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Safety Climate and Safety Culture Policies of Construction Organisations in Nigeria

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ABSTRACT
Previous studies have reported that a positive correlation exist between workers' safe behaviour and safety climate within construction site environments. Studies have also regarded safety climate as the manifestation of safety measures in the behavioural and expressed attitude of the employee. Studies on safety climate and safety culture in Nigeria are scarce which has brought about a lack of knowledge of the policies relating to safety climate and safety culture among construction workers and construction organisations in Nigeria. This study investigated the safety culture and safety climate policies of construction organisations in Nigeria. Results showed that the most important policies contributing to safety culture are safety requirements policies, safety training and orientation policies, safety inspection policies, policies on safety material, policies on safety officers and safety supervisors. Also, the results showed that the most important policies contributing to safety climate are safety communication, safety plan, safety-related decisions, and safety-related cooperation between main contractor and different sub-contractors. These findings highlight the importance of integrating safety culture and safety climate through appropriate and relevant safety policies.
KEYWORDS: *Safety culture, safety climate, safety management, safety policies, safety training.*

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I. INTRODUCTION

The societies in which we grow up have their own sets of rules about the way we behave and interact with others. These rules or norms are not written down, and often we are not even conscious of them. Such norms or rules, which enable societies to act accordingly within their own environment, are collectively called "culture" (Hope, 2004). Cultures are developed within countries as a product of national patterns of early childhood and formative experiences and education, language, religion and geography (Derr and Laurent, 1989). As culture is a learned behaviour not genetically transformed (Islam, 2004), therefore studying culture has become very important in understanding management and employee styles of working. A great deal of research has been undertaken in an attempt to understand just what culture is and how it differs from regions to region. The larger portion of available literature on culture has addressed cross-cultural studies, rather than inter-cultural investigations.

Tayeb (1994) explained that culture is composed of shared assumptions, beliefs, norms and values that guide people's behaviour. Samovar et.al, (1981) define culture as the culminations of: knowledge experience beliefs, values, attitudes, meanings, hierarchies, religions, timing roles, spatial relations, concepts of the universe and material objects and possessions acquired by a large group of people in the course of generations through individuals and group striving. For Hofstede (1980), culture is to humans collectively what personality is to an individual. Personality in this context is the patterns of an individual's behaviour that reappear in a variety of situations. Therefore, individual beliefs, values and behaviours are echoes of the habits and practices of the cultural group from which an individual hail. The cultural literature argues that behaviours differ from culture to culture because cultural groups hold divergent values. Thus, different societies have different and distinctive sets of values and priorities within their respective cultures that give guidance on how their members should proceed (Halender and Holborn, 1991).

In summary then, culture makes a unique contribution to understanding management policies and practices (Evans, 1992). Culture serves as the software of the mind (Hofstede, 1994) and it is deeply embedded in everyday life and fairly resistant to change (Newman and Nollen, 1996). As organizations are in many ways embedded in the larger society in which they exist. Consequently, workers working within those organizations

constitute part of the organizations; thus, the workers will ultimately exhibit the society's attitude interacting in harmony with the prevailing societal culture (Meshkati, 1995). Indeed, societal forces that dictate prevalent attitudes and behaviours relating to safety within a given culture are fundamental to the study of safety climate (Peckitt et.al, 2002).

The concept of culture is increasingly capturing the attention of researchers as an issue of concern in construction. Ngowi (1997) reports on a study undertaken in Botswana to determine the influence of cultural background on construction project team members with reference to innovation in the adopted procurement systems. It was found that for the projects in which team members were from different cultural backgrounds, there were inhibitions to innovation compared with these in which team members had similar cultural backgrounds. Ngowi (1997) concluded that the cultural background of project team members should be taken into consideration in predict management to create a conducive environment for innovation. Chan (1997) also demonstrated cross-cultural influence on construction project management through the identification of cultural influence on the resolution of foreign – related construction disputes in China. Chan (1997) argues that the cause of these disposers is closely related to the culture of a society, and that the different methods for resolving disputes are also social phenomena closely associated with a society's unique culture.

Ngowi (2000) later attempted to highlight the influence of organizational culture on Total Quality Management (TQM) application within the construction industry in Botswana. The study aimed to determine the outcome of implementing TQM in a workplace that does not share a cultural base. It was concluded in the study that for TQM to be successful in a particular cultural setting, it must take on some of the host culture values. Low and Shi (2002), in a cross-cultural exploratory study, examined what constituted Singaporean and Chinese culture with particular reference to construction firms. Their study was based on the four dimensions of national culture established by Hofstede (1980) to explore the cross-cultural influences brought about by the two cultures within the context of construction projects in China. Similarly, Tijhaus (2002) highlighted the impact of cultural issues when transferring western technologies abroad. The failure to consider local cultural issues, such as problematic infrastructure, lack of training opportunities, local conflicts and other matters, can cause projects to fail. Therefore, decisions made by keeping the national culture in mind during the procurement process impacts significantly upon the success of construction projects. Phua (2002) explored the reasons for the general lack of cooperation within the Hong Kong construction industry. He found an impact from collectivism and individualism on projects' participants' cooperative behaviour in the Hong Kong construction industry.

Likewise, studies have revealed that apart from safety culture, safety climate can also be used to predict safety related outcomes, such as accidents or injuries. For example, Glennon (1982) analysed safety climate of seven different organizations from six different industries. He concluded that not only each of the organization different on each of the safety climate dimensions but even organizations within the same industry showed different profiles of safety climate. Mason and Simpson (1995) and Budworth (1997) examined perceived differences among the seniors and juniors staff members' attitudes to safety climate. Budworth (1997) investigated the benefits of safety climate and concluded that major advantage of using a safety climate measure is that it can identify strengths and weakness of different sub-groups within an organization, thus allowing for safety management strategies to be developed specifically for each one.

Glendon and Litherland (2001) developed a six-factor safety climate structure of road construction organization. Lu and Shang (2005) in an empirical investigation of safety climate in container terminal operators of Taiwan reported a significant difference in perceptions of supervisors and general employees and junior and senior staff. However, in Nigeria, studies on safety climate and safety culture are scarce. This has brought about a lack of knowledge of the policies relating to safety climate and safety culture among construction workers and construction organisations in Nigeria. Therefore, this study investigates the safety culture and safety climate policies of construction organisations in Nigeria.

II. LITERATURE REVIEW

Previous studies have reported that a positive correlation exist between workers' safe behavior and safety climate within construction site environments. Studies have also regarded safety climate as the manifestation of safety measures in the behavioural and expressed attitude of the employee (Cox and Flin, 1998). Zohar (1980) was one of the first researchers to suggest a relationship between safety climate and specific measures of safety performance. Zohar (1980) correlated safety climate scores with a ranking for safety practices and accident prevention programs. From a comparison of these rankings with an overall safety climate score, Zohar concluded that safety climate is related to the safety levels of the organization. Two years later Glennon (1982) compared safety climate scores with measures of safety performances. Though he acknowledged the difficulties in using accident-based measures, he found that safety climate appears to be related to traditional measures of safety performance. Canter and Donald (1990) and Cox and Cox (1991) also demonstrated a correlation between safety climate and behaviour.

Tomas and Oliver (1995) reported that safety behaviour could be significantly predicted by workers attitudes, co-worker's response, hazards and supervisors' response. Neal and Griffin (2000) found that safety climate influences safety performance. More recently, Mohamed (2002) examined the relationship between safety climate factors and the safety climate on Australian construction sites, as well as the correlation between safety climate and workers' safe behavior. In this particular study support was found, for the influence of management, safety and risk systems on safety climate. A significant positive relationship between safety climate and safe work behaviour was also found.

Research extending attitudes, behaviour and safety management within the construction industry has been undertaken by authors such as Hinze (1978, 1979, 1981, 1988) and Dodobbeleer et.al (1987, 1991) in North America, Andreessen (1978) and Laufer (1987) in Holland, Laitinen et.al (2009) in Finland, Lingard and Rowlinson (1994, 1997) and Siu et.al (2003) in Hong Kong; MacDonald et.al (2001) and Garavan and O'Brien (2001) in Ireland, Mohamed (2002) in Australia and Fang et.al (2004) in China. A number of studies have also shown that attitudes and behaviours are significantly associated. Studies based on the theory of reasoned action and planned behaviour (Ajzen and Fishbein, 1980) shows a significant association between health attitudes and risk behaviour. The theory of reasoned action was developed as a means of explaining health-related believes attitudes and behaviour. Health-related beliefs are similar to safety beliefs in that they might affect one's health. A major assumption in this theory is that people behave sensibly, that is, they deliberately employ information from their surroundings and consider the implication of their actions. Health-related attitudes may affect middle and top management decisions, which also exert an influence on the conditions under which an employee's individual decision – making takes place. The attitudes may affect company priorities, as well as company policy, about safety. Additionally, they may affect employees' attitudes and behaviour both directly and indirectly (Rundmo and Hale, 2003).

A large number of empirical studies have examined the relationships between national culture and various aspects of management, which include planning and strategic decision – making. Meshkati (1995) has identified risk perception, motivation, workgroup dynamics, and attitudes to work, technology, hierarchy, time and religion as important cultural factors, which have a strong impact on safety culture. Lagrosen (2002), in his study on exploring the impact of culture on quality management and using Hofstede's (1994) model, found that uncertainty avoidance and individualism – collectivism are the dimensions that mainly affect the implementation of quality management. Low (1995, 1997) in his two (2) studies have analyzed some important cultural phenomena and concluded that an understanding of these phenomena can help international corporations from the west market their services more effectively as well as enhance their ability to manage adversities.

Extensive studies have also been conducted to conceptualise safety culture in the context of construction industry. For instance, House and Dorfman (2001) designed GLOBE (Global Leadership and Organizational Behavior Effectiveness), to examine the interrelationships between societal culture, organizational culture and leadership styles. The meta-goal of GLOBE was to develop an empirically – based theory to describe, understand and predict the impact of cultural variables on leadership styles and organizational process and the effectiveness of these processes. The GLOBE project studied nine (9) cultural dimensions, adopted on the basis of a review of the literature relevant to the measurement of culture from previous large-sample studies, the existing cross-culture theory. As reported by House et.al (2001), the GLOBE's cultural dimensions are: uncertainty avoidance, power distance, societal collectivism, in-group collectivism, gender egalitarianism, assertiveness, future orientation, performance orientation, and human orientation. The first six (6) cultural dimensions in GLOBE research had their origins in the dimensions of culture identified by Hofstede (1980). The first three dimensions were intended to reflect the same constructs as Hofstede's dimensions labeled Uncertainty avoidance, power distance, and individualism.

Future orientation was derived from Kluckhohn and Strodtbeck's (1961) past, present, future orientation dimensions, which focused on the temporal mode of a society. Performance orientation as derived from McClelland's work on need for achievement. The Human orientation dimension had its roots in Kluckhohn and Strodtbeck's (1961) work that Human nature is good vs human nature is bad, as well as Putnam's (1993) work on the civic society and McClelland's (1985) conceptualization of the affiliate motive. Based on a survey of 116,000 individuals from 72 countries, most of whom were employees of a single global corporation. Hofstede (1980), after applying factor analysis to the survey data sets, identified four (4) work related cultural dimensions along which the countries differed. He also suggested specific relationships among these cultural dimensions and individuals, with preferences for and reactions to elements of a management control system. Hofstede's dimensions (power distance, uncertainty avoidance, individualism and masculinity) are briefly discussed below.

Hofstede's (1980) extensive research on culture has helped conceptualize one of the most popular theories of cultural types, as evidenced by well over 1000 citations from cultural consequences reported in the social sciences citation since 1980. His approach to culture in utility identified four underlying values

dimensions: individualism vs collectivism, large vs small power distance, strong vs weak uncertainty avoidance, and masculinity vs femininity. These dimensions group together a number of social phenomena, which occur in combination. Hofstede (1994) in a latter study adds a fifth dimension to his analysis of differences among societal cultures, namely that of a long-term orientation vs a short-term orientation to life.

From a different perspective, Schein (1985) identified five (5) basic assumptions around which cultural paradigms form, namely relationship to nature, truth and reality, human nature, human activity, and human relationships. Another framework for the understanding of culture was developed by Hampden et.al (1993). It was based on 50,000 cases of managers from multinational and international corporations representing more than 100 countries, and identifies seven cultural dimensions, namely universalitism vs particularize, analyzing vs integrating, individualism vs collectivism, inner directedness vs outer directedness, time sequential vs time synchronizing, achieved status vs subscribed status; and equality vs hierarchy. In this approach cultures differ in the specific solutions they choose for problems. Hampden et.al (1993) cultural dimensions combine many aspects of Hofstede's (1980) categories, but the correspondence between the two is not always perfect (Peckitt et.al, 2002).

For this study, the relevant delimitation is that the culture would be seen only from the framework of Hofstede (1994) and the cultural dimensions Hofstede has formulated. As mentioned above, while many other scholars have proposed alternative framework, the work of Hofstede was found to be most comprehensive and most suitable to serve as a basis for this study. The reasons for this, is that Hofstede's framework is the most referred to and well validated.

III. METHODS

The study population required for this research was made up of professionals employed by construction contractors classified under the general category from the archive of Public Procurement Departments in the south-western states in Nigeria. These comprised Lagos, Ogun, Ondo, Oyo, Osun, and Ekiti States. The construction professionals included builders, engineers, architects, and quantity surveyors that were in the employment of the construction contractors studied. The data for the study were sourced through the use of questionnaire administration. The sample frames used for the study were the registered contractors in the South Western Nigeria. The registered Construction Contractors as obtained from the Public Procurement Departments in the south western states in Nigeria are represented in Table 1.

Table 1: Registered Construction Contractors by State in South-Western Nigeria

State	Number of registered companies selected	30% of companies	No. of questionnaire returned
Lagos	257	77	69
Ogun	183	55	42
Ondo	142	43	35
Oyo	154	46	37
Osun	132	40	30
Ekiti	119	35	29
Total	987	296	242

Out of the total nine hundred and eighty-seven (987) Construction Contractors registered in the six states, thirty percent (30%) of the total number were purposively sampled for the study. This gives a total sample size of two hundred and ninety-six (296) construction firms. The questionnaire used for the study was divided into five sections. Section A was designed to gather data and information about the Respondents. The general information requested from the respondent included the academic and professional qualifications, years of working experiences in the construction industry and the length of time on their present position. The questions were structured and specifically designed to check whether respondents have appropriate knowledge and experience and hold appropriate position in the industry which would give credence to collected data. The assessments were covered in question 1-10 of the section.

Section B of the questionnaire was designed to elicit further information between the culture and climate on construction sites. The questionnaire was structured in closed type format where typical features were identified and listed for Respondents to evaluate. According to Nkado (1995), a closed type question is easier to respond and consequently improves the response rate. The framework development was carried out through the use of decision tree, conceptual and flow chart to show low to enhance an optimal safety culture and climate on construction sites.

IV. RESULTS

As presented in Table 2, two hundred and forty-two (242) construction firms were surveyed. One hundred and forty-five (145) were the medium sized construction firms representing 59.92% while the large

construction firms accounted for 40.08%. These two construction firm categories (medium and large sized companies) were considered because they had formal units or sections and department within their organizational setup to oversee safety related issues. Small sized firms were not included since their modes of operation were not formal and they hardly have units within their organizations to specifically manage safety related issues.

Table 2: Organizational Set up of the Studied Firm

Firm studied	Frequency	%	Cumulative %
Medium construction companies	145	59.92	59.92
Large construction companies	97	40.08	100
Total	242	100	-

The study examined the ownership of the construction firms. Ownership implied whether the firm is wholly owned by only Nigerians or foreigners or by mixture. The findings showed that one hundred and forty-three (59.1%) of the firms studied were wholly indigenous. Fifty-five (22.7%) were multinational firms while nationalized and wholly foreign firms studied were 15.7% and 2.5% respectively. The result of the finding is presented in Table 3.

Table 3: Description of the Studied Firm

Nature	Frequency	%	Cumulative %
Wholly indigenous	143	59.1	59.1
Multinational	55	22.7	81.8
Wholly foreign	6	2.5	84.3
Nationalized	38	15.7	100.0
Total	242	100	

Another important aspect of the firms under survey is the type of projects the firm undertook. It was established that 63.7% of the firms were involved in both building and civil engineering projects. Those that engaged only in building projects were 28.2% while the least were firms that engaged in only civil engineering projects alone (8.2%). This is presented in Table 4. This result revealed that the opinion of majority of the respondents was not sectional but cuts across both building and civil engineering constructions.

Table 4: Types of Projects the Company Undertakes

Type	Frequency	%	Cumulative %
Building Projects	68	28.10	28.10
Civil Engineering Projects	19	7.85	35.95
Both Building and Civil	155	64.05	100.0
Total	242	100.0	-

The academic qualifications of the respondents in the surveyed construction firms were presented in Table 5. An observation showed that workers with first degree (B.Sc/B.Tech) constituted 40.5% (the highest) in the medium and large construction companies. Next in importance were workers with M.Sc degree holders representing 27.69% while H.N.D holders represented 24.79%. The least workers were those with PGD certificate holders. This category of workers accounted for 5.37%. The above findings showed that the workers of the construction firms studied were highly educated. By these levels of education, it can be assumed that the workers would not only be able to understand safety policies and objectives but would also be able to direct the entire workforce about the guidelines for its implementation.

Table 5: Academic Qualification of Workers in the Studied Firms

Academic qualification	Frequency	Percentage	Cumulative %
HND	60	24.79	24.79
BSc/B.Tech.	98	40.50	65.29
M.Sc	67	27.69	92.98
PGD	13	5.37	98.35
Ph.D	4	1.65	100.0
Total	242	100	-

The professional status of the respondents in the studied construction firms was also studied. The result is presented in Table 6.

Table 6: Professional Qualification of the Respondents

Professional qualification	Frequency	percentage	Cumulative %
NIA	25	10.33	10.33
NIQS	31	12.81	23.14
NIOB	91	37.60	60.74
NIESV	6	2.48	63.22
NITP	2	0.83	64.05
NSE	79	32.64	96.69
CIOB	3	1.24	97.93
No Response	5	2.07	100
Total	242	100	-

It was established through the study that 37.6% of the respondents had professional qualification of the Nigerian Institute of Building while 32.64% of the workers were members of the Nigerian Society of Engineers. Furthermore, 12.81% of the workers were members of the Nigerian Institute of Quantity Surveyors. Other professional bodies like Nigerian Institute of Estate Surveyors and Valuers, Nigerian Institute of Town Planners and Chartered Institute of Building, United Kingdom accounted for 2.48%, 0.83% and 1.24% respectively (Table 5.5). These results showed that apart from being knowledgeable educationally, the workers were also professionally qualified. This implied that the workers operated under the ethics of their profession and this would likely enhance their performance with regards to safety on construction sites. From Tables 5 and 6, it can be shown that respondents were academically and professionally well grounded, therefore, information provided for the purpose of this research can be relied upon.

The period of professional experience of the respondents in the construction industry was investigated and presented in Table 7. From the table it is deductible that 40.91% of the respondents surveyed had between 6 to10 years of professional experience, eighty (28.51%) had between 1 and 5years of experience, thirty-six (14.88%) had 11 to 15 years of experience while thirty-eight (15.70%) had over 16 years of experience. The number of years of experience of the respondents is illustrated in Figure 5 in the appendix.

Table 7: Years of Experience of the Respondents

Years of experience	Frequency	%	Cumulative %
1-5	69	28.51	28.51
6-10	99	40.91	69.42
11-15	36	14.88	84.3
16-20	25	10.33	94.63
Over 20	13	5.37	100.0
Total	242	100	

It was also established through the field survey that 68.5% of the respondents had over 5 years of professional experience. The personal interview with the respondents revealed that many of them with less than 5 years of working experience even though professionally qualified had just been recruited by their firms. It can therefore be concluded that most of the respondent (more than two-thirds) who participated in the study were experienced in construction activities and therefore, could be relied upon for the supply of consistent and suitable information. In addition, the length of time in which the respondents were in their present position is presented in Table 8.

Table 8: Length of Time over which Workers have been in their Present Position

Length of time	Frequency	%	Cumulative %
1-5	152	62.81	62.81
6-10	60	24.79	87.6
11-15	19	7.85	95.45
Over 15	2	0.83	96.28
No response	9	3.72	100
Total	242	100	-

As presented in Table 8, one hundred and fifty two (62.81%) of the respondents had been in their present post between 1 and 5 years,24.79% of the respondents had been on the job for 6 to 10 years and about 1% of the respondents had been over 15years of being on the position they presently occupy. It may therefore be concluded that a lot of the respondents who participated in the study were well oriented and experienced in their schedule of duties.

V. FINDINGS AND DISCUSSION

5.1 Safety Culture in the Nigerian construction Industry

In order to assess the safety culture in the construction industry, the respondents were asked to indicate the extent of their opinion through the indices generated. The workers were instructed to rate the perceived premium using "strongly agree", "agree", "not sure", "Disagree" and "strongly disagree". To arrive at an index, each rating was assigned a weight value of 5, 4, 3, 2 and 1 respectively. The result is presented in Table 9. The average premium index was 3.46. This showed that the perceptions to all statements affecting safety on site are above average.

Further analysis showed that in the established safety policy of the construction companies studied, the decisions on other priorities should give due regard to construction safety requirements (0.24). This is in agreement with Guldenmund (2000) which found procedures and rules to be a prominent sub-factor in studies reviewed (Lee, 1998; Mearns et.al, 1997; and Ostron et.al 1993). The respondent's perception of the policy is also in agreement with Frazier et.al (2013).

Table 9: Safety Culture in the Construction Industry

Factors	Extent of Premium					Safety Premium Index			Ranking
	5	4	3	2	1	TWV	SPI	(SPI – SPI)	
Does safety policy clearly states that decisions on other priorities should give due regards to construction safety requirements	46	80	75	16	32	839	0.740	0.24	1st
Is the safety policy explained to new employees as part of their training and orientation before entry to and work onsite	73	89	41	23	21	911	0.732	0.20	2nd
Are there appropriate arrangements to ensure that actions are taken because of the findings of safety inspections?	63	90	55	19	21	899	0.726	0.17	3rd
Is the safety material being taught relevant to those being trained	49	108	49	21	19	855	0.720	0.14	4th
Do safety officers and safety supervisors carry out safety inspections at regular interval	55	106	41	20	27	889	0.714	0.11	5th
Are the appropriate arrangements to collate and analyze the results of safety inspections	62	84	53	26	23	880	0.710	0.09	6th
Does the policy commit the organization to full compliance with all relevant health and safety legislations	45	109	50	29	14	883	0.706	0.07	7th
Is every employee in a supervisory role being trained in first aid on-site	49	101	52	26	22	879	0.704	0.06	8th
Does safety policy identify key senior personnel for overall coordination and implementation of the policy	51	101	46	29	19	874	0.702	0.05	9th
Have all workers received site-specific safety training?	52	86	61	32	17	868	0.700	0.04	10th
Have all workers received basic general safety training?	53	92	54	21	28	865	0.698	0.03	11th
Are there effective arrangements for reviewing the safety policies at least once a year?	51	87	58	32	19	860	0.694	0.01	12th
Are safety perception surveys conducted on the project?	43	98	58	24	22	851	0.694	0.01	12th
Do management and supervisory personnel received behavior overview training?	47	82	74	28	17	858	0.692	0.00	14th
Is there a safety training planned is it reviewed regularly?	49	87	65	28	18	862	0.692	0.00	14th
Does the policy set targets for health and safety performance including a commitment to progressive employment?	42	112	40	24	27	853	0.686	-0.03	16th
Is safety training a line or compulsory item within the budget?	41	86	71	29	17	837	0.686	-0.03	16th
Are there appropriate arrangements to monitor the effectiveness and thoroughness of the inspections?	42	98	53	28	27	844	0.680	-0.06	18th
Are there pre-task meetings before executing an activity?	33	108	48	41	18	841	0.676	-0.08	19th
Are the numbers of near misses investigated to help prevent accidents?	48	75	76	22	27	839	0.676	-0.08	19th
Have all workers received tool box training related to their tasks?	38	100	54	28	28	836	0.674	- 0.09	21st
Is there effectiveness of safety training monitored by checking new skills?	34	97	67	25	26	835	0.670	-0.11	22nd
Are site managers and supervisors involved in	36	109	44	26	34	834	0.710	-0.11	22nd

regular safety talks with workers									
Does the review arrangement include feedback from employees at all levels?	37	98	51	38	23	831	0.668	-0.12	24th
Is the safety booklet or short manual being provided to every worker when joining the company?	36	91	61	32	30	821	0.656	-0.18	25th
Do all sub-contractors hold regular safety meetings?	30	82	80	36	21	811	0.652	-0.20	26th
Do all subcontractor workers attend a formal standard safety orientation?	39	77	68	27	37	789	0.642	-0.25	27th

Therefore, giving priorities to decisions on safety requirements is one of the key factors contributing to a positive safety culture (Biggs et.al, 2013). New employees at the studied construction sites had a proper orientation and training about the safety policy (0.02) of the construction companies before being engaged to work in the company and also on the sites. The objective it is to provide new employee with basic safety training to effectively perform assigned duties and tasks in a safe manner and according to provisions set forth in the safety plan.

According to ISHN (2016), accidents statistics have shown that among all employees, the most likely to get injured are new employees. New employees include more than the prospective newly hired, temporary employees, an employee transferred into a new work area, contract employees, a recently promoted employee, even a member of management training for a potential task, are all really new to their jobs. Also, importance of training and watching new employee closely according to ISHN (2016) are that: they are often younger and less experienced than more seasoned workers; company's safety culture is rarely fully understood by new employees; they often lack the training necessary to perform all job functions safely and efficiently in new work areas and new employees trying to prove themselves will take unnecessary risks.

Also, as part of the safety culture in the studied construction companies, there were appropriate arrangements to ensure that action is taken as a result of the findings of safety inspection (0.17). The need for safety inspection is to help to identify potentially hazardous conditions and unsafe actions and initiate corrections. Findings were also expected to be presented to the management for review and corrective action will be implemented under direction in a timely manner. Employees were also encouraged to make suggestions to help improve a process thereby preventing an accident or making improvement in the safety system.

The respondents attested to the quality of the safety training being received (0.14). This training had majorly focused on four hazard training requirements namely, identification of major hazards, its classification protection from these hazards and employer's duties in protecting the workers. This is in agreements with OSHA (2011) which covers the worker's rights and employer's responsibilities. The issue of falls, to be struck by (e.g. falling objects, etc. (and to be caught- in or between (e.g. trench hazards, equipment's, etc.) are most construction fatalities (OSHA, 2011). Other training issues are personal protective and lifesaving equipment's etc., injury and illness prevention programs, job site inspection, accident prevention programs, worksite analysis, hazards prevention and control accident investigations, how to conduct safety meetings and supervisory communication.

The safety officers and supervisors ensured that safety inspections were carried out at regular intervals (0.11). The inspections carried out by designated officers are a way of systematically checking that the working environment and procedures are meeting the required standards. This is also in line with OSHA (2011) requirements that inspection should identify hazards and also introduce measures that will improve the conditions. Inspections are important because they are used to determine whether the organizations are meeting the standards set for the workplace and work activities. If inspections are carried out properly, they identify and remedy problems before they become more serious or result in an incident or accident.

The premium placed on collation and analysis of the result of safety inspection (0.09), commitment of the organization to full compliance with safety regulation (0.07), on training of employers in supervisory capacity on first aid on site (0.06) and identification of senior key personnel in coordination and implementation of safety policy (0.05) are ranked 6th, 7th, 8th and 9th respectively. The findings regarding safety culture predicting safety outcomes are consistent with prior research (Christian et. al, 2009; Clarke, 2006). This study extends previous research by demonstrating that safety culture is predictive of outcomes not only among workers but also among supervisors and the management.

However, the remaining twelve items showed negative deviation contrary to the non-provision in the safety policy for set targets for health and safety performance (-0.03), a safety target can be set in terms of incident rate to reflect the safety performance of the construction project. This is in agreement with Choudhry et.al (2008) that suggested that this would be a best practice to improve safety management in construction industry. The study also revealed that safety training issues was not a compulsory item within the budget of the firms studied (-0.03). For this to impact positively, training is to be considered a line item (or compulsory) within the budget and training courses need to be updated from time to time to suit the site work. The study further revealed that appropriate arrangements to monitor the effectiveness and thoroughness of the inspection

had a negative premium index (-0.06). To ensure a better safety culture, there is no doubt that daily, weekly and monthly safety inspections are conducted on site. Joint site walks involving the consultants are important on construction sites (Choudhry et.al, 2008). Nevertheless, the site safety committee may be asked to carry out strict monthly audit to review the effectiveness of weekly site inspections. In views of the inability of the studied firms to monitor the effectiveness of safety inspection, therefore, the pre-task meetings before executing any activity received a negative perception (-0.08).

In an attempt to improve the safety culture of a construction firm, it is a standard practice to organize planning meeting for workers before they execute any activity. (Choudhry et.al 2008). The issue of near misses in accident prevention was not properly investigated by the studied firms (-0.08). The companies need to seriously consider this issue (near misses) to facilitate workers' learning from such incidents.

Even though the works in the studied construction sites received site specific safety training (0.04), this is considered a general form of safety training because perception of workers towards toolbox training on how safety is applicable to their particular scope of work is negative (-0.09). The negative response to the effectiveness of safety training being monitored by checking new skills of the workers (-0.11) is indicating another below mean level score. The effectiveness of safety training needs to be monitored by examining the effect of the training and the need for refresher courses to further upgrade their safety knowledge. The ineffectiveness as reported above is also confirmed by the inability of site managers and supervisors to hold regular talks with workers (-0.11) in line with best practices, safety managers and advisers are to organize safety talks at project sites during meetings with workers. Supervisors under the instruction of the safety manager organize safety talks on site. Once the safety training has been concluded, there is no feedback from the employees at all levels (-0.12), the expected feedback can be used to include worker's opinion for any policy update. Upon recruitment by the construction company, safety booklet or short manual were not mostly provided (-0.18). Non provision of essential materials would not encourage or help the workers be informed of adequate orientation towards safety culture in the construction industry. The study also revealed that subcontractors neither hold regular safety meetings (-0.20) more nor attend formal standard safety orientation (-0.25).

This is contrary to normal safety culture practices (Choudhry, et.al, 2008) because job site orientation training, toolbox training and inspections are required for all workers including subcontractors. Subcontractors that fail to meet safety standards on the job site are required to suspend project activities until they have implemented a successful safety plan.

Independent samples t-Test (in Table 10) was used to explore the statistically significant differences in the perceptions of the workers belonging to different medium and large construction companies as regards safety culture. The results showed significant differences in the perceptions of medium and large construction companies with respect to conservative safety culture practices such as the factors affecting safety on set targets for health and performance and progressive improvement(t=-2.156, p=0.032), the factors affecting safety on site arrangement to review policy once a year(t=-2.130, p=0.034, the existence and review of safety training(t=-2.000, p=0.047), the fact that all workers received task toolbox training(t=-2.329, p=0.021),safety training is a compulsory budget item(t=-2.613, p=0.010), there issafety training for employee in supervisory role(t=-3.263, p=0.001), management and supervisors receive behavior overview training(t=-2.647, p=0.009),arrangements are made to monitor inspection(t=-2.186, p=0.030), safety officers and supervisors carryout safety inspections regularly(t=-2.284, p=0.023), actions are taken for findings from safety inspections(t=-2.859, p=0.005) and there is collation and analysis of safety inspection results(t=-2.764, p=0.006).

Table 10: T-test Analysis of Safety Culture in Medium and Large Companies

Safety culture	Size of your company	Mean	Std. Deviation	t	df	Sig.
Clear policy on safety requirements	medium construction company	3.3451	1.16720	-1.525	224	.129
	large construction company	3.5952	1.23326			
Commitment to health and legislation compliance	medium construction company	3.5211	1.02948	-1.758	224	.080
	large construction company	3.7738	1.06817			
Factor affecting safety on set targets for health and performance and progressive improvement	medium construction company	3.4225	1.19884	-2.156	223	.032
	large construction company	3.7711	1.11886			
Identification of key personnel for coordination and implementation	medium construction company	3.5532	1.08513	-.813	223	.417
	large construction company	3.6786	1.17361			
Explanation to new employees	medium construction company	3.7305	1.14567	-.854	223	.394
	large construction company	3.8690	1.22995			

Factor affecting safety on site arrangement to review policy once a year	medium construction company	3.4286	1.13253	-2.130	222	.034
	large construction company	3.7619	1.13667			
Review include feedback from employees	medium construction company	3.3688	1.16135	-1.291	223	.198
	large construction company	3.5714	1.10077			
Existence and review of safety training	medium construction company	3.4113	1.15925	-2.000	223	.047
	large construction company	3.7262	1.11237			
All workers received basic safety training	medium construction company	3.4823	1.17475	-.802	222	.423
	large construction company	3.6145	1.21807			
All workers received site safety training	medium construction company	3.4429	1.15224	-1.662	222	.098
	large construction company	3.7024	1.09522			
All workers received task toolbox training	medium construction company	3.3028	1.18495	-2.329	222	.021
	large construction company	3.6707	1.05474			
Safety training a compulsory budget item	medium construction company	3.3188	1.08732	-2.613	220	.010
	large construction company	3.7024	1.01530			
Safety training for employee in supervisory role	medium construction company	3.3944	1.16666	-3.263	224	.001
	large construction company	3.8929	1.00622			
Safety material relevant to trainee	medium construction company	3.5683	1.13604	-1.850	221	.066
	large construction company	3.8452	.98781			
Management and supervisors receive behavior overview training	medium construction company	3.3688	1.11747	-2.647	222	.009
	large construction company	3.7590	.97017			
Safety perception surveys conducted	medium construction company	3.4786	1.10244	-.569	219	.570
	large construction company	3.5679	1.16123			
Effectiveness of safety training monitored through new skills	medium construction company	3.3262	1.11160	-1.877	223	.062
	large construction company	3.6071	1.04152			
Safety booklet provided when joining the company	medium construction company	3.2394	1.20830	-1.514	224	.131
	large construction company	3.4881	1.16675			
Arrangements to monitor inspection	medium construction company	3.3310	1.20708	-2.186	222	.030
	large construction company	3.6829	1.07586			
Safety officers and supervisor's carryout safety inspections regularly	medium construction company	3.5035	1.18008	-2.284	223	.023
	large construction company	3.8780	1.19040			
Taking actions for findings from safety inspections	medium construction company	3.4965	1.16809	-2.859	222	.005
	large construction company	3.9506	1.09432			
Collation and analysis of safety inspection results	medium construction company	3.4225	1.26224	-2.764	222	.006
	large construction company	3.8780	1.04693			
Site managers and supervisors in safety talk with workers	medium construction company	3.3732	1.16454	-1.091	223	.277
	large construction company	3.5542	1.26156			
Pre-task meetings before an activity	medium construction company	3.4155	1.06686	-.276	223	.783
	large construction company	3.4578	1.18220			
Subcontractor workers attend formal safety meeting	medium construction company	3.3028	1.23190	.789	223	.431
	large construction company	3.1687	1.22792			
Subcontractor hold regular meetings	medium construction company	3.2606	1.10241	-.266	223	.791
	large construction company	3.3012	1.11240			
Near misses investigated to prevent accidents	medium construction company	3.3972	1.11406	-.453	222	.651
	large construction company	3.4699	1.23305			

5.2 Safety Climate on Construction Site

In order to examine the safety climate on construction sites, data collected from the questionnaires were subjected to relative significant index analysis based on the workers perception for each of these items (see Table 11).

Table 11 Safety Climate on the Construction Sites

Factors	Extent of Premium					Safety Premium Index			Ranking
						TWV		(SPI –SPI)	
	1	2	3	4	5		SPI		
Communication on safety is an important issue for my company	17	13	60	91	70	937	0.746	0.25	1st
Communication channel/means used by the company proves to be highly effective in promoting safety in the workplace	24	27	43	85	72	907	0.722	0.13	2nd
There is a high level of cooperation between main contractor and different sub-contractor(s) to handle safety on site	21	24	48	96	62	907	0.722	0.13	2nd
The company has a highly effective safety plan for my site	28	28	44	88	63	883	0.704	0.04	4th
Sub-contractors' employees highly follow all safety related decisions made independently by the main contractor	21	26	56	98	50	883	0.704	0.04	4th
Main contractor takes all responsibility for the safety duties and right of all site	19	33	58	91	50	873	0.696	0.00	6th
Company does have safety monitoring policy and keep safety records	22	37	47	87	56	865	0.694	-0.01	7th
Company has an effective hazard reporting system	18	35	57	94	45	860	0.690	-0.03	8th
Company has an effective incident/near misses and accident reporting system	29	26	54	85	55	858	0.690	-0.03	9th
Company does have a safety-related criteria for workers' recruitment	20	44	59	89	39	836	0.666	-0.15	10th
Company does have a safety-related criteria for manager and supervisors recruitment	33	33	56	87	42	825	0.658	-0.19	11th
Company does have a safety related criteria for sub-contractor selection	22	38	73	83	35	826	0.658	-0.19	11th

The highest premium (3.73) was placed on the importance of construction safety communication. This is in tandem with Bigg et.al (2013) which emphasized on construction safety communication (one of the subcomponents under the operational factor and clearly the most important contributor to a positive safety climate.). The respondent's perception and insistence on making the right connection allowing access to quality information that prevents site safety hazards is a major sign of compliance with safety requirement.

Independent samples t-Test (in Table 12) was used to explore the statistically significant differences in the perception of the workers belonging to different medium and large sized construction companies. The results showed significant differences in the perceptions of medium and large construction companies with respect to conservative safety climate policies such as the company has highly effective safety plan for the site ($t = -2.103$, $p = 0.037$), the company have safety related criteria for workers' recruitment ($t = -2.692$, $p = 0.008$), the company has hazard reporting system ($t= -2.366$, $p = 0.019$), and the sub-contractors' employees highly followed all safety related decisions made independently by the main contractor ($t = -2.032$, $p = 0.043$). All the large companies hold this belief in contrast to the medium companies.

Table 12: t-Test Analysis of Safety Climate in Medium and Large Companies

Safety climate	**Size of your company**	**Mean**	**Std. deviation**	**T**	**df**	**Sig.**
Company has highly effective safety plan for the site	Medium construction company	3,4722	1,15840	-2.103	225	0.037
	Large construction company	3,8313	1, 36881			
Company have safety related criteria for workers recruitment	Medium construction company	3,2361	1, 09024	-2.692	225	0.008
	Large construction company	3,6506	1,16277			

Company has safety related criteria for manager and supervisors‘ recruitment	Medium construction company Large construction company	3,2778 3,5181	1, 18525 1, 24314	-1.445	225	0.150
Company have related criteria for sub-contractor	Medium construction company Large construction company	3,2222 3,4578	1, 13707 1, 14019	-1.502	225	0.134
Company have s-monitoring policy and keep s-records	Medium construction company Large construction company	` 3,4718 3,6386	1,16506 1,25502	-1.006	223	0.315
Company has hazard reporting system	Medium construction company Large construction company	3,3636 3,7317	1,13551 1, 10049	-2.366	223	0.019
Company has an effective incident/near misses and accident report system	Medium construction company Large construction company	3,4296 3,6145	1,17539 1,29569	-1.096	223	0.274
Communication is an important issue for the company	Medium construction company Large construction company	3,7014 3,9880	1,05830 1,14225	-1.908	225	0.058
Communication channels used by my company is effective for s-promotion	Medium construction company Large construction company	3,6667 3,7590	1,14660 1,33060	-.551	225	0.582
Main contractors take responsibility for s-duties on all site	Medium construction company Large construction company	3,4167 3,6265	1,16775 1,18642	-1.296	225	0.196
High level of cooperation between main contractor and different subcontractor(s) to handle safety on site	Medium construction company Large construction company	3,6250 3,7108	1,17595 1,20497	-.525	225	0.600
Subcontractors’ employees highly follow all safety related decisions made independently by the main contractor	Medium construction company Large construction company	3,4375 3,7590	1,21021 1,03111	-2.032	225	0.043

The data from the survey was analyzed by using the principle component analysis with Varimax rotation. In order to assess the suitability of data for the factor analysis all the appropriate checks were performed. The sample size of the respondents for this analysis was 257, being well above the minimum permissible limits (Hair et.al, 1998).

The test for measuring sampling adequacy (MSA) was conducted with Kaiser-Meyer-Olkin Measure of Sampling Adequacy=0.947, significant Bartlett's Test of Sphericity (X^2= 2593.930, df=66, p=0.00) and average communalities = 0.7465 which is above average of 0.5. All these shows 7 out of a total of 12 variables within the adequacy limits of 0.5 or above. Five variables were found to be lesser than the limit, therefore it was deemed fit to eliminate them from further analyses of the safety climate practices. The eliminated five variables are: Company does have safety monitoring policy and keep safety records, Company has an effective hazard reporting system, Company has an effective incident/near misses and accident reporting system, Communication on safety is an important issue for my company, and Communication channels/means used by the company proves to be highly effective in promoting safety in the workplace.

The results revealed the presence of two distinct factors having an eigenvalue of more than unity. A Varimax rotation was then performed to obtain interpretable results for those two factors. The two-factor solution accounted for 74.646 percent of the total variance. Factors were then examined to identify the number of items that loaded on each factor by keeping in mind the rule for selecting only those items which have the loadings equal to or more than 0.5 (Hair et.al,1998).

On the basis of such restrictions, four items were loaded on the first factor and accounted for 38.170% of the total variance, and three items were loaded on the second factor and accounted for 36.476% of the total variance. Table 12 depicts the 7 items in two factors, and their respective factor loadings, explained variances, eigenvalues and Cronbach’s α for two factors.

Table 12: Factor Loadings for the 2-factor Model of Safety Climate Practices on Construction Sites

Factor 1: Strategic (Variance = 38.170%, Eigenvalue = 4.580, Cronbach’s α = 0.899)	**Loadings**
The company has a highly effective safety plan for my site	0.704
Company does have a safety-related criteria for workers’ recruitment	0.875
Company does have a safety-related criteria for manager and supervisors’ recruitment	0.855
Company does have a safety related criteria for sub –contractor selection	0.701

Factor 2: Operational (Variance = 36.476%, Eigenvalue = 4.377, Cronbach's α =0.863)	
Main contactor takes all responsibility for the safety duties and right of all site	0.813
There is a high level of cooperation between main contractor and different sub-contractor(s) to handle safety on site	0.771
Sub contractors' employees highly follow all safety related decisions made independently by the main contractor	0.819

Each of the two factors was labelled in accordance with the common thread that connects together the set of individual items loaded onto it. The first factor was labelled "Strategic" because it contained four items addressing safety management strategic issues. These items include: existence of effective safety plans for site; recruitment policy for workers and managers and sub-contractors with particular reference to their safety experience.

The majority of these items bask in relatively large factor loadings (>0.7). The mean and standard deviation scores showed that a majority of the respondents were of the opinion that their organisation have a highly effective site safety plans [mean score = 3.5203]; there is a policy for having a safety experience criteria for the recruitment of staff (which includes, workers [mean score = 3.3415], managers and site supervisors [mean score = 3.3049] and subcontractors [mean score = 3.2846]).

The second factor, "Operational", contained three items addressing the operational aspects of site work. Such items border on the level of cooperation and the effectiveness of communication styles between the main and the sub-contractors' on promoting safety issues in the workplace while ensuring efficient, hazard/incident-free construction site. Many of the respondents insist that the main contactor take all responsibility for the safety duties and right of all site [mean score = 3.4675] and opine that there is a high level of cooperation between main contractor and different sub-contractor(s) to handle safety on site [mean score = 3.6057]. The respondents also acknowledge that sub-contractors' employees highly follow all safety related decisions made independently by the main contractor [mean score = 3.5041].

VI. CONCLUSIONS

Culture is composed of shared assumptions, beliefs, norms and values that guide people's behaviour. It is to humans collectively what personality is to an individual and it makes a unique contribution to understanding management policies and practices. Culture serves as the software of the mind and it is deeply embedded in everyday life and fairly resistant to change. This indicate that the concept of safety culture is essential to guiding workers' behaviour on construction sites and in construction organisations. It also indicates that safety culture reveals the understanding of the safety management policies and practices in an organisation. Apart from safety culture, safety climate is another indicator of the understanding of the safety management policies which can also be used to predict safety related outcomes, such as accidents or injuries. This study investigated the safety culture and safety climate policies of construction organisations in Nigeria. The study found that the most important policies contributing to safety culture are safety requirements policies, safety training and orientation policies, safety inspection policies, policies on safety material, policies on safety officers and safety supervisors. It was also found that the most important policies contributing to safety climate are safety communication, safety plan, safety-related decisions, and safety-related cooperation between main contractor and different sub-contractors. Based on these findings, the study concludes that policies on safety requirements will contribute positively to safety culture. New employees in construction organisations will have a proper orientation and training about safety through these requirements. Providing new employee with basic safety training will allow them to effectively perform assigned duties and tasks in a safe manner and according to provisions set forth in the safety plan. This is the case because company's safety culture is rarely fully understood by new employees as they often lack the training necessary to perform all job functions safely. Nevertheless, the effectiveness of safety training needs to be monitored by examining the effect of the training and the need for refresher courses to further upgrade the safety knowledge of the new employees.

This study also concludes that safety officers and supervisors were carrying out safety inspection at regular intervals. These inspections were carried out by systematically checking that the working environment and procedures are meeting the required standards. This confirms that inspections are important because they are used to determine whether the organizations are meeting the standards set for the workplace and work activities. The findings of this study revealed that safety culture is predictive of outcomes not only among workers but also among supervisors and the management. Hence, a safety target must be set in terms of incident rate to reflect the safety performance of the construction project. Also, essential safety materials must be

provided in construction organisations and on construction sites so as to help the workers be informed of adequate orientation towards safety culture.

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