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# Safety Management Practices of Construction Organisations in Nigeria

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**Abstract** Studies on construction safety have not investigated proactive measurement of safety climate and culture among construction organisations in Nigeria. Hence, this research investigated the safety management practices (workable safety programme, safety programme issues, safety training, safety inspection, safety assessment, and penalty for not wearing safety equipment) employed by construction organisations in Nigeria. The results revealed that effective communication, support and involvement of the management played very important role in ensuring an effective safety programme in the construction industry. The findings show that workers with bad assessment records were punished, reprimanded or dismissed accordingly. It was also found in the study that construction organisations placed emphasis on safety inspection to identify potentially hazardous conditions and unsafe actions in order to initiate corrections. The study concluded that the personnel across levels of engagement in the construction industry must be trained periodically on the emerging safety practices, use of kits and behavioural culture such exposure and training session would also allow increased preventive and on-hand efforts to mitigate risks associated with construction processes. The study recommended that safety audit process must be carried out either by using competent in-house personnel or outsourced staff to assess levels of compliance of construction firms with safety policy on ground. This would provide avenue for zero non-compliance with safety practices and culture by personnel in the construction industry.

***Keywords:*** *safety management practices, safety programme, safety training, safety assessment*

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## 1. Introduction

Accident statistics are widely used for safety management in the construction industry. From available records [1], most safety performance systems have been preoccupied with the negative consequences of the site accidents rather than proactive prevention strategies. The most common construction safety measures for identifying these failures have been the use of accident rates, lost time injury frequency rates and workers compensation statistics. Such measures are now almost universally regarded as being unsuccessful in providing meaningful measures of safety performance [2]. This is due to their reactive nature – they only record accidents after they have occurred. The incidents or near – misses that have the potential to cause injury go unrecognized. Furthermore, using accident statistics can encourage under - reporting of accidents, as workers may not report an accident for fear of being reprimanded for compromising the safety regulation.

Although [3] stated that it is almost impossible to use accidents as a safety indicator for safety management and performance. This is because of random variation where many sites will have no accidents and it is not possible to determine whether these sites with no accidents are safer than sites with three, five or more accidents. [4] identified a number of reasons why accident data or similar outcome data, are poor measures of safety performance. The main problem from this trend is that such data are insufficiently sensitive, of dubious accuracy, retrospective and thereby ignore the exposure to risks.

To overcome the disadvantages of adopting reactive measures, it has been suggested to use behavioural observation measures [3]. These measures are based on random samples of workers behaviour, which is then evaluated to be safe or unsafe. The advantage of using a behavioural observation method in measuring safety performance and management is that it does not just focus on non-compliant behaviour but also acknowledges safe behaviour, thereby indirectly showing the accident statistics. As a result of the above, it is clear that using behaviours – related safety management allows construction organizations to move away from only considering accident – related safety management. Also, a behaviours – related safety management brings the means by which accidents can be prevented, that is enables the adoption of a much broader stance that accommodates focusing on the determinants of a positive safety climate and integrates these within the achievement of a no-accident culture.

Nevertheless, researchers so far in Nigeria on construction safety have not gone beyond the reaction level. This traditional approach measures only the historical events of safety [4]. There is no research done so far on proactive measurement of safety climate and culture in Nigeria; hence, this research will investigate the safety management practices employed by construction organisations in Nigeria.

## 2. Literature Review

### 2.1. Safety Management in the Construction Industry

Construction accidents causes many human tragedies, demotivate workers, disrupt sites, delay project progress, and adversely affect the overall cost, productivity, and reputation of the construction industry [5]. The deteriorating conditions of workplace, health and safety, as well as the emergence of new regulations and international standards, have driven organizations to improve their safety performance. Both developed and developing countries have recognized the necessity of improving occupational safety and health management on construction sites, particularly to reduce the number of occupational accidents. As a result, organizations have, to some extent, shifted from a reactive to a proactive approach toward safety [6,7,8]. Many construction industries around the world are showing an increasing interest in the concept of construction safety management as a means of reducing the potential for large-scale disasters, as well as accidents associated with routine tasks. The causes of the accidents are not only the carelessness of the workers, sometimes accidents happened due to the failure of control, which is the responsibility of management. Thus the shift of the focus on the accidents has been driven by the awareness that organizations, managerial and human factors, rather than purely technical failures, are prime cause of accidents [9].

Governments worldwide have maintained an on-going commitment towards establishing a working environment free of injury and dissuade. This commitment is reflected by establishing performance – based workplace health and safety legislation which sets generalized performance objectives and provides a system of clearly stated responsibilities to encourage greater self-regulation for the construction industry [5]. However, the introduction of legislation alone cannot be the solution, with an improvement in the cultural approach being essential to achieving workplace safety [10]. Comparison of high and low accident rate companies [11,12,13,14] shows that organizations with a low accident record have a list of factors that appear to be associated with good safety performance. Construction managers often view safety as a cost that conflicts with productions, take little direct interest in safety and rely on the site supervisor to manage safety, they neglect safety when they feel strong programme and or financial pressures [15]. Other key factors affecting safety management are the lack of the provision of safe working conditions, safety training, effective control of site hazards by the main contractors and specific safety responsibilities for managers and workers [16].

Safety management relates to actual practices, roles and functions associated with remaining safe [17]. It is therefore more than a ‘paper system’ of policies and procedures. An audit of the official safety management system may begin and end with an analysis of what is contained within the paperwork but it therefore says little about how the system is being enacted in the field. Such an analysis identifies what an organization should be doing to protect its workers, the public and the environment from harm but it does not reveal what is actually happening at the work site, whether people and the environment are being protected and whether adverse events are occurring. The development of a safety management system is seen as essential for the control of risk. Research work by [18] suggests that safety management should be proactive rather than reactive and that management should assess the adequacy of its safety management effort through safety performance audits.

### 2.2. Safety Performance Management

To determine the existing safety level of any organization, a safety performance measurement is essential [19]. Safety performance management involves assessing and controlling risks, planning activities, detecting latent failures and active failures and monitoring and reviewing performance. Therefore success of any action taken to control risks is assessed through appropriate active monitoring which may involve a range of techniques. This includes an examination of both hardware (promises, plant and substances) and software (people, procedures and systems), as well as individual behaviour [20]. Failures of control are assessed through reactive monitoring which requires the thorough investigation of any injuries, ill health or incidents with the potential to cause harm or loss. In both proactive and reactive monitoring, the objectives are not only to determine the immediate causes of sub-standard performance but, more importantly, to identify the underlying causes and the implications for the design and operation of health and safety management system [20].

One of the conventional measures of safety performance relies primarily on some form of accident statistics. [20] claimed that accident statistics are insensitive and cannot reliably measure safety. One major disadvantage of conventional safety measures is that they are retrospective, measuring unsafe behaviour after it has occurred [19,21]. Thus is it that the consequences of unsafe behaviour are measured, rather than the problems or causes of unsafe behaviour. Ideally, a safety measurement technique would be reprehensive of what it is measuring, be replicable, uncomplicated and realistic. [4] identify fifteen (15) reasons why accident data, or similar outcome data, are poor measures of safety performance. The main reasons identified were being insufficiently sensitive of dubious accuracy, retrospective and ignorance or ignoring risk exposure.

Another measurement technique developed to provide positive performance measurement of occupational health and safety is the observation of and reporting on the individual behavior, generally known as a behavioural sampling technique. It follows that once behaviorhas been measured, strategies to promote modification can be

developed. This method is based on the principle of random sampling and involves observing samples of worker behaivour at random and evaluating whether the observed behaviour is safe [22].

Behavioural sampling has been widely used by several researchers implementing behaviour modification safety programs [23,24,25]. [25] contends that behavioural observation data were superior to accident statistics as they focus on unsafe behaviour prior to accidents occurring. Unfortunately, behavioral sampling also has several disadvantages. For example sampling studies provide average results that disregard individual differences in safe behavior [26].

Another technique that could be beneficial for safety measurement, is measuring people's attitudes towards safety [27]. [27] found that the more mature employee's safety attitudes were, the more likely they would search for safer environments, thus resulting in a decrease in unsafe behaviour. [28] also highlighted the importance of safety attitudes in accident prevention and defined attitude as a reflection of the predisposition to respond in a particular way.

Within many organizations there is increasing acceptance of the need to encourage staff to: adopt a questioning attitude, search for ways to improve safety; constantly be aware of what can go wrong; and feel personally accountable for safe operations [29]. [30] suggest that safety performance should be measured on multiple levels (one of them being safety attitudes) in order to determine the true safety level of an organization. They suggest that measuring the safety climate, or peoples' attitudes towards safety, can indicate changes in organizational safety behavior, and thus can be a useful measure for evaluating safety programs. [4] propose a process (triangulation), which involves using at least two different measures to gauge the effectiveness of safety programmes or safety performance. The key benefit in triangulation is that it provides a more valid estimate of what is being measured. According to [31], a measure of the safety climate could be used to identify those areas of safety that need more attention and improvement; it also detects different safety trends within an organizations safety programmes level and benchmarks for safety levels of different organizations. Safety climate will be discussed, in the following section as one of the alternative measures of safety performances.

## 3. 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 information on the safety management practices of construction organisations. The questionnaire was structured in closed type format where typical features were identified and listed for Respondents to evaluate. According to [32], 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.

## 4. 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. These 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). These result 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 Table 5 and Table 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 to 10 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.

**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 15 years 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.

# 5. Findings and Discussions

## 5.1. Workable Safety Programme

Table 9 shows the perception of the respondents on the workable safety programme of construction organisations in Nigeria. The significant workable safety programme, according to the results in Table 9 were consideration for safety during workers recruitment, effective communication, adequate provision of resources, effective performance, monitoring and demonstration of strong management commitment to safety. Others were well defined safety policy, clearly defined safety standard and joint consultation with workforce. Findings on the consideration for safety during workers recruitment was based on the emphasis on personal attitude. This is in agreement with [33,34,35] which referred to personal attitude as a tendency to respond positively or negatively to certain people, objects or situation.

A successful safety programme can therefore be achieved if a positive employee attitude towards safety is reinforced. Also, an effective communication is an integral component of an efficient and safe workplace. There are skills and some kind of knowledge base that are critical to the safe and proper execution of job. Therefore, effective communication is the key for these knowledge and skill sets to be passed from one employee to another or from the employer to all employees. Effective and good communication is also in agreement with [36] who opined that when the lines of communication between management and the workforce are open, workers can directly report unsafe working practices and hazardous conditions to the management. Management can thereby communicate safety concerns and priorities to gain employees awareness and compliances.

**Table 9. Perception of Premium on a Workable Safety Programme**

| Key Elements | Extent of Premium | | | | | Safety Premium Index | | | Ranking |
|---|---|---|---|---|---|---|---|---|---|
| | 5 | 4 | 3 | 2 | 1 | TWV | SPI | $(SPI - \overline{SPI})$ | Ranking |
| Consideration of safety during workers recruitment | 58 | 80 | 55 | 31 | 20 | 857 | 0.702 | 0.10 | 1st |
| Effective communication with respect to safety | 48 | 87 | 464 | 33 | 17 | 863 | 0.694 | 0.06 | 2nd |
| Adequate provision of safety resources | 52 | 77 | 70 | 31 | 18 | 858 | 0.692 | 0.05 | 3rd |
| Effective performance monitoring and feedback | 46 | 83 | 67 | 36 | 16 | 851 | 0.692 | 0.05 | 4th |
| Demonstration of strong management commitment to safety | 49 | 76 | 80 | 22 | 19 | 852 | 0.690 | 0.04 | 5th |
| Well defined safety policy | 50 | 72 | 72 | 41 | 11 | 847 | 0.688 | 0.03 | 6th |
| Clearly defined safety standard | 49 | 75 | 71 | 26 | 20 | 830 | 0.688 | 0.03 | 7th |
| Joint consultation with the workforce on safety issues | 48 | 71 | 78 | 37 | 15 | 847 | 0.682 | 0.00 | 8th |
| Provision of good job design in relation to safety | 49 | 71 | 83 | 28 | 18 | 852 | 0.680 | -0.01 | 9th |
| Well defined safety objectives | 48 | 72 | 79 | 19 | 30 | 833 | 0.672 | -0.05 | 10th |
| Well practiced and effective emergency procedures | 53 | 79 | 63 | 40 | 14 | 824 | 0.662 | -0.10 | 11th |
| Systematic safety training programme | 56 | 64 | 68 | 28 | 32 | 828 | 0.660 | -0.11 | 12th |
| Effective incident investigating procedure | 37 | 86 | 63 | 37 | 24 | 816 | 0.660 | -0.11 | 13th |

The support and involvement of the management play a very important role in an effective safety program. This finding is in agreement with [37] that management must fully and actively turn ideas into actions by issuing a written comprehensive safety policy, allocating sufficient resources, promptly reacting to safety suggestions and complaints, regular safety meetings and safety training. However, each of the remaining five elements has negative deviation about RSI. This implied that the premium placed on them were below average. The key element involved in this category were the provision of good job design, well defined objectives, well-practiced and emergency procedures, systematic training programme and effective incident- investigating procedure.

## 5.2. Safety Programme Issues

For a good and effective safety programme, certain issues expected to be given consideration. The respondents were asked to identify and rate the safety programme issues in construction organisations using any of the Likert scales of very high, high, moderate, low and very low. The results of the analysis are presented in Table 10. The average premium index was 3.60. This showed that the average perception to the safety programme is above the moderate level but not high. Further analysis revealed that half (8) of the safety resources expected to feature in a good safety programme have positive deviation about SPI. These are scaffolding (0.34), first aid facilities (0.33) foot protection (0.33), head protection (0.28), others are perimeter guarding (0.08), Rigging and crane safety (0.005) and sign barricades and flagging (0.02). Furthermore, in ensuring a good safety programme, personal protective equipment (PPE) must be provided to minimize exposure to a variety of hazards.

The high premium placed on scaffolding is much expected because the issue of falling from a height is the most fearful aspect on a construction site. The PPE provided by the employer in the studied construction firms were safety booth. Other PPE provided were the safety helmet to protect employees from potential head injuries. A head injury can impair an employee for life or it can be fatal. Therefore, wearing a safety helmet or hard hat is one of the easiest ways to protect an employee's head from injury. Other PPE provided were safety goggles for eye or face protection, hear protector to prevent excessive noise, hand and arm protector to protect injuries that may affect the hand or arm. The provision and use of PPE is in agreement with [36] who identified same as an integral part of a good safety programme in the construction industry. The issues that showed negative deviation include emergency procedure induction, hand protection, eye protection, and respiratory protection. Others are safety belt, fire protection (fire extinguishers, etc.), electrical safety, and ear protection.

## 5.3. Safety Training

The respondents were asked to rate their perception using any of the Likert scales of very high extent, high extent, moderate extent, low extent, and very low extent. The result is as presented in Table 11. The average premium index is 3.36. The results revealed that safety training consist of instruction in hazard recognition and control measures, learning safe work practices and proper use of personal protective equipment, and acquiring knowledge of emergency procedures and preventive actions. Safety training also provides workers with ways to obtain added information about potential hazards and their controls; they could gain skills to assume a more active role in implementing hazard control; programmes or to effect organizational changes that would enhance worksite protection. The issue of training is an important aspect of safety programme.

**Table 10. Perception of Premium Placed on Safety Programme Issues**

| Key elements | Extent of premium | | | | | Safety premium index | | | |
|---|---|---|---|---|---|---|---|---|---|
| Safety programme expected to address the following issues | 5 | 4 | 3 | 2 | 1 | TWV | SPI | $(SPI - \overline{SPI})$ | Ranking |
| Scaffolding | 101 | 75 | 46 | 18 | 10 | 989 | 0.788 | 0.34 | 1st |
| Fist aid facilities | 97 | 81 | 45 | 18 | 11 | 991 | 0.786 | 0.33 | 2nd |
| Foot protection (steel toe boot) | 113 | 51 | 53 | 27 | 7 | 987 | 0.786 | 0.33 | 3rd |
| Head protection | 108 | 63 | 47 | 13 | 22 | 981 | 0.776 | 0.28 | 4th |
| Others, please specify | 40 | 23 | 13 | 12 | 6 | 353 | 0.768 | 0.24 | 5th |
| Primeter guarding | 72 | 84 | 58 | 22 | 16 | 930 | 0.736 | 0.08 | 6th |
| Rigging and crane safety | 78 | 81 | 43 | 25 | 24 | 917 | 0.730 | 0.05 | 7th |
| Signs, barricades, flagging | 76 | 72 | 58 | 26 | 21 | 915 | 0.724 | 0.02 | 8th |
| Emergency procedure induction | 67 | 71 | 67 | 30 | 16 | 886 | 0.712 | -0.04 | 9th |
| Hand protection (hand gloves) | 68 | 76 | 52 | 39 | 17 | 895 | 0.710 | -0.05 | 10th |
| Eye protection | 65 | 78 | 58 | 35 | 18 | 899 | 0.708 | -0.06 | 11th |
| Respiratory protection | 54 | 78 | 55 | 33 | 31 | 844 | 0.672 | -0.24 | 12th |
| Safety belt and life line | 50 | 77 | 58 | 36 | 28 | 832 | 0.666 | -0.27 | 13th |
| Fire protection (fire extinguishers, sand buckets etcs) | 77 | 84 | 54 | 20 | 17 | 830 | 0.658 | -0.11 | 14th |
| Electrical safety | 76 | 85 | 43 | 25 | 20 | 819 | 0.658 | -0.11 | 15th |
| Ear protection | 44 | 66 | 71 | 35 | 35 | 802 | 0.636 | -0.42 | 16th |

**Table 11. Perception of Premium placed on Safety Training**

| Key elements | Extent of Premium | | | | | Safety Premium Index | | | Ranking |
|---|---|---|---|---|---|---|---|---|---|
| Training issues expected in a safety programme | 5 | 4 | 3 | 2 | 1 | TWV | SPI | (SPI – $\overline{SPI}$) | |
| First aid procedures | 59 | 81 | 68 | 31 | 13 | 898 | 0.712 | 0.20 | 1st |
| New worker orientation | 61 | 76 | 64 | 26 | 21 | 874 | 0.704 | 0.16 | 2nd |
| Fire protection and prevention | 41 | 86 | 78 | 30 | 15 | 858 | 0.686 | 0.07 | 3rd |
| Safety inspection | 38 | 86 | 79 | 34 | 15 | 854 | 0.676 | 0.02 | 4th |
| Safety work practices | 47 | 68 | 88 | 16 | 32 | 835 | 0.666 | -0.03 | 5th |
| Any other, please specify | 19 | 32 | 19 | 7 | 17 | 311 | 0.662 | -0.05 | 6th |
| Accident investigation procedures | 43 | 71 | 76 | 40 | 21 | 828 | 0.660 | -0.06 | 7th |
| Emergency procedures | 37 | 65 | 89 | 32 | 24 | 800 | 0.648 | -0.12 | 8th |
| Fire drills | 31 | 79 | 83 | 24 | 36 | 804 | 0.636 | -0.18 | 9th |

This result showed that the average perception to safety training is moderate. There are four training issues that showed positive deviation about the safety premium index. These are first aid procedures, new worker's orientation, fire protection and prevention and safety inspection. This result is quite expected because during one - on - one interaction on some sites, the general remarks by the workers showed that first-aid procedures was rated high and mostly preferred in the aspect of safety training. This is because it was considered an immediate treatment procedure given to unlucky injured personnel. Also, new worker orientation after engagement was given preference. This is to ensure efficiency and safe work practices.

## 5.4. Safety Inspection

**Table 12. Frequency of the safety Assessment**

| Period | Frequency | % | Cumulative % |
|---|---|---|---|
| Weekly | 41 | 21.2 | 21.7 |
| Bi-weekly | 15 | 7.9 | 29.6 |
| Monthly | 65 | 34.4 | 64.0 |
| Quarterly | 21 | 11.1 | 75.1 |
| Randomly | 47 | 24.9 | 100.0 |
| Total | | | |

This study investigated whether the construction organisations undertake job safety inspection. One hundred and sixty nine (72.5%) respondents indicated that a surprise inspection was carried out. The result presented in Table 12 showed how the assessment is conducted. Monthly inspection was mostly common (34.4%). This is contrary to regularized or weekly safety inspection contained in the [39].Therefore, this irregular inspection is not likely to be most effective in safety management on construction sites. The respondents indicated that the inspection is done just anytime without notice.

## 5.5. Safety Assessment

The management of a construction organisations has a unique role in the selection of its various workforces. Therefore, the items being considered in assessing worker's ability for safety are presented in Table 13. A high premium was placed on the workers ability to take instructions (3.80), high mental ability (3.71), both high level of orientation (3.66), and physical ability (3.55). These combinations are generic factors as opined by [38] or the basis that determined how the average person or team would be expected to perform when given a particular procedure or work schedule. Also, high level of orientation among operatives or workforce would promote mutual agreement between them. The workers safety assessment results are presented in Table 14. The results revealed that workers with good assessment record are commended, given incentive, and promoted.

## 5.6. Penalty

As shown in Table 15, 180 respondents (74.7%) claimed that there is penalty for not putting on the safety equipment or apparels. The results also revealed that the management of the construction organisations placed lowest premium on capital punishment for the violation of the safety rules (see Table 15). Further, the results showed that warning was the commonest punishment usually given to offenders. This shows that the management could find it difficult to effect the order.

**Table 13. Assessing Workers Ability for Safety Consideration**

| Key elements | Extent of premium | | | | | Safety premium index | | | Ranking |
|---|---|---|---|---|---|---|---|---|---|
| | 5 | 4 | 3 | 2 | 1 | TWV | SPI | (SPI – $\overline{SPI}$) | |
| Ability to take instruction | 84 | 70 | 61 | 20 | 11 | 934 | 0.760 | 0.02 | 1st |
| High mental ability | 78 | 65 | 70 | 20 | 12 | 912 | 0.742 | 0.11 | 2nd |
| High level of orientation | 68 | 81 | 60 | 23 | 15 | 905 | 0.732 | 0.06 | 3rd |
| High physical ability | 66 | 76 | 58 | 19 | 27 | 873 | 0.710 | -0.05 | 4th |
| Others | 20 | 28 | 26 | 11 | 8 | 320 | 0.688 | -0.16 | 5th |
| Social affinity | 36 | 85 | 82 | 29 | 15 | 839 | 0.680 | -0.02 | 6th |

**Table 14. Workers Safety Assessment Result**

| Factors | Extent of Premium | | | | | Safety Premium Index | | | Ranking |
|---|---|---|---|---|---|---|---|---|---|
| | 5 | 4 | 3 | 2 | 1 | TWV | SPI | $(SPI - \overline{SPI})$ | |
| Workers with good assessment record are commended | 83 | 69 | 49 | 23 | 15 | 899 | 0.752 | 0.38 | 1st |
| Workers with good assessment record are given incentive | 85 | 54 | 42 | 32 | 24 | 855 | 0.722 | 0.23 | 2nd |
| Workers with good assessment record are promoted | 67 | 70 | 47 | 34 | 20 | 844 | 0.710 | 0.17 | 3rd |
| Workers with bad assessment record are punished | 57 | 59 | 62 | 28 | 31 | 794 | 0.670 | -0.03 | 4th |
| Workers with bad assessment record are reprimanded | 21 | 65 | 78 | 49 | 25 | 722 | 0.606 | -0.35 | 5th |
| Workers with bad assessment record are dismissed | 37 | 52 | 69 | 36 | 45 | 717 | 0.600 | -0.38 | 6th |

**Table 15. Penalty for Not Wearing Safety Equipment**

| Factors | Extent of premium | | | | | Safety premium index | | | Ranking |
|---|---|---|---|---|---|---|---|---|---|
| | 5 | 4 | 3 | 2 | 1 | TWV | SPI | $(SPI - \overline{SPI})$ | |
| Warning | 63 | 67 | 46 | 13 | 19 | 766 | 0.734 | 0.41 | 1st |
| Dismissal | 51 | 41 | 33 | 32 | 50 | 632 | 0.610 | -0.04 | 2nd |
| Suspension for some days | 35 | 39 | 63 | 34 | 35 | 623 | 0.604 | -0.17 | 3rd |
| Non-payment of the day's wages | 21 | 51 | 39 | 48 | 46 | 568 | 0.604 | -0.17 | 4th |

# 6. Conclusions

This study investigated the safety management practices employed by construction organisations in Nigeria. These practices were identified to include workable safety programme, safety programme issues, safety training, safety inspection, safety assessment, and penalty for not wearing safety equipment. The study found that effective communication, support and involvement of the management played very important role in ensuring an effective safety programme in the construction industry. The study also revealed five elements that are important but not strongly influencing a workable safety programme. These were the provision of good job design, well defined objectives, well-practised and emergency procedures, systematic training performance and effective incident-investigating procedure. The important aspects of training revealed included first aid procedures, the orientation for new workers, fire protection and prevention. The findings show that workers with bad assessment records were punished, reprimanded or dismissed accordingly.

The study found that prioritizing the decision or policies on safety requirements is the key factor to ensuring a good safety culture. It was also found that construction organisations placed emphasis on safety inspection to identify potentially hazardous conditions and unsafe actions in order to initiate corrections.

Furthermore, the study also revealed that periodic inspection being carried out by safety officers and supervisors. The study showed no provision of targets for health and safety performance and training issues was not made a compulsory item within the budget of the firms studied. Also, after the completion of safety training, no feedback from the employees was obtained at all levels. The expected feedback could have been used to make a policy update. In the light of the research findings, the following recommendations are proffered. First, procurement policy should encompass due consideration to provision of safety behaviors among construction workers. This would make it possible to provide proactive platform that would prevent occurrence of risks during construction processes. Also, the personnel across levels of engagement in the construction industry must be trained periodically on the emerging safety practices, use of kits and behavioural culture such exposure and training session would also allow increased preventive and on-hand efforts to mitigate risks associated with construction processes. Moreover, safety audit process must be carried out either by using competent in-house personnel or outsourced staff to assess levels of compliance of construction firms with safety policy on ground. This would provide avenue for zero non-compliance with safety practices and culture by personnel in the construction industry.

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