	The organizational cultural factors identified to be improving employees safety performance at work are: visibility of management commitment to construction employees' safety culture, establishment of monthly safety incentive schemes for employees, training and retraining of employees on safe work procedure, increase in site safety audits, and, focusing on monthly safety meetings on employees' attitudinal change towards safety.
Bello and Mahmud (2012)	Studied safety culture of Nigerian construction workers in Yola	It was discovered that: Construction workers' attitude toward s safety is influenced by their perception of risk, safety rules and procedures. Lack of training of workers was ranked the most severe factor that hinders workers' safety on site. Reduce accident cost was ranked the most important benefit of safety on site while Poor understanding of the risk s associated with the work was ranked second and these could all be attributed to the poor safety culture in the Industry.
Okolie and Okoye (2012)	Assessed the impact of national culture on the safety climate of construction workers in South-East, Nigeria	Four cultural dimensions were identified having positive correlation with safety climate and which invariably influence the safety perceptions and behaviour of construction workers. These are: * Long Vs Small power distance, * Individualism Vs Collectivism, * Strong Vs Weak uncertainty avoidance, and, Masculinity Vs Femininity.

Source: Authors' review of literature on H&S Management Practices (2014)

Table 1 (Continued)

Year and Authors	Summary of Research	Health and Safety Management Practices
Idoko and Ogunsiye (2013)	Examined background of OHS practices in Nigeria by highlighting the importance of mitigating OHS challenges identified from moral, legal and financial dimensions	Reasons for frequent violation of OHS standards and norms by the operators, against the background of extant health and safety legislation in Nigeria, were identified as bribery and corruption in the system, the Nigerian factor, monitoring institutions, low level education of employees, and, inadequate funding. Problems of unemployment
Okobe and Okoye (2013)	Developed a framework for incorporating cultural elements in issues relating to construction businesses	The study identified cultural factors influencing behaviour and perceptions of construction workers towards safety in South - East Nigeria to be collectivism, uncertainty avoidance, long term orientation, power distance, and, masculinity
Okoye and Okobe (2014)	Assed the cost of health and safety performance of building contractors in Nigeria and the relationship between cost performance and success of building projects	It was concluded that health and safety performance of contractors affect success of building projects in terms of delivery time, quality, cost and productivity
Agumba and Haupt (2014)	Examined the validity and reliability of health and safety practices and respondents demographic attributes perception on these health and safety practices implementation of South African construction SMEs	It was established that th health and safety practices were valid for construction SMEs It was also discovered that the number of years (experience) of employer's/employees in an organization and perception towards health and safety did not differ, while educational level of employer/employee in an organization and perception towards health and safety differed

Source: Authors' review of literature on H&S Management Practices (2014)

1.3 *Summary of Findings from Previous Research*

On a general note from the review of literature in this study, health and safety management literature suggests a move towards stricter health and safety legislation and more proactive approaches to managing health and safety risks. Literature on health and safety tends to focus on legislation and on workplace arrangements for effectively dealing with health and safety risks. As reviewed in this study, it was discovered that the characteristics of construction SMEs make them present unique problems in health and safety management and therefore unique solutions need to be devised.

The literature discussions in this chapter conclusively give rise to two key issues - difficulties in adoption of health and safety practices by SMEs and the roles the contextual environments of construction SMEs and their organisational characteristics play in health and safety management. Three critical research questions with regards to these key issues are:

- What are the constraints limiting the capability of Nigerian construction SMEs from carrying out their operations in a healthy and safe manner?
- What are the main health and safety management practices/procedures adopted by the Nigerian construction SMEs in controlling the risks of hazards in the construction industry?
- What is the influence of organizational characteristics on the health and safety management practices of Nigerian construction SMEs?

The following propositions (P_1 and P_2, derived from the third question and literature discussions relating to it, summarize the relationships between SME demographic characteristics and health and safety practices.

P_1: construction SMEs with few employees are less likely to adopt health and safety practices. Those with a large number of employees are likely to be health and safety conscious and adopt measures to control health and safety risks.

P_2: long established SMEs are more likely to adopt health and safety measures than newer companies.

In the light of the above and seeking answers to the research questions and investigating the propositions stated above, the study aims to evaluate the impact of demographic features on the H&S management practices of Nigerian construction SMEs. In order to achieve this aim, the specific objectives of the study are stated thus:

- To identify the constraints limiting the capability of Nigerian construction SMEs from carrying out their operations in a healthy and safe manner.
- To assess the health and safety management practices/procedures adopted by the Nigerian construction SMEs in controlling the risks of hazards in the construction industry.
- To establish the influence of demographic features on the health and safety management practices of Nigerian construction SMEs.

2. METHODOLOGY

This study adopted the mixed methods approach or what Kheni (2008) referred to as multimethodology. Multimethodology, according to Kheni (2008) refers to the combining of whole or parts of qualitative and quantitative research methods either originating from the same or different paradigms in particular research situation. This is a multi-paradigmatic position argued to follow from the study's context (SMEs) and the diversity of information needed to shed light on health and safety management. The study involved the conduct of a survey using questionnaires with both closed and open-ended questions which were used to examine the significance and incidences of health and safety practices of construction SMEs within the study setting and the constraints to the management of health and safety. The data obtained was used to determine associations between independent variables identified in the literature and health safety management practices of SMEs. A pilot study carried out revealed that 46 H&S practices were very important and considered to have major impact to improve H&S performance of SMEs. These H&S practices comprised the final questionnaire to the SMEs in the Nigerian construction industry. The 46 practices addressed five H&S core practice areas. The respondents, who are experts with reasonable years of experience in construction, were required to indicate their level of agreement with the H&S practices. The questions were ranked on a five-point Likert's scale; where 1 = least important, 2 = less important, 3 = undecided, 4 = Important and 5 = most important.

Other sections of the questionnaires were designed to get the respondents' demographic information: size and age of firms. The questionnaire was pilot tested with ten (10) top management personnel and experienced H&S officers. The final version was presented to 436 SMEs which were randomly sampled from the 2219 construction contractors contained in the list of construction contractors registered with Corporate Affairs Commission (CAC) in Abuja, Nigeria. This sample was based on Watson's (2001) formula for getting a representative sample size from a large population. Out of the 436 questionnaires distributed, 235 were returned and found useful for analysis, thereby giving a good response rate of 53.9%. The study employed the use of both descriptive and inferential methods of analysis to analyse the collected data in order to achieve the objectives of the study. In order to achieve the first objective of the study, frequency/counts/percentage was employed to determine the major constraints facing the SMEs in the proper management of H&S on site. To achieve the second objective of the study, the use of Literature Review was employed to identify the the H&S management practices adopted by the Nigerian construction SMEs in controlling the risks of hazards on construction sites. The identified H&S management

practices adopted by the Nigerian construction SMEs in controlling the risks of hazards on construction sites are thereafter ranked respectively with the use of Mean Item Score (MIS) and percentages in order to determine the level to which they are been implemented.

Factor analysis was employed, based on the work of Pallant (2013), to reduce the 46 H&S practices identified from the review of literature to eight major health and safety management practices/ which were used for further analysis to explore the relationship between demographic features (years of experience of employees, age of firm and number of full-time employees in firm) and the eight set of H&S practices (domestic health and safety practices of firms, practices given as provisions in conditions of contract, use of outside health and safety consultants, workers' consultation and participation, health and safety communication, pre-contract health and safety panning, contract health and safety planning, health and safety education and training) explored. The use of SPSS 13.0 computer software package was employed to determining whether research data set was suitable for factor analysis or not by considering the sample size, and the strength of the relationship among the variables (or items). After confirming the suitability of the research data for data analysis, factor extraction was done using the principal components analysis techniques which are Kaiser's criterion, scree test, and parallel analysis. After the factors have been extracted, the results are then interpreted based on the number of factor rotation components done by SPSS software by checking the variables that load strongly on each component.

The use of hierarchical multiple regression analysis was employed to establish the relationship between organizational characteristics and H&S practices of construction SMEs in Nigeria, based on the recommendation of Agumba and Haupt (2014). The following tests were carried out to confirm the suitability of the data in this study for multiple regression analysis before being subjected to multiple regression analysis:

- Normality test by inspecting the Normal Probability Plot (P-P) of the Regression Standardized Residual and the Scatterplot.
- Linearity test by inspecting the Normal Probability Plot (P-P) of the Regression Standardized Residual and the Scatterplot.
- Multicollinearaity test by inspecting the Normal Probability Plot (P-P) of the Regression Standardized Residual and the Scatterplot.
- Homoscedasticity test by inspecting the Normal Probability Plot (P-P) of the Regression Standardized Residual and the Scatterplot.
- Outliers Test by inspecting the Scatter plot and Mahalanobis distances produced by the multiple regression program.

3. RESULTS AND DISCUSSIONS

3.1 Results of Descriptive Analysis

3.1.1 Results of Demographic Features

The results revealed that most of the respondents (69.36%) have had between 1 and 15 years of experience at the construction firm and majority of others (representing 23.4% of the total number of respondents and 76.4% of others) have years of experience between 16 and 20 years. In the light of this, the respondents are discovered to be suitable to provide accurate answers to the questions in the research questionnaire. It was also revealed that majority of the firms (62.13%) have been in existence for more than 10 years implying that the firms are suitable and old enough to provide accurate response to the questionnaire. It was gathered from the results that 38% of the construction SMEs has a size band of less than 30 workers while 31% of the construction SMEs have the size band of 31 – 70 workers and 31% of the construction SMEs has a size band of 71 – 200 workers. This reveals that most of

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the construction firms (62%) are Small and Medium – sized Enterprises.

3.1.2 *Results of Important H&S Practices*

The descriptive analysis of results of the important H&S practices of SMEs which are capable of enhancing H&S performance revealed 46 important H&S practices under 5 major or core H&S practices which are *company's commitment, workers' consultation & participation, H&S communication, H&S planning* and *H&S education & training*. Twelve important H&S practices were identified under company's commitment with Relative Importance Index (RII) ranging between 0.92 and 0.71. The practices here range from *provision of first aid box* which is the highest ranked (0.92) to *implementation of employee drug testing* which is the least ranked (0.71). Four important H&S practices were identified under workers' consultation and participation. These are *rewarding workers who demonstrate exemplary safe behaviour on site* with RII of 0.81 and *consulting trade union representatives on health and safety matters* with RII of 0.78. H&S communication comprises of 8 H&S practices ranging from *using health and safety posters & other signs to give safety education* (RII = 0.88) to *communicating health and safety through company newsletter* (RII = 0.70). The twelve important H&S practices discovered under H&S planning range between *identifying hazards on sites before work commences* (RII = 4.50) and *obtaining a labour certificate for every contract* (0.70). The fifth core H&S practice which is H&S education & training has 6 H&S practices ranging between *organizing health and safety training and retraining for supervisors and/or senior management* (RII = 0.88) and *organizing alcohol- and substance-abuse programme* (RII = 0.74). Table 2 summarizes these results.

Table 2: Ranking of H&S practices

S/NO	COMPANY'S COMMITMENT	RII	RANK
1	Provision of first aid box	0.92	1st
2	Provision of personal protective equipment	0.88	2nd
3	Keeping of safety record keeping and follow-ups	0.88	3rd
4	Provision of procedures for investigating accidents and nearmisses	0.87	4th
5	Existence of formal health and safety policy	0.86	5th
6	Provision of adequate work space and neat environment	0.84	6th
7	Having a designated safety personnel	0.84	7th
8	Having fire protection programme	0.84	7th
9	Provision of cloak and toilet	0.82	9th
10	Provision of procedures for reporting accidents	0.79	10th
11	Using outside health and safety consultants	0.78	11th
12	Existence of minimization policy for cost of ill-health and injury	0.83	12th
13	Provision of drinking water on site	0.76	13th
14	Provision of canteen service on site	0.74	14th
15	Use of ISO 26000 to identify social responsibilities of employees	0.74	14th
16	Implementing employee drug testing	0.71	16th
S/NO	**HEALTH & SAFETY COMMUNICATION**	**RII**	**RANK**
17	Using health and safety posters and other signs to give safety education	0.88	1st
18	Using verbal communication with operatives during site tours	0.88	1st
19	Communicating safety value to corporate stakeholders and use of two-way safety communication	0.84	3rd
20	Discussing health and safety during site meetings	0.83	4th
21	Communicating health and safety performance to employees	0.83	4th
22	Focusing your monthly safety meetings on employees' attitudinal change towards safety	0.83	4th
23	Networking with other companies/institutions	0.78	7th
24	Communicating health and safety through company newsletter	0.70	8th
S/NO	**HEALTH AND SAFETY PLANNING**	**RII**	**RANK**
25	Identifying hazards on sites before work commences	0.90	1st
26	Providing job hazard analysis	0.90	1st
27	Documenting risk assessments	0.88	3rd
28	Carrying out post-accident investigation	0.87	4th
29	Price health and safety in preliminaries	0.85	5th
30	Carrying out safety pre-task planning	0.85	5th

Table 2 (Cont.)

S/NO	HEALTH AND SAFETY PLANNING	RII	RANK

31	Documenting method statements	0.84	7th
32	Exercising disciplinary measures to correct wrong behaviours relating to health and safety	0.83	8th
33	Providing emergency response plan	0.81	9th
34	Providing insurance cover for sites and Employer-paid group insurance plan	0.77	10th
35	Ensuring adequate welfare provisions on site	0.74	11th
36	Obtaining a labour certificate for every contract	0.70	12th
S/NO	**WORKERS' CONSULTATION AND PARTICIPATION**	**RII**	**RANK**
37	Rewarding workers who demonstrate exemplary safe behaviour on site	0.84	1st
38	Asking workers for their ideas on health and safety matters	0.80	2nd
39	Involving workers to participate in hazard identification on sites	0.80	2nd
40	Consulting trade union representatives on health and safety matters	0.78	4th
S/NO	**HEALTH & SAFETY EDUCATION AND TRAINING**	**RII**	**Rank**
41	Organizing health and safety training and retraining for supervisors and/or senior management	0.88	1st
42	Organizing orientation on safety for new workers	0.88	1st
43	Organizing health and safety training of operatives - first aid, manual lifting etc	0.88	1st
44	Organizing site inductions for operatives	0.86	4th
45	Organizing toolbox talks	0.74	5th
46	Organizing alcohol- and substance-abuse programme	0.74	5th

3.2 Factor Analysis

Factor analysis was employed to reduce the 46 H&S practices identified to 8 major H&S practices. Each of the 5 core H&S practices were subjected to Principal Component Analysis (PCA) using SPSS Version 13.0. Prior to the performance of PCA, the suitability of the data for Factor Analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of 0.5 and above. The Kaiser-Meyer-Okin (KMO) value was 0.916, exceeding the recommended value of 0.6 (Kaiser, 1970, 1974 cited in Pallant, 2013) and Bartlett's Test of Sphericity (Bartlett, 1954 cited in Pallant, 2013) with the value of 0.000 reached statistical significance of $p < 0.05$, supporting the factorability of the correlation matrix in all cases. The eight major H&S practices which the 46 practices were reduced to and used for further analysis (hierarchical multiple regression) are summarized below:

- Domestic Health and Safety Planning of Firms
- Practices Conforming to HSE Requirements in Conditions of Contract
- Using Outside Health and Safety Consultants
- Workers' Consultation and Participation
- H&S Communication
- Pre-contract Health and Safety Planning
- Contract Health and Safety Planning
- Education and training

3.3 Results of Hierarchical Multiple Regression Analysis

The use of hierarchical multiple regression analysis was employed to explore the relationship between the three demographic features which are years of experience of employee in firm, age of firm and number of employees in firm, and the 8 major H&S practices of firms identified from the Factor Analysis carried out. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity for each of the cases. The preliminary analyses revealed that there was no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity because the tolerance value was greater than 0.10, variance inflation factor (VIF) value less than 10, Normal P-P Plot points lie in a reasonably straight diagonal line from bottom left to top right and the Scatterplot standardized residuals roughly rectangularly distributed. The presences of outliers were also checked and it was observed that the maximum Mahalanobis Distance value was greater than the critical value (24.32)

indicating absence of outliers. The maximum Cook's Distance in all the analysis was less than 1 indicating the absence of any undue influence on the results of for the whole model.

3.3.1 *Relationship between Demographic Features and Domestic Health and Safety Planning of Firms*

This analysis revealed that Number of Employees beta (beta = 0.484; $p < 0.001$), Years of Experience of Employees (sig (p) value of 0.024 ($p < 0.05$)) and Age of Firm (sig (p) value of 0.000 ($p < 0.05$)) were statistically significantly related with Domestic Health and Safety Planning of Firms at 95% confidence limit.

3.3.2 *Relationship between Demographic Features and Company's Commitment*

It was revealed from this analysis that Years of Experience (sig = 0.035; $p < 0.05$ beta = 0.137), Age of Firm (sig = 0.001; $p < 0.005$; beta = 0.229) and Number of Employees (sig =0.004; $p < 0.05$; beta = 0.228) were respectively observed to be statistically significant with Company's Commitment from HSE Requirements in Conditions of Contract at 95% confidence limit.

3.3.3 *Relationship between Demographic Features & company's commitment to using outside H&S consultants*

None of the demographic features was observed to be significantly related with Company's Commitment to Using outside H&S Consultants at 95% confidence limit from this analysis.

3.3.4 *Relationship between Demographic Features and Workers Consultation & Participation*

Number of Full-time Employees (beta = 0.321; $p < 0.001$), Years of Experience of Employees (sig (p) value of 0.021 ($p < 0.05$)) and Age of Firm (sig (p) value of 0.000 ($p < 0.05$)) were observed in this analysis to be significantly related with Workers Consultation & Participation at 95% confidence limit.

3.3.5 *Relationship between Demographic Features and H&S Communication*

Number of Full-time Employees (beta = 0.369; $p < 0.005$), and Age of firm ((p) value of 0.000 ($p < 0.05$)) were observed to be statistically significant with H&S Communication at 95% confidence limit in this analysis.

3.3.6 *Relationship between Demographic Features and Pre-contract Health & Safety Planning*

It was discovered from this analysis that there exists a statistically significant relationship between Pre-contract H&S Planning and Number of Full-time Employees (beta = 0.500, $p < 0.005$), Years of Experience of Employees (sig (p) value of 0.017 ($p < 0.05$) and beta value of 0.155) and Age of Firm (sig (p) value of 0.000 ($p < 0.05$) and beta value of 0.416).

3.3.7 *Relationship between Demographic Features and Contract H&S Planning*

Number of Full-time Employees (beta = 0.360; $p < 0.005$), Years of Experience of Employees (sig (p) value of 0.023 ($p < 0.05$) and beta value of 0.148) and Age of Firm (sig (p) value of 0.000 ($p < 0.05$) and beta value of 0.320) were statistically significant with Contract H&S Planning at 95% confidence limit as revealed in this analysis.

3.3.8 *Relationship between Demographic Features and H&S Education & Training*

It was shown from the results of this analysis that Number of Full-time Employees with a beta value of 0.477 (beta = 0.477, sig = 0.000 i.e. $p < 0.005$) and Age of Firms with sig (p) value of 0.000 ($p < 0.005$) and beta value of 0.382 were observed to be significantly related with H&S Education & Training.

The results of all the analyses discussed above led to the rejection of the hypothesis formulated based on literature

findings, third research questions and the study's proposition, except in the third analysis between Demographic Features and company's commitment to using outside H&S consultants. This hypothesis is stated thus.

H0 There is no significant relationship between demographic features and health and safety management practices of Nigerian construction SMEs.

3.4 Constraints to Construction Site H&S Management

It was discovered from the responses of the questionnaires distributed to construction SMEs that the construction firms face a lot of challenges which limit their ability to effectively perform activities on construction sites in a safe and healthy manner. About 60% of the respondents express their experience on the challenges they face in effective health and safety management on site. Some of these construction SMEs face the problem of poor attitude of their workers towards safety while some of them face the problem of being able to retain experienced workers. This implies that a large proportion of the respondents indicated that they experience difficulties in the management of health and safety. Lack of proper awareness of some health and safety regulations is the problem facing some of the construction SMEs while some face the problem of inadequate capital base. The major constraints faced by the construction SMEs, in order of severity, are discussed below based on the opinions of respondents.

3.4.1 Literacy Level

It has been discovered that most of the workers, especially the unskilled workers, are not literate. Some of them are either not well educated or they are not educated at all. It is therefore usually difficult to give them the appropriate health and safety orientation/education to make them work better in a healthy and safe manner except if there is someone to interpret to them in their native dialect. One of the respondents had this to say:

> *"There is high level of illiteracy among the site operatives which, to a reasonable extent, contributes to their inability to understand safety directions on site"* (Respondent Number 4).

3.4.2 Poor Attitude of Construction Workers

About 75% of the respondents indicated that problem of poor attitude towards health and safety exists in their organizations. Most of the workers fail to wear their personal protective equipments even when they are provided on sites especially when they are not being monitored. A respondent had this to say:

> *"Human beings generally are difficult to manage on site, especially when you remind them of safety on site, they will say "I know sir". Seeing you he will act immediately, but as soon as you leave, he removes his helmet and gloves"* (Respondent Number 152).

3.4.3 *Financial Constraints.* Some constructions

SMEs lack the financial capability or buoyant capital base to adequately fund health and safety procedures on sites in terms of human and material resources. One of the respondents shared this on financial constraints:

> *"We sometimes experience financial constraint in meeting up with HSE Requirements. This makes us to cut down of the budget for health and safety"* (Respondent 101).

3.4.4 Environmental Influences

This is another serious problem to health and safety management on site which many firms either do not take note of, or do not take seriously. When some workers go to sites where the natives there have uncultured teen-agers or adults, they can influence workers of their peer-groups in to bad habits like smoking and drinking of alcohol.

3.4.5 Cost of Health and Safety

Some of the respondents expressed that the cost of putting health and safety procedures on sites is very expensive because most of the good health and safety equipments are imported or foreign materials which are expensive and scarce. In the light of this, most construction firms are not able to afford them but instead go for local substitutes which are usually of a lower quality or inferior in nature to the imported ones. One of the respondents simply put it this way:

> *"Cost of HSE is expensive if it is to be appropriately estimated in a bill"* (Respondent Number 123).

3.4.6 Lack of Basic Facilities

It was revealed by some of the respondents that some of the rural communities lack some basic facilities like ambulance, clinics, experienced medical personnel and drugs. If there is any emergency case on site it will be difficult to get urgent attention. A respondent simply expressed it this way:

> *"In rural communities, access to medicine facilities in terms of accidents is a problem"* (Respondent Number 135).

3.4.7 Job Security and Continuity

Some respondents stated job security and continuity as a factor that compelled them from relying greatly on casual labour and labour only subcontractors which they thought did not promote the effective management of health and safety. An owner/manager responded as thus:

> *"... because we don't know how long it will take us to get another contract after completing one. most of our unskilled workers are casual workers and so they don't take HSE seriously as the HSE Budget does not cover their HSE issues adequately"* (Respondent Number 86)

3.4.8 Lack of Awareness and Orientation from Government Regulatory Agencies

About 40% of the respondents revealed that the agencies responsible for regulating health and safety standards on sites, like the Factory Inspectorate Department, Labour Department and Federal Environmental Protection Agency, do not perform their functions effectively. This therefore results in to lack of proper awareness of some basic health and safety regulations and requirements by some construction firms.

3.4.9 Weather Condition

Poor weather condition is another challenge faced by construction SMEs. When the weather is extremely hot workers find it not conducive to properly put on their safety wears. When the weather is very cold or when there is heavy rain, work on site may have to stop and the health of workers may also be affected.

3.5 Discussion of Results

The study used three demographic features which define the H&S practices of construction SMEs. These demographic features are age of firm, experience of employees and number of employees which have also been used in many previous studies which includes that of Kheni (2008), Choudhry *et al.* (2009) and Masood and Choudhry (2012). The study also identified 46 important H&S practices which are capable of enhancing positive H&S performance of the construction SMEs. These H&S practices were reduced to 8 core H&S practices using factor analysis. These 8 H&S practices which range between domestic H&S practices and H&S education & training have also been studied by Kheni (2008) and Agumba and Haupt (2014). The relationship between the identified organizational characteristics and H&S practices was explored with the use of hierarchical multiple regression analysis as suggested by Agumba and Haupt (2014).

Number of full-time employees in firms was discovered to be a good predictor of 7 major health and safety practices

adopted by the construction SMEs namely: domestic HSE practices, HSE requirements con forming to the requirement in conditions of contract, workers' consultation and participation, H&S communication, pre-contract H&S planning, contract HSE planning and H&E education and training. The result of the study carried out by Idoro (2011) is evidence to the findings discussed above because it revealed that the protection provided to workers engaged by multi-national and national contractors is higher than the protection provided to workers engaged by regional and local contractors in order to protect workers from sustaining injuries in the event of accident. The findings of Adeogun and Okafor (2013) also corroborates with the finding of this study because it revealed that most of the indigenous establishments see HSE myopically such as cleanliness of the environment alone while the few companies that recognize occupational health and safety are the large companies or big multinationals who are running the policies as constituted in their parent countries of origin. Majority of the construction SMEs undertaking mainly civil engineering construction works are the medium-sized firms among which have a tendency of becoming large or multinational firms.

It was also discovered that years of experience of owner/managers significantly and positively correlated with five major H&S practices namely: domestic H&S practices, company's commitment to the H&S practices in the requirements in the conditions of contract, workers' consultation and participation, pre-contract H&S planning and contract H&S planning. The results of the study also indicate that age of construction SMEs is a significant predictor of 5 H&S practices which are: domestic H&S practices, company's commitment to the H&S practices in the requirements in the conditions of contract, workers' consultation and participation, H&S communication and pre-contract H&S planning. As a result of this, the second proposition that long established SMEs are more likely to adopt health and safety measures than newer construction SMEs is supported. This is supported by the results reported in studies of Fang et al (2006), Choudhry *et al.* (2009) and Masood and Choudhry (2012) who consensually discovered that age, gender and experience among other variables have significant impact on health and safety management practices. On the contrary the study of Agumba and Haupt (2014) revealed that the number of years the respondents was involved in the construction industry (experience) and their perception towards H&S management practices were not different in the South African construction industry.

The study also identified 9 major constraints to the effective H&S management practices of the construction SMEs which are literacy level, poor attitude of construction workers, financial constraints, environmental influences, cost of health and safety, lack of basic facilities, job security and continuity, lack of awareness and orientation from government regulatory agencies and weather condition. Most of these constraints have also been identified in previous studies as major hindrances to H&S management practices of construction SMEs especially in the study of Kheni (2008).

4. CONCLUSIONS

It was established that low literacy level, poor attitude of construction workers, financial constraints, environmental influences, cost of health and safety, lack of basic facilities, job security and continuity, lack of awareness and orientation from government regulatory agencies and weather condition are the major constraints limiting the capability of Nigerian construction SMEs from carrying out their operations in a healthy and safe manner.

It was also established that domestic health and safety planning of firms, practices conforming to H&S requirements in conditions of contract, using outside health

and safety consultants, workers' consultation and participation, H&S communication, pre-contract health and safety planning, contract health and safety planning and education and training, were very important H&S practices which are capable of enhancing high H&S performance of Nigerian construction SMEs.

It was also established that all the demographic features have positive and significant relationship with the H&S practices except with the practice of using outside health and safety consultants. The demographic features are therefore good predictors of H&S practices. The propositions of the research therefore hold. Thus implying that construction SMEs with few employees are less likely to adopt H&S practices than those with a large number of employees; and long established SMEs are more likely to adopt H&S measures than newer companies.

5. RECOMMENDATIONS

In view of the conclusions from the research findings, it was therefore recommended that construction SMEs should lay great emphases on training and orientation for all level of employees in order to address the issue of poor safety performance and poor attitude. Older firms should assist younger firms with H&S orientation and training while older and more experienced employees in a firm should assist younger and less experienced employees with H&S orientation and training.

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