PROCEEDING 7

REDUCING ACCIDENTS AND HEALTH HAZARDS IN THE NIGERIAN BUILDING INDUSTRY

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Accidents and health hazards owing to building collapse have been the talk of the day in the Nigerian building industry. The building team such as the architect, quantity surveyor, builder, engineer, and contractor are always blamed as a result of their indiscriminate attitude toward the construction of such building which has led to numerous lives wasted and injuries sustained. A descriptive research method through the conduction of oral interview and observation in some construction sites has shown that source of accidents and health hazards in the Nigerian building industry can be traced down to three main areas such as: design, construction and physical/environmental elements. This paper therefore, discussed the sources of accidents and health hazards in the building industry, and proffered ways to reducing such menace. It finally advocates that the National building code now in place should be enforced so that Developers would avoid the uncaring attitude of developing the Environment.

Keynotes: *Accidents, Building Industry, Construction, Design, Environment*

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INTRODUCTION

The building construction industry carries with it its fair share of accidents and health hazards. Accidental occurrences continue to show construction in a poor light, and this is understandable. The construction industry as a whole is often considered to be complex and unique. For instance, two buildings are rarely identical and the work on each construction site changes from day to day and this takes place mainly when it is open and exposed to the weather. Safety and health should be a major concern to the whole building team. Building personnel can contribute to safety at work by carrying out building operations correctly. Contracting organizations too, must safeguard the safety, health and welfare of the people who work for them as far as it is reasonably practicable. There should be the incorporation of safety working practices in the process of building. Tudunwada (1987) posited that injuries, industrial hazards and deaths need not be accepted as an inevitable price to be paid for industrial progress. Accidents do not just occur. They are mostly caused by people. Also occupational diseases are caused by unsafe work method and processes.

According to St. Paul's Steiner School (2013), accident is an unplanned event which has the capacity to cause injury or damage, and is attributed to either damage to plant or product, loss of production; increased cost, pollution of the environment and injury to person, few of which may even lead to death. According to Prokopenko (1981), a health hazard is the risk or danger of occurrences of work related disease, illness or serious discomfort, which could harm the physical or mental well being of a worker or the public.

Sources of accidents in the building industry have been channeled toward abuse of responsibility and error by workers. McCormick and Tiffin (1975) have highlighted the tendency towards error as a pervading human trait. They opined that errors of various kinds can of course, affect the quality of work people do and can also contribute to injuries and fatalities. Not only that, the factory inspector should also sit up to enforce the workplace health and safety standards.

The Factory Inspectorate Department is empowered to enforce workplace health and safety standards, ensuring that all workplaces maintained minimum standards of health and safety prescribed by the Factories Act, 1990 (Chapter 126, Volume VIII of the Laws of the Federation of Nigeria). Apart from carrying out workplace inspections, the department also conducts workplace surveys, investigates accidents, provides some occupational health and safety information, registers factories including construction sites and struggled to proactively promote workplace health and safety through enlightenment programmes, safety awareness, workshops, lectures and seminars.

The sources of errors and accidents are not entirely to be found in the individual in question, however; situational variables such as the nature of the work activities, the design of equipment and structure, the work procedures and the work environment can have a significant bearing upon the frequency and nature of errors and accidents. In the construction industry, however, sources of accidents can be traced generally to the three main areas which this paper shall dwell on: design, construction and physical/environmental elements.

SOURCES OF ACCIDENTS IN THE BUILDING INDUSTRY

Design:

In the conventional process of building industry, the design team directly employed by the client consist of:

i. Project manager (Team leader)

ii. The architect (designer)

iii. The Quantity surveyor (who serves as financial adviser)

iv. The Builder (who serves as a building construction expert)

v. The structural engineer (who serves as specialist consultant to structural works)

vi. The Electrical engineer (who serves as specialist consultant to electrical works)

vii. The Mechanical engineer (who serves as specialist consultant to mechanical works)

viii. The Acoustic engineer (who serves as specialist consultant to Acoustical works)

The architect produces and supervises an architectural plan of a building after generating a design brief from the client. Structural engineer basically produces the structural design, while the builder and/or contractor construct the building with the specification of the designer and specialist consultant and delivers same to the client. According to Ward (1978), building must be well planned, suitably sited and satisfy not only the numerous regulations regarding standards of construction, planning and safety, but also the need of the client in all climatic and environmental conditions. According to Ayininuola and Olalusi, (2004), buildings are structures, which serve as shelter for man, his properties and activities. They must be properly planned, designed and erected to obtain desired satisfaction from the environment. The design team primary concern during the design stage should be structural reliability, risk of consequence of fire, storms, flood, earthquakes and tremors and details, precision and appropriateness of specifications.

Ayodele (2003) asserted that a large number of accidents have occurred in building sites due to failure of temporary or partially complete structures and poor specification. Olalusi (2004) described failure as an unacceptable difference between expected and observed performance. A failure can be considered as occurring in a component when that component can no longer be relied upon to fulfill its principal function and therefore this can cause a health hazard. Bush (1973) noted that safety should be a prime consideration during planning, designing and construction in the building industry.

Construction:

In the construction of buildings, issues to be considered as sources of accidents in the building industry include:

i. Feasibility of Construction Method: Many building failures have been linked to poor unrealistic construction method adopted.

ii. Sufficient technical expertise by contractor: Some buildings have failed as a result of engaging wrong hands who don't have the technical knowledge on how to build. This as a result has endangered many lives and destroyed properties worth billions of naira.

iii. Quality and Availability of Supervisor and craftsmanship: Poor and irregular supervision by the architect or those that stand on the gap has jeopardized the quality of buildings which has led to accident in the site. Supervisors and craftsmanship should be engaged in the building sites.

iv. Satisfactory Construction Materials: Quality materials should be specified and be used for building construction in order to save lives and properties. For instance, use of sub-standard material has led to building collapse as shown in Plate 1.

v. Site Layout: None serious attention to the site layout during the setting- out operation and its construction has caused a lot of accident on the site. To less accident on building sites, contractors should strictly adhere to the ideology of the site layout.

vi. Adoption of realistic safety practices on site: Unconcerned (don't care) attitude toward the use of safety measures has caused more injuries to accident victims on site.

Plate 1.: A collapse building due to use of sub-standard material.
Source: Amadi, Eze, Igwe, Okunlola & Okoye(2012)

Ayodele (2004) observed that many accidents in Nigeria have occurred in building sites due to lack of sufficient technical expertise by the builder. Odumusu (1986) opined that the building industry involves the application on skills in areas of programming and design, construction management and erection, and in the prudent use of materials. He observed that absolute lack of knowledge and improper coordination of the various areas of inputs are responsible for the numerous failures, cracks, vibration and excessive deflection of the structural system. When a construction method is not feasible, this constitutes a accident risk (Perry and Hayes, 1985). A large number of accidents have occurred in building sites due to failure of temporary or partially complete structures and poor specifications. Bush (1973) has noted that safety should be a prime consideration during planning, designing and construction in the building industry.

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Hazards may be encountered when inexperienced or unqualified personnel are employed in the building process. Bush (1973) opined that safety must be put into the hands of practical men with knowledge of the industry. Usage of unsatisfactory construction materials, especially concrete has been known to cause accident in many building sites. Odumusu (1986), observed that defective workmanship and materials often arise in projects under construction as a result of lack of proper understanding of the nature and properties of a major material like concrete.

According to Ogunjobi (2003), concrete has been responsible for the serious cracks which develop in some structures where it has also been known to have created both hazards to the public, and in some cases risks of instability within the system itself.

On the part of contractor, they should ensure that building site is laid out in the most effective manner is an essential part of a good planning process. Ogunjobi (2003) opined that a contracting organization produces a site layout showing the proper position of such item as site accommodation, materials sheds, compounds and storage areas, temporary roads, mechanical plants and scaffoldings, services, and hoarding. They should ensure that there is ease of movement of labour, materials and some plant items in order to prevent unnecessary accident. Scaffolding should be erected in such a manner as to provide a safe method of working and means of access. A temporary service like electricity should be provided where there will not be a likelihood of electrocution. Hoarding is another safety measure that should help ward off unnecessary interference of work on site by the public, and especially children. Non-adoption of realistic safety practices on site has been a major source of accident in the building construction industry. According to Ogunjobi (2003), under normal circumstances, the contracting organization should have a person specifically in charge of safety; but in Nigeria this aspect is practically non-existent.

The international Labour Office [ILO] (1969) pointed out names of the unsafe practices on site to include:-

a) Non-shop prefabrication of building members earmarked for high-building elevation as an aspect of materials handling.
b) Equipment failure through lack of proper maintenance
c) Use of inappropriate tools
d) Inadequate sharing of trenches
e) Improper use of electric and gas welding equipment (Bush 1973)
f) Improper construction of ladders, scaffolds and guards for floor opening
g) Poor housekeeping like incorrect ways of piling materials, storing combustibles.

Physical/Environmental Factors

Physical environmental factors that can contribute to accidents at construction sites include:- rain, sun, fumes, ice vapours, unlevel or uneven surfaces, radiation, snow, fog and heat, confined space, noise, gas and humidity (Prokopenko 1981). Perry and Hayes, 1985 also

In Plate 1, owing to nonchalant attitude or lack of knowledge of being in existence, a typical Work Place Accident occurred which would have been preventable through regular Factory and Labour Inspections. This is an evidence of an accident which could have been prevented if there was proper registration of site by the contractor and site inspection by the Factory Inspectorate Department.

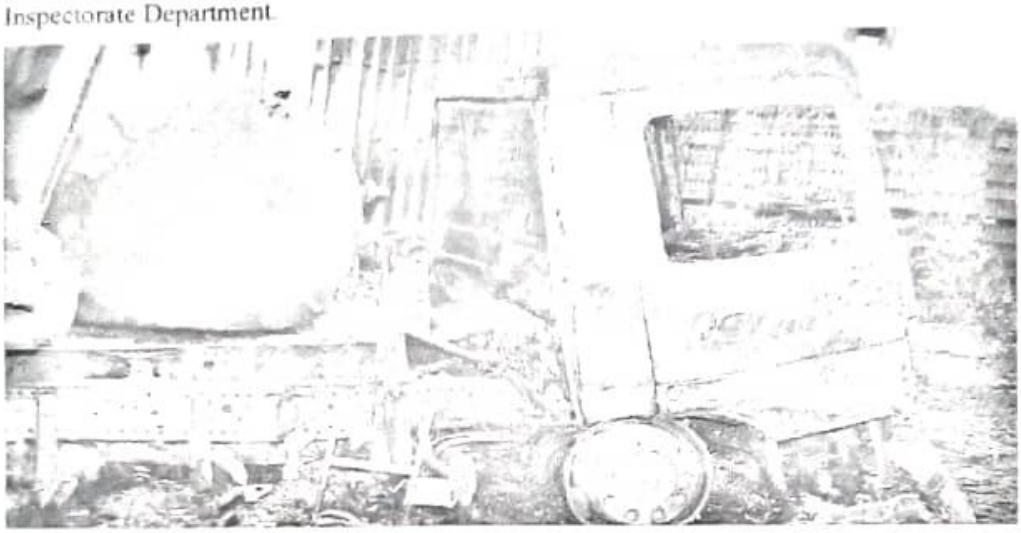

Plate 2: A typical Work Place Accident preventable through regular Factory and Labour Inspections.
Source: Wogu (2013)

Figures 1 and 2 present the trend of accidents record of the construction SMEs in terms of severity for a five-year period (2009 - 2013). Figure 1 reveals that over the five-year period accidents resulting to minor injuries of less than one day off work summed to 733 cases; accidents leading to injuries of 1 – 3 days off work summed to 353 cases; accidents resulting to injuries of 4 or more days off work amounted to a total of 181 cases; and accidents leading to permanent disabilities or death summed to 55 cases only.

Figure 2, on the other hand, reveals that over the five-year period accidents resulting to minor injuries of less than one day off work summed to 55.45% of total cases recorded; accidents leading to injuries of 1 – 3 days off work amounted to 26.70% of total cases recorded; accidents resulting to injuries of 4 or more days off work amounted to 13.69% of total cases recorded; and accidents leading to permanent disabilities or death amounted to 4.16% of total cases recorded only. This implies that the construction SMEs incurred more minor accidents than fatal accidents over the five-year period. This shows further that the construction SMEs had very good accidents record.

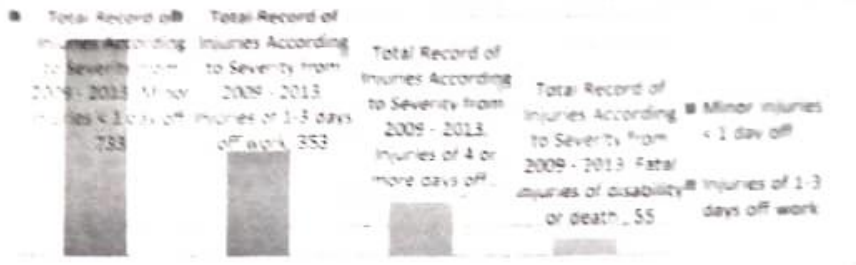

Fig. 1: Total Record of Injuries According to Severity from 2009 – 2013
Source: Authors' Field Work (2014)

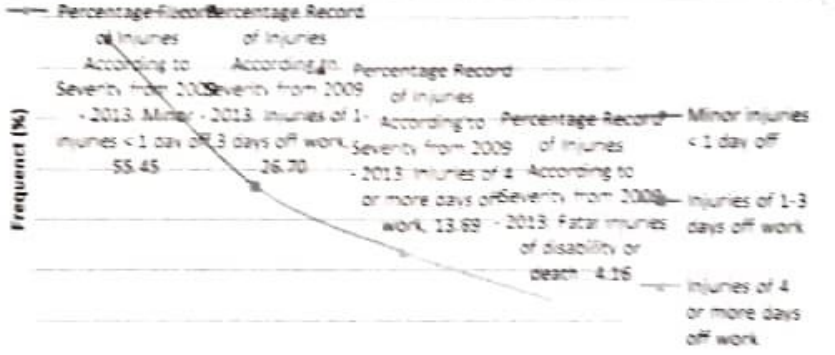

Fig. 2: Percentage Record of Injuries According to Severity from 2009 – 2013
Source: Authors' Field Work (2014)

SOURCES OF HEALTH HAZARDS

Protopenko (1981) identified sources of health hazards in the building industry to include physical hazards, chemical and stress hazards.

i. **Physical hazard includes**: These consist of vibration, noise, heat, cold and ultraviolet in the built environment.

ii. **Chemical hazards include**: Chemical, gases, fumes, vapours, metals materials, which may damage the eyes, skin, lungs and other internal organs or bones. Ogunjobi (2003) observed

that lead which comes from such products as paints and petrol can enter the body through the respiratory tracts, especially when unclean paint-strained hands are used to eat. He observed that over 40% of lead inhaled is absorbed into the blood stream, accumulates in body organs the kidney and the nervous system and damage the brain over time. More so, environmental impact of concrete, its manufacture and application is complex which has harmful effect to the body. For instance, the carbon (iv) oxide (Co_2) emission for the cement factory (Mehta & Monterio n.d.)

iii. **Stress**: According to American Heritage New Dictionary of Cultural Literacy (n.d.) it is a term which denotes the effects of metal and emotional pressure. It stressed that a building worker who is frightened may suffer from headaches palpitation, insomnia, nervous tension, instability or other symptoms. Stress is one health hazard which affects individuals very differently. People vary greatly in their ability to cope with this and very often a small amount of stress at work added to psychological pressure outside work can produce severe symptoms.

RECOMMENDATIONS

The following recommendations are made for the effective management of safety and health in the building industry:-

i. All building should be designed by qualified professionals. There should be no compromise for the structural aspect, since the consequences of exempting any class of qualified member of building team from their specialized field are enormous and the risk must not be contemplated.

ii. All registered building firms should be made to have an officer specifically in charge of safety so that the need for prevention of accidents and health hazards can be more actively appreciated.

iii. The planning authorities of the various local governments should employ professionally qualified personnel to cope with the approval and supervision works within their local government areas. There must always be a follow-up to ascertain compliance of the building execution with architectural impressions, structural design and specification.

iv. There is a great need for the Federal government to promulgate a national construction regulation, governing both building and civil works in the country.

v. Proper soil investigation should always be done, whatever the type of structure to be built. The structural system of any building must not be made to suffer from inappropriate design solution.

The researchers believe that these recommendations as listed above will go a long way in making construction safer in Nigeria. Therefore, there is an urgent and a great need to safeguard the lives and health not only of building workers but also building users.

identified fire, earthquake, flood, landslip to be among factors that can cause accidents and health hazards at construction sites.

Mechanical:

Vehicles and/or tractors can as well be a contributing factor to accident in construction industry. According to European Agency for Safety and Health [EASH] (n.d) about one in three fatal accidents at work involve vehicles. The main categories of transport accidents at work include:

(i) People are struck or run over by moving vehicles (e.g. during reversing);

(ii) Falling from vehicles

(iii)Struck by objects falling from vehicles

(iv)Injured because of vehicles overturning.

It follows that by removing or reducing the risk of accidents involving vehicles on construction sites, there can be a significant reduction in the number of fatal accidents in this sector.

RESEARCH METHODOLOGY

A descriptive research method was employed in this research which incorporates conduction of oral interviews and through observation in the building construction site. The choice of study area is based on the fact that there is rampant increase of building construction as well as site accident in Nigeria. A single case study of Abuja was conducted whereby information from the Factory Inspectorate Department was assessed to find out their compliance when accident and/ or health hazard occur in construction industry.

Method of Data Collection

The research scrutinizes the various sources of accidents, ways of reducing accidents and health hazards in Nigeria building industry. This was done through conduction of oral interviews, literature review and observation in order to have firsthand information.

DISCUSSION

A record from the Factory Inspectorate Department has shown that some construction industry do not comply with the obligation of given information to factory inspectorate department when accident and/ or health hazard occur in construction industry. The department is headed by a qualified director who oversees the activities of the department and has various factory inspecting officers (headed by a qualified inspector of factories) who visit sites and on health and safety at workplaces and report directly to the director of factory.

The most frequently undertaken activities of the department are general factory inspections, construction site inspections, and accident and incident investigations as shown in Table 1

Table 1: Major Activities Undertaken by Factory Inspectorate Department

Activity	Frequency at which activity is carried out
General factory inspection	Carries out inspections throughout the country within the limits of resources
Construction site inspection	Carries out inspections of some sites that have been registered with the Factory Inspectorate Department
Scrutiny of factory plans	Examines all factory plans brought to its notice in order to give approval
Safety awareness seminars	Organizes seminars and workshops with health and safety stakeholders and some employers about twice a year or depending on availability of fund and logistics
Accident and incident investigation	Investigates all reportable accidents and dangerous occurrences notified to the department
Occupational Diseases investigation	Investigates all reportable occupational diseases notified to the department

Source: Umeokafor, Evaggelinos, Lundy, Isaac, Allan, Igwegbe, Umeokafor, and Umeadi, (2014).

Reporting of accidents and incidents to Factories Inspectorate Department was low because most employers were ignorant of their duties under the Part IV of the Factories Act 1990 and partly, for the fact that some employers were not aware of the different roles played by the Factory Inspectorate Department and Labour Department (Umeokafor *et. al.*, 2014). Even at the visit of Factory Inspectors to the sites some workers exert fear to give sincere account of the actual severity of accidents or dangerous occurrence because they are afraid of being sacked by their employers. This was evident from the numbers of accidents reported to the Factory Inspectorate Department which is shown in Table 2. Dangerous occurrences, fatal and over three-day accidents are reportable to the Factory Inspectorate Department. Most employers do not report these reportable incidents as also shown in Table 2.

Table 2: Accidents Reported to Factory Inspectorate Department from 2007 to 2012

Year	Number of Injuries	Number of Deaths	Number of Near Misses	Number of Accidents Reported
2007	4	1	1	3
2008	8	6	-	2
2009	3	2	-	16
2010	5	1	1	3
2011	8	2	-	7
2012	14	4	1	6

Source: Table structure, partly adopted from Umeokafor *et al* (2014) and modified by author; content from accident reports collected from the Factory Inspectorate Department (2007-2012)

CONCLUSION

It has been found out that a majority of accidents and health hazards in construction industry is the handwork of human being. The design and construction aspects of building have been the veritable sources of accidents in the building industry in Nigeria, but it seems that serious attention is not being paid to them. Probably, this may be as a result of various mal-practices that have been noted in the construction industry. A situation whereby quacks design buildings and get approvals in local planning authorities is indeed worrisome. The National building code now in place should be enforced so that buildings do not pose any danger to the occupants.

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