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The Development of Health and Safety Measures through Absolute Assessment of Causes of Site Accidents in Building Project

L.O.Asikogu

Department of Architecture, Imo State University, Owerri, Nigeria.

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ABSTRACT

The rate of increase in construction site accident is very large which readily indicate the need to examine and overhaul the existing safety practices deployed in building construction sites. In order to improve the overall safety performance, there is ample need to investigate the root causes of accidents; results of which could be utilized in formulating more conducive working conditions and environments to avert accident. The following were conducted: review of literatures, archives of reported accidents cases kept by the Construction Industry Development Board (CIDB). Also social surveys exercise using structured questionnaire forms were implemented to obtain relevant data from respondents who are mainly contractors, developers and consultant within Imo State, Nigeria. The finding reveals that accident result from critical factors such as unsafe method, human element, unsafe equipment, job site conditions, management and unique nature of the industry. After due analysis the main causes of accident were attributable to workers' negligence, failure of workers to obey work procedures and safety principles; operating equipment without safety devices; poor site management; harsh work operation work at high elevation; low knowledge and skill level of workers; failure to use personal protective equipment and poor workers attitudes about safety. In general, lack of adherence to safety requirements which has led to increase exposure of workmen and the general public to risk situations on construction resulting in a high rate of incidence of accidents.

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Introduction

Accidents in construction sites are unplanned occurrences involving movement of persons, objects or materials which may result in injuries, losses to properties or people. The majority of accidents happen as result of unsafe acts and unsafe conditions since all hazards in construction workplaces are not always possible to be identified and eliminated, effective accident investigation programmes are needful.

Accident include not only direct physical injury to person or damage to property, but also short and long terms effects or incidents due to other exposures on sites that affect the workers' health and physical wellbeing.

According to [1], over the last ten years the construction industry has thrived as a result of the liberalization of the economy which has attracted both local and foreign investors. Construction of new structures and upgrading or remodeling the existing structures have become the order of the day. Therefore the question of safety in construction can no longer be ignored, it should be given due consideration.

The increase vis-à-vis the existing non-commiserate number of qualified and skilled manpower have caused construction industry the influx of half-baked and often times in great number non skillful and untrained workmen who are ignorance of safety principles/requirements. These men are always very keen applying short cuts in the area of observing safety precautions and measures in carrying construction assignments behind the monitoring glares of supervisors.

Hence, lack of adherence to safety measures and requirements has led to increased exposure of workmen and the general public to risk situations resulting in a high rate incidence of accidents in construction sites.

Moreover, health measures that hinders workmen from undertaking risk that will endanger their health is captured in Public Health Act (1905) [2]. It stipulates measures in the area of clean and green environment in construction sites. When strictly adhered to and every necessary efforts and budget provided by employers to ensure construction sites cleared of debris, sharp objects haphazard droppings of materials, moist/watery floors, noise pollution, faulty ladders will go a long way to drastically reduce incidence of accidents and health related problems.

The need for appropriate health/safety measures enforcement by requisite government agencies, supervisors and employers of labour, cannot be over emphasized.

There is equally, the urgent need to update the safety and health regulations as stipulated in the Factories Act (1964) [3] and the Public Health Act (1905) [4] in order to incorporate present realities not anticipated in the precious Acts.

The standard of safety measures in building construction industries in Nigeria has nose-dived when compared to the stipulation in the factory Act and Public Health Act of Nigeria. Hence it has become increasingly impossible to achieve zero tolerance to accident.

It has been identified that safety programmes are only observed at the early stages of work by majority of the construction companies [5].

This clearly shows that these companies do not have a comprehensive safety programme driven by a safety culture [6].

With the increasing number of construction industry with the attendant increase in accident, injuries and fatalities, strict enforcement instrument to insist on adherence and compliance to safety management measures are paramount.

Safety management strategies are considered very crucial in a construction project but unfortunately many employees do not feel that it is one of the keys to the success of construction site activities. In order to decrease the job site risk and improve safety measures, the research will identify the common causes of accident and investigate the roles and responsibilities needed to be employed by participant to improved safety of our construction sites.

The study focus is on the identification of causes and sources of site accident, examining and analyzing them with a view to developing and establishing appropriate guidelines /strategies for improved preventive measures in construction sites. The following objectives will be developed to achieve the aim.

- i. identify accident and their causes in the study area
- ii. examine existing preventive measures already in use and
- iii. assess the role of building construction participants on improving standard.

The scope is limited but focus on construction sites located in Imo State, Nigeria. On visit to selected sites causes of accidents in the area; of unsafe equipment and machines, job site, human factors and others will be meticulously identified. Also a study on the roles and responsibilities of various parties involved will be included in the area of investigations. Findings will certainly reveal options on the appropriate guideline/strategy for construction safety practice to minimize accident.

Research Methodology

In the appraisal of site accident, causes and preventive measures in Nigerian construction sites, the following construction sites were visited such as sites handled by the following Organization/Institutions include Expo Construction Limited, ENIC (Nig.) Limited, Matric Construction Company Limited all located at Owerri, Imo State, Nigeria. Oral interviews, Observation and copies of questionnaire were utilized as the instrument of data collections.

Table 1. Data collection and analysis using contingency table to analyze the following data.

Option	No of respondent	Percentage (%)
Neglect to Instructions	25	25
Inadequate preventive wear	35	35
Absent of regular meeting	40	40
Total	100	100

Table 2. Number of accidents.

Options	No. of respondents	Percentage (%)
Every week	28	28
Every month	37	37
Regularly	35	35
Total	100	100

Table 1 and 2

H₀: There is no significant difference between no. of respondent and percentage. (P₁ = P₂)

H₁: There is significant difference between no. of respondent and percentage (P₁ ≠ P₂).

For Table 1

H₀: P₁ = P₂

H₁: P₁ ≠ P₂

P₁ is the proportion of the no of respondent.

P₂ is the percentage

This test is sometime called the test of Homogeneity which is used to indicate same or equal.

Table 3. Test of homogeneity.

Option	No of respondent	Percentage (%)	
Neglect to instructions	25 (25)	25 (25)	50
In adequate preventive wear	35 (35)	35 (35)	70
Absence of regular meeting	40 (4)	40 (40)	80
Total	100	100	200 Grand Total

Expected value $E_1 = \frac{100 \times 50}{200} = 25$

$E_2 = \frac{100 \times 50}{200} = 25$

$E_3 = \frac{100 \times 70}{200} = 35$

$E_4 = \frac{100 \times 70}{200} = 35$

$E_5 = \frac{100 \times 80}{200} = 40$

$E_5 = \frac{100 \times 80}{200} = 40$

$X^2_i = \frac{\sum (O_0 - \sum i)^2}{e_i} = 0.00$

Use 5% = 0.05

$X^2_{0.05, (3-1) (2-1)}$

$X^2_{0.05, 2} = 5.99147$

Conclusion: Since the tabulated is greater than chi-square calculated ($X^2_t > X^2_c$), i.e. we accept H₀.

There is no significance difference between the proportions.

Therefore, negligence of options in table 1.1 results to hazard.

For Table 2

H₀: P₁ = P₂

H₁: P₁ ≠ P₂

P₁ is the proportion of the no of respondent.

P₂ is the percentage

This test is sometime called the test of Homogeneity which is used to indicate same or equal.

Table 4. Test of homogeneity.

Option	No of respondent	Percentage (%)	
Every week	28 (28)	28 (28)	56
Every month	37 (37)	37 (37)	74
Regularly	35 (35)	35 (35)	70
Total	100	100	200 Grand Total

Expected value $E_1 = \frac{100 \times 56}{200} = 28$

$E_2 = \frac{100 \times 56}{200} = 28$

$E_3 = \frac{100 \times 74}{200} = 37$

$E_4 = \frac{100 \times 74}{200} = 37$

$E_5 = \frac{100 \times 70}{200} = 35$

$E_5 = \frac{100 \times 70}{200} = 35$

Use 5% = 0.05; $X^2_{\alpha, (r-1) (r-1)}$

$X^2_{0.05, (3-1) (2-1)}$

$X^2_{0.05, 2} = 5.99147$

Conclusion: Since the tabulated is greater than chi-square calculated ($X^2_t > X^2_c$), i.e. we accept H₀.

There is no significance difference between the proportions.

Therefore, the probability of accident occurring is not minute.

Descriptive Analysis of Data

This data is said to be descriptive statistics.

Taking Analysis from Table 1

➤ The major causes of accidents from options is said to be absence of regular meeting which has 40 No of respondent which is 40% = 0.4

From table 2

➤ The occurrence of accident in the site from the options is every month with 37 no of respondents which is 37% = 0.37

Findings

From the data collected in conjunction to the field observations, the rate of increase of site accidents are on the high side. The target nonetheless should be zero tolerance on accident because where one occurs it entails an untold pain, hardship and economic lost to the family and national economy in general. Often times resources otherwise to be used for the progress of works is diverted to remedy the consequences of the accident before work can progress.

The major causes are negligence and non-adherence to safety principles and procedures as a result of indifference attitudes to manuals and gazettes provided on site to ensure zero tolerance. Non-monitoring through regular checks by supervisors and site meetings has rendered sites vulnerable to accidents. Accelerated and routine monitoring of construction sites by government agencies will help matters with sufficient legal enforcement instrument to ensure compliance. Insistence on regular site meeting and reports will assist in a long way to check mate non adherence to safety roles and principles.

Client should be encouraged to make adequate financial budget to employ requisite construction managers to man their project sites.

There were various acts that were observed that led to accidents such as:

- i. Refusing to wear personal protective equipment (PPE) which increased the probability of injuries.
- ii. Throwing or accidental dropping of objects down high levels which led to other workers been struck head and caused head injury.
- iii. Improper disposition of careless workers making short cuts by climbing or jumping from high levels instead of using ladders.
- iv. Executing work by using defective equipments and tools.
- v. Unsafe condition of sites in which their physical layout or work location status of tools, equipment and material violate the safety standards.

Such as open sided floors, defective ladders, improperly constructed scaffolds, protruding ends of reinforcing rods.

Other factors that caused accidents include:

Taking shortcuts in doing works that are being assigned to workers. Without having a well-planned organization, the manager will find it hard to execute monitoring policy implementation, to determine the role of safety and health responsibilities on each worker.

Conclusion

Construction activities in the area of building projects are on the increase in Nigeria as result of huge deficit in housing stock. It has made it difficult to checkmate the number of illegal construction firm entrants into the building industry. Most of these firms that statistic is difficult to capture is devoid of requisite certified personnel to engage in construction assignments. Hence utter negligence to safety principles and rules which in turn gives entrance to incessant construction sites accidents.

In view of the above premise, maximum safety on sites should be achieved by government agencies concerned to constitute sufficient safety monitoring committees to intensively conduct inspections within a catchment neighborhood and ensure compliance to safety rules and principles.

Furthermore adequate legislative enforcement instruments to ensure compliance by client, contractors and employers of labour in construction site will definitely assist to ameliorate accidents in building sites.

Recommendations

Other measures to improve safety condition in building constructions are recommended as follows.

- (i) Safety standards and measures should be made inclusive in contract documents. This will make it a contractual obligations as well as a legal matter which is actionable in case of non-compliance.
- (ii) There should be federal and state safety enforcement officers to ensure compliance for safety measure and to take appropriate administrative action in case of default by the construction firm. The federal government should establish a building information research centre (BIRC) to take care of the problem of keeping data of site accidents, employment rate, training output and current development in materials plant and equipment and construction method.
- (iii) Safety and training are closely connected since a well trained personnel is aware of all these factors which can impair his own safety and that of others.
- (iv) Caution signs in red colour should be used against potential hazard on site or to caution against unsafe practice. Caution signs are to be written all over in the language appropriate to those concerned.
- (v) To ensure safety on site, men in site should be taught how to obey and respect order on site which will on adherence promote safety on site to a greater extent. This attitude will prevent any form of accident emanating from over speeding.
- (vi) Medical facilities should be mandatory for construction firms to provide well equipped and adequately manned first-aid room at every construction site.
- (vii) Tools and machineries are of vital importance regarding its ability to execute his job efficiently. Tools should be kept in good and safe condition and should be used for purpose which they are designed for.
- (viii) Good and safety working conditions devoid of construction hazards should be provided. The worker should not be made to work under unsuitable conditions like under rain or at night without lighting.

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