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Evaluating Health And Safety Performance of Nigerian Construction Site

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ABSTRACT

The construction industry is the most risky of all industries in terms of health and safety hazards. In the recent past, death tolls, permanent disability and severe environmental threat had been on the increase through collapse of buildings and major operational accidents. This unfortunate scenario has been a monumental threat to productivity and the overall performance of construction projects in Nigeria. This study explores the level of awareness of construction industry operatives in Nigeria as regards health and safety standards. It also evaluates the effectiveness of improvised safety facilities in construction sites and proffers an assessment of critical success factor associated with construction accidents victims in Nigeria.

Direct observations, interviews and questionnaire surveys were appropriated to evaluate operatives' perception of health and safety performance of some major Nigerian construction projects. Mean ranking was used to establish the severity of major causes of construction accidents in Nigerian to come up with responsive recommendation for best practices in terms of prevention and correction as established from literature.

Keywords: Occupational Safety, Nigerian, Operational Hazard, Project Performance, Critical Success Factor.

1. INTRODUCTION

The Nigerian construction industry is one of the largest markets of construction products in Africa. With over 140 million population, 969,

000km² landmass and 5.6% Gross Domestic product growth (in 2006) the construction industry is responsible for an average of 5 - 7% improvement of the GDP growth and over 42% of the fixed capital formation over the last 4 decades (Olatunji and Bashorun, 2006).

Although, there are evidences of acute skill shortage in the industry, over 7% of the populace mainly depends on their construction industry employment (both as skilled and unskilled manpower) for livelihood. Unfortunately, United Nation record (perhaps outdated) puts it that 900 million people globally are either homeless or live in grossly uncomfortable habitation and environment. In a place like Nigeria with a range of 2.5% - 9.3% (or an average of 3.2%) annual population growth, housing need is seriously pertinent. (NPC, 2006). Population and Housing Census (2006) figures show that because of rural urban drift, most noble cities can be as tough as having tenant to landlord ratio of 90% to 10% respectively.

However, with serious population increase in Africa, more of Africa's skilled workforces always find their ways out of the continent to other parts of the world, due to poor economic situation at in their home countries. Inadvertently, the subsequent shortage of skill, (due to manpower reduction without corresponding or no replacement at all) coupled with poor spirit of technology transfer in relation to other parts of the world, the cost of construction products has always grown beyond its value.

On the other hand, in the verge of recessionary economy, Nigerian (and indeed Africa at large) is also loosing its skilled workforce into avoidable accidents at construction sites due to various reasons. Poon (2004) argues that the construction industry is 10 times more hazardous than any other industry in our economic world. This is because workers are constantly exposed to adverse technical, economic, material, social, psychological and environmental conditions. The construction industry in Nigeria looses 5 – 7% of her workforce annually to construction accidents, while relative number of people deserts the industry due to motivational factors. This paper explores causes of accidents in Nigeria construction sites, evaluates the level of awareness of construction operatives as regards health ad safety standards and finally, evaluates the effectiveness of improvised safety facilities in construction sites in relation to critical success (survival) factors associated with construction accidents in Nigeria.

Therefore, the focus of the paper is to update construction practitioners and administrators in Africa the pertinent issues on construction health and safety as a way of impacting development in the construction industry.

2. CONSTRUCTION SAFETY IN NIGERIA

Latham (1998) argues that construction client reserves the absolute mandate to be put at the core of the construction process. Hatush and Skitmore (1997a) claim that all construction clients desire the maximum value for their project at the cheapest possible cost within the shortest possible time. Per se, the disposition of construction clients to the flow of resources has a lot to do with the quality and value of safety in any construction product development process, especially in a recessionary economy where desires are delimited by insufficient resources.

However, the construction structure and the quality performance of materials and tools used for construction works are also very important. Obviously, achieving optimal safety performance of any construction project is a function of the vulnerability of constituent materials' critical safety factor. Recommended standards and their standard descriptions are often prescribed in contract literatures (where applicable). However, apart from the fact that manufacturers' qualities are always at variant with recommended standards, in some cases, the performance of material 'standards' can be peculiar (thus restricted) to where they are recommended. To date, the Nigerian land construction industry (and indeed in most countries in Africa) has no coherent package of standard document to guide her material specification and standards. British and Australian standards are always referred.

Apart from substandard materials as principal causes of construction failure and most clients' poor economic capability to afford best quality materials as well as established standard triangulation for reference, most materials in use also pose conspicuous health hazards. An understudy of confirmed effects of some of the major primary construction materials reveals that almost all primary construction materials like cement, water, glass, metals, timbers, paints, aggregate, asphalt, asbestos etc pose very severe health hazards during site applications than during manufacturing. For instance, silica, cement, timber, quarry and asbestos dusts are known to cause lung function impairment, chronic obstructive lung disease, restrictive lung disease, pneumoconiosis, serious bacteria infections, skin cancer and carcinoma of the lungs, stomach and colon. Commonly, construction dusts have severe damaging effects when they enter system circulation, and after reaching all the organs of the body and different tissues, they pose more dangers to heart, liver, spleen, bone, muscles, hairs as their microstructure and physiological performance are being affected.

Regrettably, construction workers are commonly exposed to various hazardous substances, physical agents, ergonomic factors and severe environmental hazards through hazardous conditions and materials like asbestos, lead, silica dust, organic solvents, sewer gases, welding fumes, radiation, noise and vibration. Many workers are also exposed to acute injury, chronic illness, permanent disability or even death through immediate effects of direct exposures.

On the other hand, fatigue, loss of concentration at work, poor health condition, site condition, constantly changing environment and distraction by other activities on site also increases the risk of accidents. In other words, apart from the fact that Nigerian construction workers seldom receiving modern technological training imperative to modern dynamic requirements of their job and the impact of the recessionary economy of the state of tools being used, workers psyche are constantly being demonstrated because of low payment, poor working conditions and social perceptions. In Nigeria, construction workers are mostly seen as indigent workers who are rarely respected for their skills in terms of remuneration. Thus, the discrepant flow of workforce in the industry is frightening. While many deaths are recorded through bad condition on sites, operational accidents, accumulated diseases etc, the industry's human capital also reduce tremendously through loss of interest of workers as many pick up other (better) jobs in vital industries of less risks and better appreciation.

The labour attrition phenomenal in the Nigerian construction industry is both abhorrent and not regenerating. Thus, though with incessant increase in construction cost principally propelled by rise in the costs of construction materials (material and results are cocooned priorities to clients), not labour achieving cost performance and maximizing the true value for money. Therefore, this cultural misalignment in people issue explicates one of the basic fundamentals of disputes and feasibility obstacles in construction.

2. EVALUATION OF HEALTH AND SAFETY MANAGEMENT IN CONSTRUCTION

The training content of human capital packaging and the psychological disposition of construction workers have a lot to determine in evaluating the quality of the industry's understanding of health and safety risk. Regrettably, the Nigerian construction industry is at verge of circumstantial criticism of the technical content of her professionals, ditto the training facilities in diverse places where manpower development is scheduled. This is largely blamed on the poor spate of the economy, whereas systemic overview may mean lack of commitment and political will as well as the true spirit of collaboration with the outside world to entrench the facilitation of flow of value and knowledge from better parts of the world.

Although prequalification has gained tremendous support and popularity in contract procurement in Nigeria, regrettably health and safety factors of contractor performance are not popularly prioritized (Olatunji and Aje, 2005c; Olatunji, 2006d). However, since in Nigeria, contractors are predominant risk bearers, assessing health and safety management disposition of the industry is largely a function of contractors firm. To measure this, major variables include; Experience Modification Rating (EMR), Occupational Safety and Health Administration (OSHA) procedures and the general assessment of Contractor Safety Attitudes and Practice.

2.1 Experience Modification Rating (Emr)

The Experience Modification Rating (EMR) scheduled is an objective assessment of health and safety performance of contractors by independent rating bureaus. It was developed in America as an equitable means of determining premium for workers' compensation insurance. The methodology is such that record is made of the average workers' compensation losses expected to be paid by an employer in a designated period (mostly 3 years) over a given type of firm's work compared with others doing similar work. When the coefficient of losses incurred by the employer compared with the expected benchmark of losses is low, it means fewer or less accident had occurred than expected as a result of low insurance cost and vice versa if the rating is high.

Hinze and Godfrey (2003) argue that the experience rating of contractors is largely a function of nature of project, workers motivation factors like pay, compensation, commission, welfare packages etc as well as the effective, ubiquitous and responsive applications of technological assiduity all through the construction process. For instance, more severe accidents should be expected when inexperienced, unknowledgeable and unexposed workers, cheap labour, bad tools are patronized under heavy pressure to meet schedules and work specifications.

Unfortunately, there are no stance of record keeping in the Nigeria construction industry while (though the philosophy is badly needed in the interest of a safe and hazard free industry) both the private, public, domestic and multinational organization seldom showing interest in keeping standards of safety to EMR's statistical record measures of evaluation. Therefore, if only for posterity, EMR ideal proposes redress to the loose supervisory pattern of the Nigerian construction industry. Human lives' value of workers should be elevated from its demoralized and dehumanized status to be at par with kingly priority of client's requirement in construction material development such that their could be more commitment to addressing the problem of avoidable health and safety crisis rampant during and after construction at the detriment of the industry and the economic performance of the nation at large. Therefore, the nature of client organization and the subsequent interactions affect contractors' disposition to health and safety risk management (Proverb et al, 1996; Male and Mitrovic, 1999; 2005; Olatunji, 2006c)

2.2 Occupational Safety And Health Administration (Osha)

The occupational safety and Health Act of America (1970) requires construction clients to record and report accident information on the sites on a form named Occupational Injuries and Illnesses Annual Survey Form

No 300 & 300A. It is to be retained for about 5 years maximum and returned to the appropriate office for subsequent administrative action, which is to keep record of construction site fatalities. Although, it may not be as objective as Experience Modification Rating, Occupational Safety and Health Administration assessment provides analytical data on the number of fatalities, number of injuries and illnesses involving lost workdays, number of injuries and illnesses involving restricted workdays, restricted work activity and number injuries and illnesses without lost workdays.

In most cases, OSHA is calculated over the number of fatalities recorded through a 200,000 hour of employee that worked 40 hours a week and 50 weeks a year. Therefore to evaluate the safety consciousnesses of any contractor, Forms 300 and 300A records of Occupational Injuries and Illnesses Annual Survey of OSHA Act (1970) is a reliable indicator which is based on recordable incidences of injuries and illnesses that negatively imparted productivity, relationships and transactional harmony.

2.3 Contract Safety Attitudes And Prentice

Evaluating the safety and health capabilities of contractors is largely, a positive way to providing a systemic overview of health and safety orientation of the construction industry. To this end, Hatush and Skitmore (1996) shortlist: management accountability with respect to safety and health variables, technical strength and quality of staff, demonstrable evidence of documentary corporate health and safety code, plans and programs, regular on-the-job training for old and new workmen, frequent and effective tool box safety meetings, on-the-job discipline and management commitment as well as amount of own workforce in the overall work populace, quality of technological sophistication in use and firm's stability among others (Olatunji, 2005a; Olatunji and Aje, 2005a and c)

3. RESEARCH METHOD

The approach of methodology adopted for this study is to observe activities of 30 construction sites in Nigeria operated by 4 multinational organizations and 4 indigenous contracting firms. Data were gathered from responses directly administered questionnaires and interviews. The target audience includes construction professionals having to do with contractor selection and construction management in the Nigeria construction industry e.g. Architect, Engineers, Quantity Surveyors and Builders. Skilled operatives like tillers, concreters, plasters, painters, carpenters, bricklayer/masons, plumbers and electrical technicians were also interviewed. Medical Record

officers and labour and Productivity officers of public establishments were equally interviewed. Management staff of client organizations were contracted to evaluate the effects of poor health and safety safeguard mechanism in construction projects.

4. DATA ANALYSIS

Although, the dynamics of construction activities may deny deterministic approach (Smith, 1995), however, results from data gathered shows that research objectives could be achieved through simple analytical tools. From direct observations recorded between September 2005 and December 2006, on 4 multinational contractors and 4 indigenous contractors handling 30 selected major national construction contracts on civil building projects, an estimated 543 interviewees, questionnaires respondent and consistent site operatives were accessed. Table 4.1 shows the breakdown of target and fence used or this study. For anonymity reasons, organizations were tagged A, B, C and D.

Firms	Multinationals	Indigenous Contractors
A	116	52
B	81	31
C	68	27
D	54	14
Total	418	124

Table 4.1: Breakdown of target audience used for the study

From Table 4.1 above, 77.16% of the target audience represents multinational organizations, while 22.84% represents famous indigenous contracting firms. Although, this does not represent the full staff strength of the organizations under study observations, the study integrates construction firm of various capacities, capabilities and competences to explicate reasons behind poor health and safety performance of construction sites in Nigeria, vis-à-vis the industry's understanding of health and safety intricacies inherent in construction processes.

4.1 ANALYSIS OF RESPONDENTS' DEMOGRAPHIC VARIABLES

A total of 61 responses from questionnaire survey and interview to represent a total of 11.23% of the target audience of the study, were appropriated. The limit was early set because responses seldom reflecting large variant of opinions, thus the reason that devoid the study of

stochastic analysis. For easy analysis of respondents' demographic background, responses were grouped into client organization (represented by the respective Chief Executives/Management staff), construction professionals, construction skilled operative contractors and Health and Safety record officers (Medical Record Officers and Labour and Productivity Officer in public service).

Responses gathered shows that 12 valid responses were used from client organizations; public establishment (4), corporate organization (4) and private individual clients (4). 58.3% of the respondents in this category possesses at least first degree in construction related discipline and recognized professional affiliations in the Nigerian construction industry. Averagely, they had a minimum of 1 construction project that normally spanned above 18 months in the last decade and have witnessed relative occurrences of site accidents of conspicuous fatalities that impacted workflows.

On the other hand, 3 respondents each represent the 4 notable professionals in the construction product development process in the Nigeria construction industry, viz; Architects, Builders, Engineer and Quantity Surveyors. All the respondents are dully registered with their professional bodies and posses an average of 6.57 years of post qualification professional practice experience. On the average, they have interested 8.3 fatalities that disturbed workflow for average of 18.17hours in every other project supervised in the last 1 decade, especially when constructing project duration spans 18 months and beyond.

Also, 3 respondents each represent the skilled operatives' category, viz; bricklayers/masons, carpenters, concreters, electrical technicians, equipment operatives, iron benders, plasterers, painters and plasterers. They are all Trade-Tested practitioners with an average of 8.6 years of experience. 63% of them had experienced of serve fatalities that kept them off work for a range of 12 weeks to 27 weeks in their career life, while 5 people have lost their close associates to severe fatalities. 1 management staff each of the 8 contracting organizations (4 multinationals and 4 indigenious) were interviewed whole secondary data were collected from the interviewed Medical Officer and Labour and Productivity Officer.

4.2 ANALYSIS OF SURVEYED SAMPLES

In relation to the objective of this study, respondents' opinions were integrated to explicate major causes of contraction fatalities in Nigeria, evaluate the level of awareness of the industry with respect to health and safety risks management issues, evaluate the effectiveness of safety tool-box improvised on site and assess the success of interventions to critical fatalities of construction accidents. To this end, respondents were made to assess the causes of construction accidents using a scale of 1 - 5; 1 being "very often and 5 being "rarely occurred".

S/N	Causes of Construction accidents	Mean Ranking
1	Tool Problem	1.32
	Bad tool	1.21
	Wrong tool	2.91
	No tool at al	2.92
	Complexity of tool/equipment	2.88
	Poor knowledge about tool	3.41
	Poor maintenance mechanics	3.08
	Poor handling of tool	2.96
	Accidental breakdown of instruments	1.24
2	Psychological problem	1.46
	Poor pay/motivation	1.28
	Family crisis	1.36
	Job insecurity	4.17
	Social status	2.06
	Inferiority complex	3.88
	Economic desperation or anxiety	1.86
3	Health Problem	1.96
	Poor Living Condition	1.87
	Exposure to work health hazard	1.86
	Systemic job complexity	1.95
	Poor access to health facilities	1.85
	Existing injury	2.62
	Poor working condition	1.91
	Inclement weather/environmental condition	3.61

	Accumulated health hazard	2.66
4	Workmanship & material factor	2.26
	Poor on-job discipline	3.51
	Inconsistent material performance during application	2.18
	Poor technical content and know-how of operatives	1.68
	Systemic lack of own standard reference	1.68
	Poor engineering instinct	2.62
	Poor Economic commitment of client	1.96
	Conflict in professionals' orientation	2.18
	Manufacturing error	2.20
	Sophisticated technical requirement of material application	2.85
	5	Contingencies
Acts of God/force majeure		2.61
Civil commotion/strife		2.08
Climatic factor		3.86
Crisis on site		2.48
Labour attrition		3.42
6	Corporate health and safety orientation of organization	2.96
	On-job training	1.26
	Disposition to knowledge transfer	2.89
	Disposition to health and safety code	2.15
	Health and safety tool kit	1.96
	Amount of own workforce	3.46
	Amount of others' work	2.89
	Technical and management competence	3.21

Table 4.2.1: Respondents' rating of causes of construction accidents

From the analysis in Table 4.2.1, respondents ranked Tool Problem and Psychological Factor as the most dreaded major causes of construction accidents. Surprisingly, Contingencies Factor was ranked lowest. To this, the author opines that construction workers in Nigeria are

exposed to diverse situations and so know the best way to handle each situation. However, on record, Tool Problem is responsible for about 62% of work fatalities, and this is always fuelled by negative psychological factors, existing poor health problem and questionable workmanship and materials factors.

Respondents were further requested to rate the contributory factors affecting the major causative factors of accidents in the Nigeria construction industry. Analysis reveals that most respondents blame tool problem on bad state of tools and accidental breakdown of tools on use. While complexity of tool can cause problem, unavailability of the right tool for some specific jobs and poor handling of tools can also be responsible for many devastating damages. However, respondents opine that poor knowledge about tools and poor maintenance instructions hardly make impact.

On the other hand, poor pay/motivation factor, family crisis and economic hardship/desperation and anxiety were ranked in top sub-factors impacting workers' psychology. However, job insecurity and inferiority complex were ranked as least sub factors. Poor living condition, extensive exposure to operational hazards, systemic job complexity and poor access to health facilities were top ranked sub factors impacting worker health problem. Inclement weather/poor environmental condition was ranked as posing the least problem to workers' health hazard in the Nigerian construction industry.

For Workmanship and Material factor, systemic lack of own developed Standard reference and poor economic commitment of client are ranked most important. Also considered important are inconsistent instincts of material performance during application, conflict instinct in professionals' orientation and manufacturing error while poor on-job discipline and sophisticated content of technical requirement of material application seem to pose no treat to many Nigeria construction workers.

Lastly, civil commotion, crisis on site and force majeure were ranked as major sub factors impacting Contingencies, while climatic condition was rarely considered. For Corporate and Safety Management Code of organization, respondents opine that poor on-the-job training and poor health and safety tool-kit are most dreaded sub factors. Amount of own workforce in the team and the disposition to knowledge transfer were considered as being not so important to health and safety management in the Nigeria construction industry.

Establishing the level of awareness of health and safety risk management in the Nigerian industry, respondents confirm the fact that construction clients in the industry are mostly aware of the enormous risks in the industry. However, analysis of responses reveals that employers and client of construction labour seldom preferring efficient solution to health and safety risk management issues. This, interviewees say is due to the cultural misalignment of risk transfer in the industry; the client traditionally transfer all risks to contractor, while the contractor extensively translate all

operational risks to the operatives, while economic flow remains the major determinant with respect to planning, control and profitability instincts of both parties.

On the other hand, selection of contractors for construction projects in Nigeria is largely subjective. Health and safety risk management capability is rarely an important factor for considering contractors' worthiness (Olatunji 2005a, Olatunji and Aje 2005a,b, c). Only 25% of the 8 contracting firms observed provide fair standard of safety. Helmet, overall and rarely, gloves, are commonest personal protective equipment. Respiratory equipment for protection against dusts and vapour or gases are rarely used, while protection against corrosive and irritating substances as well as abrasion and vibration are not available. Sight protectors like visors for protection against chemical splashes are very uncommon. To this end, health and safety plan or programme for construction workers hardly happen especially in areas like protective materials' selection, maintenance, user training and supervision. Regrettably there is no evidence of medical surveillance mechanism in the study to show how the health status of workers were monitored (especially those commonly engaged in hazardous occupations). Medical surveillance is to be expected to assist detect early signs of illness on workers so that intervention may be taken to prevent permanent health damage of occupational illnesses with long latent period like silicosis, deafness and optical problems.

Unfortunately, it is obvious that Nigeria professional bodies and research organizations seldom study into this like other spheres of research, perhaps for economic reasons. Moreover, analysis reveals that construction operatives in Nigeria rarely undergo consistent health and safety hazard training, except in rare cases of corporate decision. Also, there are no evidence of efficient provisions to palliate occupational hazards in the Nigeria construction industry. Although, property insurance is highly patronized, life insurance of workers are very uncommon. Compensation for workers who are hazard victims is not always realistic, if at all observed; while professional indemnity run-off cover has very poor history in the Nigerian construction industry.

Lastly, evaluating the success of interventions to very critical fatalities in the Nigerian construction, respondents opinions and the analysis of secondary data from medical office and public supervisory agency office reveal that the industry loses an average of 17 people per annum to death and permanent disability arising from occupational hazards and building collapse during construction. This witnessed unprecedented increase of recent due to clients' low patronage of professionals in some construction projects owing to recessionary economic situation. This is corroborated by low quality of safety tool-kits; first aid provisions and emergency response facilities etc on construction sites observed. To this, respondents say the Nigerian construction industry loses at least 5% of its work force annually, while influx of new blood has reduced by about 17%

compared to that of 1970s. This means increase in construction cost is pertinent and will never be relative to value for money anticipated by client except something urgent is done

5. CONCLUSION AND RECOMMENDATIONS

The 60 weeks study on 30 notable construction projects in Nigeria vis-à-vis the industry's health and safety performance orientation reveals that this major factor is seldom considered important in contractor selection process in the industry due to poor awareness level. Analysis shows that tool problem, psychological factor, health problem, workmanship and material standard factor, contingencies and corporate code of health and safety management are the major factors causing occupational hazards. Further analysis shows that the awareness level of the industry is very poor while about 5% of the industry's influence is cost annually due to death and permanent injuries suffered on site. Regrettably, the industry continues to witness depreciating interest and embarrassing criticism of the technical quality of its practitioners, while influx of workers has draped beyond 17% recently. It is thereby recommended that.

1. Establishment of Standards for material and labour based on current forms of materials and labour as peculiar to the industry – even when they are closely relate to those in other countries. Professional bodies and construction multinationals should be manipulated to research into this and create standard reference Literature/Analysis.
2. There should be special focus on training for all categories of industry participants by all professional bodies and at industry levels.
3. Safety should be integrated into the physics of contractor selection and procurement laws. Contractors should not bid if adequate measures or commitment is not provided. Clients should be avoided if not committed too.
4. Workers' motivation should be proactively looked into to address situation of cultural misalignment cocooning or polarizing the industry toward unreasonable bias for professionals only.

FURTHER RESEARCH

This study refers for further study, the empirical relationship between motivation variables in construction and measures of Experience Modification Rating (EMR) and Occupational Health and Safety Administration (OSHA).

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