

WORKMEN HEALTH AND SAFETY ON INDIGENOUS CONSTRUCTION CONTRACTORS SITES IN LAGOS STATE

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This study investigates health and safety incidences on construction projects handled by indigenous contractors. It assesses the frequency at which health and safety incidences occur on construction sites and evaluates potential factors that could influence health and safety performance of indigenous construction contractors on construction sites within the study area. A survey of randomly selected sites within the study area was conducted using self-administered structured questionnaires as instruments of primary data collection. The data collected were analyzed using descriptive and inferential statistics. The analysis showed that the rate at which accidents occur on indigenous contractors' site is high. Rated as the most significant causes of accidents on construction sites are injury from nails, sharp objects and handheld tools. This study concludes that giving monetary incentives to workmen for carrying out construction task in a safe manner, regular safety inspections during construction activities and carrying out disciplinary action for activities carried out unsafely are measures that could enhance the health and safety performance of construction contractors. This study then develop a model that could assist indigenous contractors predict the likelihood of accident occurrence from unsafe condition, unsafe act and near miss on a construction site.

Keywords: Accidents, Construction Sites, Unsafe Condition, Unsafe Act, Near miss, Health and Safety.

1 INTRODUCTION

Occupational Health and Safety in construction involves employing appropriate precautionary measures in protecting people from injury at work or from becoming ill (Okeola, 2009). A safe, healthy and productive workforce is needed to achieve the objective of national development and economic growth. Fagbenle, Makinde & Oluwunmi (2011) opine that the output of the construction industry in Nigeria accounts for over 70% of GDP and therefore is a stimulator of the national economy.

The construction industry plays an important role in any economy and its activities are also vital to the achievement of the socio-economic development goals of providing shelter, infrastructure and employment (Burke, Salvador, Smith-Crowe, Chan-Serafin, Smith & Sonesh 2011). It is therefore imperative that safety on construction projects cannot be neglected.

Globally, the construction industry is regarded as one of the most hazardous industries. Health and Safety Executive (2001) reports that the European average fatality rate in

UK construction was 13.3 per 100,000 workers in 1996; thereby making the construction industry one with the highest possibility of accident and injury. Similarly, in 1996 Tariq and John (2000) posit that 1,000 construction workers in the United State, lost their lives at work and another 350,000 had disabling injuries. Dodo (2014) opines that construction work is hazardous as construction workers all over the world are three times more likely to be killed and twice as likely to be injured as workers in other occupations. With such safety records in developed nations, it becomes imperative to characterize construction safety conditions in Nigeria. The laissez faire attitude among construction workers, poor safety records and inadequate statutory regulations on health and safety issues describes the construction safety situation in Nigeria. Idoro (2008) suggested that Federal Government needs to support the construction industry by putting in place legislations that would control the health and safety practice of the industry as well as structures that would monitor and enforce such legislations.

In Nigeria, the availability of reliable data on construction work health and safety related incidences remains a challenge. Construction work health and safety record is not readily available; because contractors do not readily record, keep or report safety incidences and accidents to the appropriate regulatory authority. Safety incidences and accidents on construction sites are made public only when it results from building collapse or it becomes obvious and makes media reports. Oketola, Falode, Adeoye, Odusanya, and Alagbe, (2014) reports such incidence in the collapse of a building under renovation in Edo State which occurred on the 19th of September, 2014 killing over 3 site workers. A similar incidence occurred in Lagos, when a church building under construction collapsed killing over 80 people of varying nationalities (Oketola, Falode, Adeoye, Odusanya, & Alagbe, 2014). The unavailability of statistics on incidences and accidents on construction sites in Nigeria does not translate to the non-occurrence of accidents on the various sites. Agwu and Olele (2014) suggest that many construction workers have died as a result of various degrees of accidents and injuries sustained from construction sites. While the issue of safety remains a serious concern to construction stakeholders across the nation, studies investigating causes of accidents on construction sites in Nigeria are inadequate. Most of the existing studies such as Awodele and Ayoola (2005); Idoro (2008), (2011); and Dodo (2014) investigate laws regulating safety practices of construction contractors. These studies in common recommend that there is need for government to formulate policies and legislate laws that would support construction contractors improve on their health and safety performance.

Gap emanating from previous studies on the causes of construction sites accidents, particularly in Nigeria require further investigation. Such investigation would improve the awareness of construction stakeholders on the causes of accidents and consequently improve the health and safety performance of construction contractors by managing identified causes of incidences. There is therefore the need to investigate safety incidences arising from unsafe act, unsafe condition and near miss, and accidents on construction sites within the study area. This would provide clear direction in recommending health and safety measures for improving safety of workers on construction sites.

This study aimed at evaluating construction contractors' health and safety incidences (unsafe act, unsafe condition, and near miss) and accidents in Lagos state. The

objectives of the study are: to investigate causes of accidents on construction sites in Lagos State, to investigate health and safety incidences and accidents occurring on construction sites within the study area and to evaluate measures for improving health and safety performance of contractors on construction sites.

The study also seeks to test the null hypothesis that:

Ho: There is no significant difference in the rate at which incidence occurs on main contractors' site and indigenous contractors' site within the study area.

2 LITERATURE REVIEW

Dosh (2007) defines the construction industry as the industry responsible for the production, alteration, renovation, maintenance, facility management, demolition, and re-cycling of building and civil engineering works. It is also responsible for the supply of resources which include those who promote the industry's policies, procedures, practices, and culture, which help the industry to fulfil the tasks required of it and thus satisfy its internal and external stakeholders. According to Danso (2010), the construction industry is unique among other industries as the activities of construction often take place in the outdoor under conditions which often are not conducive for safety and health.

Most people tend to relate construction industry with dangerous working environment and high risk as compared to other industry (McDonald & Hrymak, 2002). The reputation of the construction industry with respect to safety relies on the expertise employed in the implementation and management of safety policies and also how construction activities can be safely completed within the scheduled timeframe. According to Hassanein & Hanna (2007), many more accidents occur in construction per every 100,000 workers than overall in the workforce of other sectors. Thwala and Phaladi (2009) state that researches shows that construction industry has been labelled as an industry with low level of safety and health culture compared to other industries.

Awodele and Ayoola (2005) define safety as "the condition reached when the hazard which could result in accident is removed" and Zolfagharian, Ressang, Irizarry, Nourbakhsh, & Rosli (2011) define safety programme as "an outline of a safety policies, project practices and procedures, and should provide actions that must be taken to regulate accidents, and systematically integrate them into day to day management and operation of the company". Zolfagharian et al. (2011) explained further that safety policy is a more detailed document that contain the specific plans and procedures for achieving safe operations, such plans should include, but not limited to the following; general safety policy, hazard assessment procedures, safe work practices and procedures, personal protective equipment, maintenance policies and information, training policies, inspection policies, incidence investigation policies and information, emergency provision among others. Okeola (2009) identifies fall from heights, tool injury and struck by moving object as common accidents on construction sites.

Observation of prevalent health and safety practice in the construction industry indicates that contractors are seldom awarded contracts solely on the basis of anticipated safety performance. When employing a contractor with a history of poor safety performance, clients should emphasize that such contractor operate in accordance with acceptable industrial safety practices. Such would assist the contractor

and client in reaping cost savings from such better safety performance. According to Danso (2010), construction stakeholders can take measures to achieve better safety performance, such measures include; providing safety and health guidelines that the contractor can follow, safety education of workers on construction sites among others.

Agwu and Olele (2014) describe accident as chance-caused events that are normally not given to direct observation but rather on post factum measurement. Ahmad, Gibb and Mccaffer (1998) posit that accidents causes delays and, both directly and indirectly incur cost. A safer and more effective working environment can be achieved through proper management commitment, planning and establishment. Put in another form, it is an eventful occurrence in a work place that interrupts production activities or process through the loss of time, loss of resources upon wrongful and inappropriate human behaviour and deficient working environment, design or management. Dodo (2014) asserts that accident is an unplanned event which has the capacity to cause injury or damage and is attributed to either unsafe act or an unsafe condition. He also stressed that it could result in damage to plant or product, loss of production, increased cost, pollution of the environment and injury to persons, few of which may prove fatal or even lead to death.

According to Zolfagharian et al. (2011), construction worksites are complex due to sequential work processes, levels of technology used, interaction between workers and equipment, and the varying degrees of safety awareness and training of the workers. The unpredictable and complex nature of the construction tasks has made safety a concern wherever construction activities take place. European Agency for Safety and Health at Work (2004) citing the European Survey of Working Conditions (ESWC) report of 2000, which indicate that construction workers report an average of 7.3 days of illness related absence from work during the year, of which they report that 32 % are due to accidents at work, 28 % to non-accidental work-related health problems and 40 % to non-work-related health problems. These statistics provide a strong justification of the need for research focused on safety and health in the construction industry.

Important characteristics of every construction project are the cost, duration, quality and safety of the project (Lubega, Kiggundu, & Tindiwensi, 2000). Unfortunately there has been greater emphasis on the first three characteristics, at the expense of safety. A lot of people have been exposed to risk situation on building sites, resulting in a high chance of accidents as a result of lack of adherence or inadequate provision of safety requirements.

Previous studies on safety practices on construction sites postulates that there is a significant relationship between health and safety practices and project delivery periods since a robust health and safety culture on any particular site would reduce the occurrence of accidents on such site. Furthermore, whenever accidents occur on site, ongoing works are momentarily suspended and if the impact of the accident is severe, the construction site may be forced to close down which may consequently result in extended project delivery period.

It can therefore be concluded that the control of accidents on any building site is not the responsibility of just any particular individual but rather the responsibility of everyone that is involved in the various activities of the construction process. On the other hand, Mwombeki (2005) enumerates safety plans, safety trainings and meetings, first aid and

medical arrangements, and management policy as the four preventive approaches for accidents.

3 RESEARCH METHODS

This study is geographically delimited to Lagos State, the economic nerve center of Nigeria. Fifty (50) construction companies that were indigenous companies were selected from the list of contractors registered with the Lagos State Tender Board. Simple random sampling technique was employed in selecting the companies. This was done by assigning numbers to the companies in the sample frame and using the table of random numbers, numbers were randomly picked and the companies corresponding to the selected numbers were each time added as part of the sample for this study. Two (2) structured questionnaires were administered by hand to each of the fifty (50) randomly selected firms making the total number of administered questionnaires One hundred (100). Personal visits and phone calls were made to the respondents to retrieve the questionnaires. Out of the 100 copies of research questionnaire distributed, Eighty (80) were returned. The returned copies were scrutinized for errors, omissions, completeness and inconsistencies after which seventy-four (74) questionnaires were found to be adequately and substantially filled representing a 74% response rate. Data for the study were processed and analyzed with the aid of the Statistical Packages for Social Sciences (SPSS) and the results generated are presented accordingly using frequency distribution and percentages for the descriptive statistics while cross tabulation, one sample t test and multilinear regression analysis were employed for the inferential statistics generated from the data.

4 RESULTS AND DISCUSSION OF FINDINGS

4.1 Organisation of Respondents

Data on the category of firm to which the respondents belong were collected. This was done to examine the proportion of respondents whose firms are main contractors and those that are sub-contractors. Table 1 reveals that respondents from main contracting firm represents 77% of the overall respondents while the sub – contracting firms account for 23% of the respondents’ organisation.

Table 1 Respondents Organisation

| | Frequency | Percent | Cumulative Percent |
|-----------------|-----------|---------|--------------------|
| Main contractor | 57 | 77.0 | 77.0 |
| Sub-contractor | 17 | 23.0 | 100.0 |
| Total | 74 | 100.0 | |

4.2 Frequency at which Incidences and Accidents occur on Site

In the course of this study, four major potential health and safety occurrences scenario were presented to the respondents. The respondents were requested to indicate the frequency of occurrence of incidences and accidents on their respective sites using a 5 point Likert scale ranging from 1 – 5, with 5=Always, 4=Usually, 3= Sometimes, 2= Rarely and 1= Never. The resulting results from the analysis of the data obtained are presented in Table 2 below:

Table 2 HSE occurrences on construction sites

| HSE Incidences | Frequency of HSE incidences (%) (N=74) | | | | | Total |
|------------------|--|--------|-----------|---------|--------|-------|
| | Never | Rarely | Sometimes | Usually | Always | |
| Unsafe Act | 0 | 13.5 | 27 | 52.7 | 6.8 | 100 |
| Unsafe Condition | 0 | 10.8 | 31.1 | 44.6 | 13.5 | 100 |
| Near Miss | 0 | 9.5 | 31 | 56.8 | 2.7 | 100 |
| Accident | 2.7 | 24.3 | 41.9 | 24.3 | 6.8 | 100 |

The results in Table 2 reveals the frequency at which incidence occurs on indigenous contractors sites. The results shows that accidents occurs 73% of the time there are construction activities on site. The rate at which unsafe act and near misses occurs are equally of concern as these happens 52.7% and 56.8% of the time respectively. This results compare with the results obtained by Hassanein and Hanna (2007), that site accidents are more likely to happen when there are inadequate company policies, unsafe practices, poor attitudes of construction personnel, poor management commitment and insufficient safety knowledge and training of workers.

4.3 Causes of Accidents on Construction Sites

Literature revealed that safety incidences and accidents that occur on construction sites could be attributed to a number of factors. This study therefore examines the causes of safety incidences and accidents on construction sites within the study area. Table 3 shows the result for the assessment of factors causing accidents on construction sites as identified in literature.

Tables 3 Causative factors of accidents

| Causative Factors of accidents | N | Mean score | Ranking |
|---|----|------------|---------|
| Inadequate scaffolding | 74 | 3.95 | 1 |
| Non-use of personal protective equipment | 74 | 3.80 | 2 |
| Operator failed to follow necessary procedure | 74 | 3.78 | 3 |
| Inappropriate use of ladders and hoists | 74 | 3.62 | 4 |
| Stepping on or striking against objects | 74 | 3.60 | 5 |
| Equipment failure | 74 | 3.55 | 6 |
| Unsafe work practice | 74 | 3.50 | 7 |
| Poor house keeping | 74 | 3.45 | 8 |
| The lack of toe boards on scaffolding | 74 | 3.43 | 9 |
| Lack of edge protection | 74 | 3.40 | 10 |
| Lack of tool belts for workers | 74 | 3.33 | 11 |
| Unsafe work conditions | 74 | 3.33 | 11 |
| Improper use of hoists and cranes | 74 | 3.30 | 12 |
| Dress or apparel hazard | 74 | 3.28 | 13 |

| Causative Factors of accidents | N | Mean score | Ranking |
|--|----|------------|---------|
| Lack of edge protection in roof work | 74 | 3.25 | 14 |
| Dangerous demolition work | 74 | 3.25 | 14 |
| Unprotected openings in buildings | 74 | 3.23 | 15 |
| Bad storage and stacking | 74 | 3.23 | 15 |
| Scaffolds were not provided with guard rails | 74 | 3.18 | 16 |
| Broken or energized power line falling | 74 | 3.15 | 17 |
| Vehicle overturns | 74 | 2.88 | 18 |

The results reveal that inadequate scaffolding ranked first among causes of accident on construction sites while non-use of personal protective equipment's and operator failure to follow necessary procedure ranked second and third respectively. This result suggest that most of the activities on the sites of surveyed construction professionals are activities at height but artisans involved in such activities do not pay adequate attention to their safety while carrying out the work. This result concurs with the findings of Ogunde, Owolabi, and Kukoyi (2014) that the major causes of accidents on construction sites are related to human behaviour, difficult work site conditions, and poor safety management. The result is however in contrast with the study of Lubega, Kiggundu, and Tindiwensi (2000) which opine that major causes of accident on construction projects are inadequate supervision, use of incompetent personnel and use of inappropriate construction techniques.

4.4 Measures for Improving Health and Safety Situations on Construction Site

This study assesses possible measures by which incidences and accidents can be reduced on construction sites using a 5 point Likert scale ranging from 5-1 with 5=Very important, 4= Important, 3=Moderately important, 2=of little important, 1= Not important. Table 4 shows the results of the analysis.

Tables 4: Potential measures for improving health and safety on construction sites.

| Measures for improving H&S practices on construction. Sites | N | Mean | Ranking |
|--|----|------|---------|
| Conducting Safety Meetings for Field Safety Directors | 74 | 4.73 | 1 |
| Use of Personal Protective Equipment | 74 | 4.18 | 2 |
| Awards for Safety Performance | 74 | 3.95 | 3 |
| Safety Rules | 74 | 3.93 | 4 |
| Safety Inspection | 74 | 3.90 | 5 |
| Tools Box Meeting and Safety Orientation | 74 | 3.87 | 6 |
| Management Talk on Safety During Site Visit | 74 | 3.85 | 7 |
| Training of Safety Personal | 74 | 3.85 | 8 |
| Accident Records Reviewed By Company Management | 74 | 3.68 | 9 |

| Measures for improving H&S practices on construction. Sites | N | Mean | Ranking |
|--|----|------|---------|
| Safety Meetings For Supervisors | 74 | 3.67 | 10 |
| Formal Safety Orientation | 74 | 3.65 | 11 |
| Physical Examination Of Workers | 74 | 3.63 | 12 |
| Confined Space Entry Without Autho Into Strategic Places | 74 | 3.60 | 13 |
| Employing the Use of Safety Administrator on Site | 74 | 3.50 | 14 |
| Job Safety Training | 74 | 3.48 | 15 |
| Safety Inclusion in Site Visits | 74 | 3.45 | 16 |
| Training of Safety Representative | 74 | 3.43 | 17 |
| Corporate Accident Records Provided | 74 | 3.33 | 18 |
| Accident Cost Report Broken Down | 74 | 3.33 | 18 |
| Allocating Safety Expenses To The Company Overhead | 74 | 3.33 | 18 |
| Writing an Investigative Accident Report | 74 | 3.30 | 19 |
| Written Hazard Communication Program | 74 | 3.15 | 20 |

The analysis reveals that conducting safety meetings for field safety directors ranked first as a measure that could improve health and safety on construction sites with a mean score of 4.73. Use of personal protective equipment was ranked second with a mean score of 4.18 while award for safety performance and safety rules were ranked third and fourth with mean scores of 3.95 and 3.93 respectively.

This result implies that conducting safety meetings regularly will help to reduce safety incidences and accidents on construction site. While written hazard communication program is perceived to be rarely important in reducing accident rate on construction site. This results aligns with the result of Loughborough University (2003) that safety on work site could be achieved by the use of less hazardous techniques during work execution, frequent reminder of workers of the need to use personal protective equipment (PPE) and improved housekeeping in the work area.

4.5 Research Hypothesis

Ho: There is no significant difference in the rate at which incidences occur on main contractors' site and indigenous contractors' site within the study area.

H₁: There is significant difference in the rate at which incidence occurs on main contractors' site and indigenous contractors' site within the study area.

Independent samples t test was used to analyze the hypothesis for this study. An average t value of 0.306 was obtained which is greater than 0.05. This implies that there is no significant difference in the rate at which incidences occur on indigenous

contractors' site within the study area irrespective of the category the construction company belong (main contractor or sub-contractor), hence the null hypothesis is accepted.

4.6 Research Model

Using the data collected from the field survey of this study, a regression model was developed to predict the likelihood of accident occurring on construction site using unsafe act, unsafe condition and near miss incidences as predictors. The resulting model is presented in equation 1 below:

$$AC = 0.387NM + 0.103UA - 0.003UC + 1.364 \quad (1)$$

Where:

AC is the likelihood of accident occurring on site

NM is the frequency of near miss incidences on site

UA is the frequency of unsafe act incidences on site

UC is the frequency of unsafe condition incidences on site

In comparison with the study of Haslam et al. (2005), this study concur that there is the need across the industry, encompassing designers and suppliers, as well as site-based personnel, to raise awareness and understanding of the generic safety risks that are commonplace in construction. So construction contractors should induct workmen to be mindful of potential sources of accidents (such as unsafe act, unsafe conditions and near miss) on construction sites as on-site accidents occur mostly because the real hazards were either not perceived or were perceived to be less dangerous than they actually are. However accidents in the workplace do occur when there is no proper integration between the people who tends to be safe and unsafe behaviour. Finally, in line with hypothesized safety management practices for improved health and safety performance in the workplace as proposed by Danso (2010), the findings of this study reveals that conducting safety meetings for key field officers on construction sites and the use of appropriate personal protective equipment among other factors, could help improve the health and safety performance of contractors on site thereby reducing the rate of accident.

5.0 CONCLUSION

This research concludes that safety inspection has a major influence on contractor's health and safety performance on construction site. The use of appropriate and adequate PPE is also a major factor that determines the health and safety performance of contractor's on construction site. The need to conduct safety meetings for field safety directors was found to be the most effective measure for improving health and safety practices on construction sites. This implies that regular safety meetings will help to reduce accident on construction site. Provision of adequate scaffolding should always be made on construction sites especially for works to be carried out at significant heights because thus study reveals that inadequate scaffolding for use on buildings is the most significant cause of accidents on construction site. The findings of this study brings the causes of safety incidences and accidents on construction sites to the fore. The study provides stakeholders in the construction industry clarity on factors that are responsible for most accidents on construction sites. Therefore, these findings can assist construction stakeholders in general and construction contractors in particular within and outside the study area to improve the safety performance of construction

projects by reducing safety incidences and accidents on construction sites. The findings of this study has also expanded the current body of knowledge on health and safety in construction projects.

Further to the study findings, this study recommends the enforcement of safety measures that could improve the health and safety practices on construction sites within the study area by relevant government regulatory agencies. Also, since the study identified inadequate scaffolding and non-use of personal protective equipment as the major causes of accident, contractors should focus on engaging competent workers in scaffold erection under strict supervision and safety inspection before scaffolds are mounted for use by site workers. Provision and proper use of adequate personal protective equipment should also be enforced on construction site, this would ensure safety for workmen and administrative personnel on construction site.

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