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Dr. A. A. Shittu

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NIGERIAN JOURNAL OF TECHNOLOGICAL RESEARCH

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Background Brief: The Nigerian Journal of Technological Research (NJTR) is the official journal of the Federal University of Technology, Minna, Niger State, Nigeria. It was first published in June 1989. It has since made giant strides in its effort to provide an avenue for the dissemination of relevant modern up-to-date research information in the core areas of discipline available in The University at inception; namely, Pure and Applied Sciences, Engineering Technology, Environmental Technology and Agricultural Technology.

Philosophy: As a strictly scientific and technological journal, it tends to provide information on problem solving technology to its immediate environment and the international community.

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Editorial Comments.

The editorial comments for 2016 vol 11 no 1 is coming to you with excitement from your board. At the close of 2015, our esteemed authors, readers and subscribers were assured of a vibrant journal as technological advancement progresses. We like to inform you that the process of The Nigerian Journal of Technological Research joining the ScholarOne Team under Thomson-Reuters is now concluded. The journal webpage can now be accessed and manuscripts submitted using the template provided under scholarOne. That implies that the whole process of manuscript reception to review is now improved upon.

Dear authors and scientists, this journal has the ability to make your submissions more visible to colleagues outside your terrain and make your contributions more acceptable to a wider scope of readers. Please follow the journal webpage regularly since new changes will be introduced and subscribers would not wish to be left behind.

The Nigerian Journal of Technological Research would also bring in new concepts on manuscript preparation shortly which authors will be required to take note of. All these efforts by your Board is to ensure that the best is yet to be provided in the stride of making this journal a standard and well rated one.

The manuscripts in this edition further bring into lime light the technological focus of our university that has continued to strive in elevating recent scientific techniques across the globe. The manuscripts have tried to create a central focal point on integrated scientific research which gives an alignment to current day effort in ensuring scientists make cross border approaches to research and information.

In the next few editions this will be most obvious even with the structural processes embarked upon. Please keep faith with the journal and you will be glad.

Editorial Board.

Table of Contents	Page
Articles	
Agriculture	
Performance of Two Locally Adapted Okra Varieties as Influenced by Cucumber Mosaic Virus Disease. Salaudeen, M. T., Bello, L. Y. and R. O. Oyewale. http://dx.doi.org/10.4314/njtr.v11i1.1	1 - 6
Farmers Accessibility to the Cassava Initiative Elements in the Central Agricultural Zone of Nigeria. Kehinde Yewande Ogunleye http://dx.doi.org/10.4314/njtr.v11i1.2	7 - 13
Phosphorus adsorption pattern in selected cocoa growing soils in Southwestern Nigeria Aikpokpodion P. E, S. M. Omotoso and F. E. Asowata http://dx.doi.org/10.4314/njtr.v11i1.3	16 - 25
Engineering	
Modeling and Simulation of Energy Recovery from a Photovoltaic Solar cell Adeniyi, O. D., D. A. Ali, M. A. Olutoye, M. I. Adeniyi, O. S. Azeez, A. J. Otaru and B. O. Eniafe http://dx.doi.org/10.4314/njtr.v11i1.4	26 - 31
Application of Box-Behnken Design for Optimum Citric Acid Production from Cocoyam Starch Hydrolysate using <i>Aspergillus niger</i> . Amenaghawon, N.A., Ebewele, E.O. and O. Salokun http://dx.doi.org/10.4314/njtr.v11i1.5	32 - 39
Simultaneous Transesterification of Baobab Seed (<i>Adansonia digitata</i>) Oil Using Heterogeneous Zn/SiO ₂ Supported Catalyst. Olutoye, M.A., Adejumo, A.Y., Sunday, D.J., Opathe, J. I., Elendu, I.K., Folorunsho, A.I. and S. Y. Adams http://dx.doi.org/10.4314/njtr.v11i1.6	40 - 45
Life Sciences	
Physicochemical, bacteriological and metal analysis of some surface waters in Akure, Southwestern Nigeria. Olusola-Makinde, Olubukola Olayemi. http://dx.doi.org/10.4314/njtr.v11i1.7	46 - 53
Environmental Technology	
Probabilistic Analysis of Peak Daily Rainfall for Prediction purposes in Selected Areas of Northern Nigeria. Salami, A. W., A.S. Aremu, A.M. Ayanshola, T.S. Abdulkadir and M.K. Garba. http://dx.doi.org/10.4314/njtr.v11i1.8	54 - 59
* Impact of organisational characteristics on health and safety practices of construction contractors Abdullateef A. Shitnu, Ahmed D. Ibrahim, Yahaya M. Ibrahim, Kulomri J. Adogbo and Dumo O. Mac-Barango http://dx.doi.org/10.4314/njtr.v11i1.9	60 - 67
SHORT COMMUNICATION	
Changes In Serum Electrolyte Levels In Typhoid Fever Patients Attending Minna General Hospital Kabiru, A.Y., Tahir, I., Garba, M.H., Kuta, F. A., Jibril, A. and M. A. Shuaib. http://dx.doi.org/10.4314/njtr.v11i1.10	68 - 72



Abdullateef A. Shittu *et al.* (2016). Impact of organisational characteristics on health and safety practices of construction contractors. *NJTR* Vol. 11: 60-67

Impact of organisational characteristics on health and safety practices of construction contractors

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Abstract

The construction industry makes a contribution to occupational accidents and ill-health records in Nigeria. This study was designed to evaluate the impact of organisational characteristics on health and safety (H&S) management practices of Nigerian small and medium-sized construction enterprises (SMEs). The study employed a survey using questionnaires with both closed and open-ended questions which were used to examine the significance and incidences of H&S practices of construction. The questionnaire 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. Factor analysis was employed to reduce 46 important H&S practices identified to 8 major H&S practices used for further analysis. The use of hierarchical multiple regression analysis was finally employed to establish the relationship between organisational characteristics and H&S practices of the construction SMEs. It was established that all the organisational characteristics have significant relationship with the H&S practices. It was concluded that the organisational characteristics are good predictors of the H&S practices of the construction SMEs.

Keywords: Health and Safety, Impact, Organisational Characteristics, Practices.

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Introduction

The output of the construction industry in Nigeria reported by Okeola (2009), accounts for over 70% of Gross Domestic Product (GDP) and therefore it is a stimulator of national economy. Alongside the attractiveness of the construction industry in nation building, it has also been identified as the most risky and hazardous of all industries in terms of health and safety (H&S) 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 and 2005b; Murie, 2007).

Idubor and Oisamoje (2013) emphasized that all organizations have a duty to care for their employees and other persons who may be affected by the company

Most contractors in developing countries, including Nigeria, are Small and Medium Sized Enterprises (SMEs) and operate within domestic markets (Koehn *et al.* 1995; Kheni *et al.* 2006; Idoro, 2011). These SME contractors in developing countries (Koehn *et al.* 1995; Kheni *et al.* 2006), including Nigeria (Idoro, 2011), operate within domestic markets and are managed as family businesses, rarely

employing up to 200 employees (Addo-Abedi, 1999).

Foreign contractors operating in developing countries, especially Ghana (Kheni *et al.*, 2007; Kheni *et al.*, 2008) and Nigeria (Idoro, 2011), effectively manage Health and Safety; whereas indigenous construction businesses have no effective arrangements in place for controlling Health and Safety risks. This is because Health and Safety standards on sites are rarely enforced due to lack of resources for enforcement and enabling environment which promotes Occupational Health safety (OHS). The above problem necessitates the study of organisational characteristics on Health and Safety performance within the contextual environment of Nigerian construction SMEs using a case study of Abuja.

Nature of Health and Safety in the Nigerian Construction Industry.

Okeola (2009) reported that all over the world construction workers are 3 times more likely to be killed and twice as likely to be injured as workers in other occupations. In Nigeria there is no reliable data on accident cases in construction, because contractors do not report accidents at appropriate ministry nor keep proper records on accidents. According to Akpan (2011) management policy, especially in developing economies is yet to properly address the issue of employee Health and

Safety and this has resulted in frequent accidents and hazards, leading to inefficiency and ultimately decreasing performance in most construction organizations.

A poor Health and Safety performance in the Nigerian construction industry is evident from the above findings, thereby requiring drastic solution. This can only be achieved through a holistic approach by carrying out a study which will establish the influence of organisational characteristics and H&S practices of construction firms.

Organisational Characteristics of Construction SMEs

Organisational characteristics are the unique or distinguishing features which defines an organization or a corporate entity (Chinowsky *et. al.*, 2007). Different researchers have used different parameters as organisational characteristics to define or determine the performance of construction firms. Okafor (2007) identified the following four organisational characteristics: staff, style, skills and shared values. Dada *et. al.* (2012) used five variables to define the organisational characteristics of construction firms and these are years of experience of firm, type of organisation (consulting, contracting or client), size of organisation (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) also identified the following five organisational characteristics: firm's size, area of specialisation, type of client, project funding arrangement and years of experience of firm.

This study makes use of the more frequently used organisational characteristics to define distinguishing features of the Nigerian construction SMEs. They include, type of construction, years of experience, number of employees and firm's annual turnover.

Materials and Methods.

This study adopted the mixed methods (multimethodology) approach. 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. The study involved the conduct of a survey using questionnaires with both closed and open-

ended. The data obtained was used to determine associations between independent variables identified in the literature and 46 important H&S management practices of SMEs. The 46 practices addressed five H&S core practice areas. The questions used to identify important H&S practices 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 were designed to get the respondents' demographic information and organisational characteristics such as: type of business, size of firm and geographical location. The questionnaire was administered to 436 SMEs which were randomly sampled from 2,219 construction contractors contained in the list of construction contractors registered with Corporate Affairs Commission (CAC) in Abuja, Nigeria. Of the 436 questionnaires distributed, 235 were returned and found useful for analysis, thereby giving a good response rate of 53.9%.

Frequency/counts/percentage was employed to determine the major constraints facing the SMEs in the proper management of H&S on site. Identified H&S management practices adopted by the Nigerian construction SMEs were ranked with the use of Relative Importance Index (RII) in order to determine the level to which they are being implemented.

Factor analysis was employed, based on the work of Pallant (2013), to reduce the 46 H&S practices identified to eight major health and safety management practices which were used for further analysis. Preliminary analyses were employed to determine whether the research data set was suitable for factor analysis and regression analysis or not by considering the sample size, and the strength of the relationship among the variables (or items). Use of hierarchical multiple regression analysis was employed to establish the relationship between organisational characteristics and H&S practices of construction SMEs, based on the recommendation of Agumba and Haupt (2014).

Results and discussions.

Descriptive analysis on organisational characteristics.

Results revealed that most of the respondents (69.36%) had between 1 and 15 years of experience at the construction firm and

majority of others (representing 23.4% and 76.4% of others) have years of experience between 16 and 20 years. It was also revealed that majority of the firms (62.13%) have been in existence for more than 10 years. It was gathered from the results that 38% of the construction SMEs had 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 had a size band of 71 – 200 workers. This reveals that most of the construction firms (62%) are SMEs. Taking an overview of the results, it was shown that the construction firms predominantly undertake a combination of building and civil engineering construction works. The results also revealed that 20% of the construction SMEs have an average turnover of less than =N= 2,000,000.00, 21% have an average turnover ranging from =N= 2,000,000.00 - =N= 5,000,000.00, 15% have an average turnover ranging from =N= 5,000,000.00 - =N= 10,000,000.00, 16% of the SMEs have an average turnover ranging from =N= 10,000,000.00 - =N= 15,000,000.00 and 28% have an average turnover ranging from =N= 15,000,000.00 - =N= 20,000,000.00. In the light of these findings, the respondents are discovered to be from SME firms and therefore suitable to provide accurate answers to the questions in the research questionnaire.

Descriptive analysis on important Health and Safety practices.

The descriptive analysis results on the important Health and Safety practices of SMEs which are capable of enhancing this performance revealed 46 important Health and Safety practices under 5 major or core practices which are;

*Company's commitment,
Workers' consultation and participation,
Health and Safety communication,
Health and Safety planning and
Health and Safety education and training.*

Twelve important 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 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. Health and Safety communication comprises of 8 practices ranging from using health and safety posters and other signs to give safety education (RII = 0.88) to communicating health and safety through company newsletter (RII = 0.70). The twelve important practices discovered under Health and Safety 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 practice is Health and Safety education training has 6; 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).

These 5 core health and safety practices which range between domestic and education and training have also been studied by Kheni (2008) and Agumba and Haupt (2014) as important practices capable of improving performance of construction firms. Table 2 summarizes these results.

Table 2. Ranking of Health and Safety practices

S/NO	COMPANY'S COMMITMENT	RJI	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
	HEALTH AND SAFETY COMMUNICATION	RJI	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
	HEALTH AND SAFETY PLANNING	RJI	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
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
	WORKERS' CONSULTATION AND PARTICIPATION	RJI	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
	HEALTH AND SAFETY EDUCATION AND TRAINING	RJI	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

Results of factor analysis.

Factor analysis was employed to reduce the 46 H&S practices identified to 8 major H&S practices by subjecting them to Principal Component Analysis. These 8 major H&S practices are:

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

- Contract H&S Planning; and Education and Training.

Results and Discussions of hierarchical multiple regression analysis

The preliminary analyses carried out revealed that there was no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity.

Relationship between Organisational Characteristics and Domestic Health and Safety Planning of Firms.

This analysis revealed that Number of Employees (beta = 0.484; $p < 0.001$), Construction Type (beta = 0.180; $p < 0.001$), 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.

Relationship between Organisational Characteristics and Company's Commitment.

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

Relationship between organisational characteristics and company's commitment to using outside H and S consultants.

Only Construction Type (beta = 0.173; $p < 0.05$) was observed to be significantly related with Company's Commitment to Using outside H&S Consultants at 95% confidence limit from this analysis.

Relationship between Organisational Characteristics and Workers Consultation and Participation.

Number of Full-time Employees (beta = 0.321; $p < 0.001$), Construction Type (beta = 0.225; $p < 0.001$) were statistically significant, 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.

Relationship between Organisational Characteristics and Health and Safety Communication.

Number of Full-time Employees (beta = 0.369; $p < 0.005$), Construction Type (beta = 0.129; $p < 0.05$) and Age of firm ((p) value of 0.000 ($p < 0.05$)) were observed to be statistically significant with H and S Communication at 95% confidence limit in this analysis.

Relationship between Organisational Characteristics and Pre-contract Health and Safety Planning.

It was discovered from this analysis that there exists a statistically significant relationship between Pre-contract H&S Planning and four organisational characteristics which are Number of Full-time Employees (beta = 0.500; $p < 0.005$), Construction Type (beta = 0.181; $p < 0.005$), 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.

Relationship between Organisational Characteristics and Contract H and S Planning.

Number of Full-time Employees (beta = 0.360; $p < 0.005$), Growth Rate 2 (beta = -0.129; $p < 0.05$), 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.

Relationship between Organisational Characteristics and H and S Education and 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. $p < 0.005$), Growth Rate 2 with a beta value of -0.138 (beta = -0.138; sig = -0.015 i.e. $p < 0.05$) Construction Type with a beta value of 0.126 (beta = 0.126; sig = 0.028 i.e. $p < 0.05$) 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.

Relationship between Annual Turnover and Organisational Characteristics.

Annual turnover did not relate significantly with any health and safety management practices in the results of the hierarchical multiple regression analysis but showed fairly

strong correlation with most of the H&S management practices. In the light of this fairly strong correlation, annual turnover was further tested using the simple regression model in relation with each of the H&S management practices after testing and confirming that all the required statistical rules are not violated. It was however discovered that annual turnover has significant relationship with each of the H&S management practices at 95% confidence interval and $p < 0.005$, except HSE practices of using outside H&S consultants. Fairly strong and positive correlation ranging between 33% and 49% was observed between annual turnover and each of the H&S management practices. This therefore implies that annual turnover is a good predictor of domestic H&S Company's Commitment, H&S Requirements in Conditions of Contract, Workers' Consultation and Participation, H&S Communication, Pre-contract H&S Planning, Contract H&S Planning and H&S Education & Training.

The above findings agree with those of Fang *et. al* (2006), Idoro (2011), Choudhry *et. al* (2009), Masood and Choudhry (2012) and Adeogun and Okafor (2013). On the other hand, the study of Agumba and Haupt (2014) disagrees with some of the findings above because it revealed that the number of years the respondents were involved in the construction industry (experience) and their perception towards H&S management practices were not different in the South African construction industry.

Constraints to construction site H and 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. These constraints are *Literacy Level, Poor Attitude of Construction Workers, Financial Constraints, Environmental Influences, High Cost of H&S, Lack of Basic Facilities, Job Security and Continuity, Lack of Awareness and Orientation from Government Regulatory Agencies, and Weather Condition.*

Conclusions and Recommendations.

It was also established that all the organisational characteristics identified in the study have positive and significant relationship with the H&S practices. The organisational characteristics are therefore good predictors of H&S practices. The four 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; construction SMEs with small turnovers are less likely than their counterparts with large turnovers to adopt H&S measures; civil engineering SMEs are more likely to adopt health and safety practices compared to building contractors; and long established SMEs are more likely to adopt H&S measures than newer companies.

In view of the conclusions of the study, it is 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 experience employees with H&S orientation and training.

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