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Contractors' Response to health and safety risk in construction site in Southwestern Nigeria

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Abstract

Health and safety is one major aspect of construction activities that is not free of risk which is an exposure of construction activities to economic loss due to uncertainties which were not properly accommodated. Fatal construction accidents sometimes occur as a result of rapid technological advancements in the construction industry, consequently, a higher level of health and safety protection is essential. Thus, this paper assessed the contractors' response strategies to health and safety risk factors in Southwestern Nigeria, with a view to enhancing a safe construction working environment. Stratified random techniques were adopted and One hundred and seventeen (117) contractors registered with FOCI were sampled using structured questionnaire. The descriptive data analysis revealed that the major health and safety risk factors associated with construction sites were working in an unsafe environment, working on high rise building(working at height) followed by accidental struck by object. In addition, the use personal protective equipment e.g. boot, helmet, gloves etc, using right tool/equipment followed by the use of banners, posters, signs, colours and symbols are the main contractors' response strategies to health and safety risks. Conclusively, the identified risk response strategies were used to minimize health and safety risk factors associated with construction activities on construction sites in Southwestern Nigeria. It is therefore recommended that the identified health and safety risk response strategies factors are of great importance in dealing with the critical health and safety risk factors which threaten the life of construction site workers, thereby minimizing their effect on the well-being of construction site workers and enhancing a safe construction working environment.

Keywords: Construction Site; Construction Workers; Health And Safety Risk Factors; Response Strategies

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1. Introduction

The construction industry is more prone to risk and uncertainty than other industries (Jaafari, 2001). Also, risk is an integral part of construction which calls for consideration due to its overall effect of time and cost on construction projects (Makui et al., 2009). Risk is involved virtually in all activities. However, either success or failure of such risk grossly depend on how these risks are being handled (Dey and Ogunlana, 2004), failure to appropriately respond to these risks will lead to cost and time overrun. The incessant increase in the rate of accident on construction site is an indicator of unsafe working place and system of work in which workers are susceptible to and therefore already at risk of accident. Many people have met their untimely death on construction sites in Nigeria while others have become permanently deformed as a result of injuries. This therefore underscored the need for adequate health and safety response strategies for workers on site, in order to prevent unplanned expenses as a result of accident to the construction site workers and the employer. Occupational health and safety in construction ensures that people are being prevented from hazard and provision of conducive working (Ede, 2010). To achieve excellence in the construction industry, there is need to assess the risk associated with health and safety in the construction industry; however, it is revealed in literature that a greater emphasis is laid on construction cost, duration and quality of a project, at the expense of safety (Lubega et al., 2001). In view of this, this paper identified the construction health and safety risk factors and as well assessed the contractors' response strategies to health and safety risks in Southwestern Nigeria with a view to enhancing a safe construction working environment.

Construction works is by nature complex, and occurs in a rapid changing environment in which many different people interact with highly energized equipment, massive material and often-significant heights in a loosely coordinated fashion. As a result of this constant movement and process of carrying out their work, the potential for injuries occurring at any location on the site at any particular time is always high. Consequently, a lot of people have been exposed to risky situations on building sites, resulting in a high chance of accidents as a result of lack of adherence or inadequate provision of safety requirements. This implies that, a lot of contractors in the building industry are much more concerned about the cost, time and quality of the project delivery but are less concerned about the safety of the workers, who are the facilitator of the project delivery to cost, time and quality. There is the urgent need to apply control measures on health and safety related risk in the construction industry.

2. Health and safety hazards risk factors

Health and safety of the construction workers are of paramount importance in achieving the construction goal, though contractors consider cost, quality and time as the parameter to measure the success of a construction projects at the expense of health and safety of construction workers who are the facilitators of cost, quality and time. The reasons for considering safety and health are human factor, legislation and financial issues (Adan, 2004). Various researchers have divided health and safety hazards into two categories, namely the physical injury hazards and the Ill-health hazards (Davies and Tomasin, 1996; HSE, 1998; 11). Hazard of physical injury include death consequences. Hazard of ill-health can only be notified after a long

period and shall cause sickness or death after a certain period of time [10]. Some of these risks associated with health and safety as identified according to Gbajobi (2017) include non-provision of health and safety environment, non implementation of health and safety risk response strategies; working on high rise building; manual handling of loads; working in the sun and high temperature, exposure to fire, structural defect of building, working in an unsafe environment (bushy site environment), exposure to chemical substance and accidental struck by object, careless usage of tools, stepping on sharp object, working on slippery platform, unavailability of safety equipment, machines and tools, working underneath loads moving crane, exposure to noise, working with faulty equipment and exposure to electrical dangers.

Ogunbode (2010) revealed that the level of health and safety awareness of health and safety (H&S) in the Nigerian construction industry is low and that contractors show non-challant altitude to health and safety implementation. Despite its importance, construction sites have been regarded as very risky areas where construction workers are subject to fatalities and ill- health problems. Many building construction activities are inherently risky to health and safety such as working at height, working underground, working in confined spaces and close proximity to falling materials, handling loads manually, handling hazardous substances, noises, dusts, using plant and equipment, fire and exposure to live cables.

3. Response strategies adopted in responding to health and safety risk

Response strategies is a means of eradicating or minimising risks associated with health and safety as practicable as possible, and if that is not possible. Eliminating a hazard will also eliminate any risks associated with that hazard because construction projects can be unpredictable. In order to achieve project objectives in terms of time, cost, quality, safety and environmental sustainability, it is essential for contractors to manage risks in construction project (Zou, 2007). Contractors generally aim to make an acceptable range of profit margin. Profit margins in the industry have been low for most contractors on projects in recent years. Correct understanding and allocation of risk helps for contractors to avoid erosion of the profit margin Project risk management is an iterative process: the process is beneficial when is implemented in a systematic manner throughout the lifecycle of a construction project, from the planning stage to completion.

Although, the risk management tools are available and beneficial, but the peculiarity of the tools cum lack of knowledge of these tools make it unsuitable for many industries, organizations and projects (Zwikael and Sadeh, 2007). There are four alternative strategies – risk avoidance, risk transfer, risk mitigation, and risk acceptance, for treating risks in a construction project. Construction projects can be managed using various risk management tools and techniques. Ahmed et al. (2007) reviewed the techniques that can be used for development of risk management tools for engineering projects. Techniques for context establishment, risk identification, risk assessment and treatment were provided. Application of risk management tools depends on the nature of the project, organization's policy, project management strategy, risk attitude of the project team members, and availability of the resources (Uher and Loosemore, 2004). In this paper, the strategies adopted in responding to health and safety risk include use of banners, posters, signs, colours and symbols,

using right tool/equipment, use of personal protective equipment e.g. boot, helmet, gloves etc, provision of first-aid to workers for minor injuries and to make the necessary arrangements for major injuries to be treated in hospital, communicate with workers about health and safety risks in their tasks and control measures, (Using posters, signs and symbols), safety monitoring, mounting of safety signs, distribution of PPE to workers, according to the task performed by them, using of guard rails/barriers, provision of standby vehicle, holding of health and safety meeting, health and safety training, identification of hazards from everyday activities (tasks), safety enforcement and examine the causes of incidents.

4. Research methodology

The paper focused on contractors registered with FOCI in Southwestern Nigeria. The study made use of structured questionnaire administered to the contractors registered with FOCI in Southwestern Nigeria in order to evaluate the strategies adopted in responding to the health and safety risk. This is with a view to enhancing a safe construction working environment. One hundred and fifty (150) questionnaires were administered to the contractors in which one hundred and seventeen (117) were dully filed and retrieved which represent 78% of the total/ number of questionnaires administered in the three states covered by this study (Osun, Ondo and Lagos). The selection is adjudged adequate, according to Trochim (2000) who identify a percentage range of not less than 10% for a small study population. This percentage selection has been adopted in social sciences researches involving larger population like Graham et al. (2005) and Kalantari et al. (2007). Data collected were analyzed using descriptive statistics such as relative important index (RII), relative significance index (RSI) and risk occurrence index (ROI) to assess the respondents' views based on each of the health and safety risk and strategies adopted by contractor in responding to them.

5. Results and discussion

5.1. Background profile of the respondents

From Table 1, 100% were contractors. Also, 44.44% of the respondents were in Lagos, 32.47% were in Osun state, and 23.08% were in Ondo state. 88.3% had minimum of Higher National Diploma (HND), with 43.4% in B.Sc / B.Tech. and others with higher degrees. This showed that the respondents were qualified to participate in construction works as revealed by their educational status. Therefore, they were competent to provide the needed information for the study. The table also shows that over 90% of the respondents (Contractors) were found to be member of professional bodies which include Nigeria Institute of Building (NIOB), Council of Registered Builders of Nigeria (CORBON), which makes them qualified to practice as construction professional. Hence, the respondents were academically and professionally sound; therefore information provided for the purpose of this research can be relied upon. The Table shows that average year of experience for the contractors in construction work were 14 years with most of them 73.3% has more than

10 years of experience. This result indicated that most of the clients surveyed were highly experienced in construction work and hence, they could be relied on to supply dependable and suitable information.

Table 1. General particulars of the respondents

Background Information	**F**	**%**	**CP**
Respondents			
Contractors	117	100	100
Total	117	**100.0**	
Location			
Lagos	52	44.44	44.44
Osun	38	32.47	76.91
Ondo	27	23.08	100
Total	**117**	**100**	
Academic Qualification of Contractors			
N(Dnational diploma)	14	11.7	11.7
HND	26	22.2	33.9
B.Sc./B.Tech.	51	43.4	77.3
M.Sc.	21	18	95.3
Ph.d	5	4.7	100
Total	**117**	**100**	
Professional Affiliation of Contractors			
No response	9	7.5	7.5
CORBON	36	30.5	38
NIOB	59	50.6	88.6
Others	13	11.4	100
Total	**117**	**100**	

Years of Experience of Contractors			
<5 years	3	2.8	2.8
6 to 10	28	23.8	26.6
11 to 15	47	40.3	66.9
16 to 20	32	27.0	93.9
>20	7	6.1	100.0
Total	**117**	**100.0**	

F = Frequency, CP = Cumulative Percentage (Source: Survey data, 2017)

5.2. Health and safety factors associated with construction activities

The study reveals that the most significant H&S risk factors associated with construction activities in the study area are working in an unsafe environment as well as working on high rise building (working at height) (RSI= 0.76, both ranked 1st). An unsafe work environment occurs when an employee is unable to perform her required daily duties because the physical conditions of the workplace that is too dangerous. For instance, exposed wiring, broken equipment, hazardous materials, or asbestos could pose an unsafe working environment for employees. This is not surprising due to the fact that contractors, in consultation with workers identified physical work environment as potential hazardous things or situations that may cause harm as required by Work Health and Safety legislation requires. This is in agreement with Abdullah and Chai (2010), who affirmed that inadequate housekeeping caused site condition become messy and cluttered and the risk of workers to fall increase due to this poor site condition. Furthermore, the Occupational Safety and Health Act (OSHA) requires employers to maintain a workplace that is free of dangerous health and safety conditions that can cause illness, injury, or death. It is not surprising that those working on high rise building experience restricted mobility and accessibility in high up places, plus the chance of human error and misuse or failure of safety equipment (OSHA, 2018). This further validates the argument of International code council (ICC) that working at height accounts the largest percentage of annual fatalities in the work place than any other construction activities, likewise HSE statistics show that falls from height are the main cause of workplace fatalities this include vertical distance of a fall, fragile and slopping roofs and unprotected edges.

Table 2. Identification and Assessment of the Health and Safety Risk Factors

Health & safety risk factors	**Contractor**	
	RSI	**Rank**
Working in an unsafe environment	0.76	1

Working on high rise building(working at height)	0.76	1
Accidental struck by object	0.72	3
Working in the sun and high temperature	0.64	4
Manual handling of loads	0.63	5
Working underneath moving loads with the aid of crane	0.58	6
Exposure to noise	0.56	7
Unavailability of safety equipment, machines and tools	0.55	8
Exposure to dust	0.54	9
Aggression, violence and bullying	0.52	10
Working with faulty equipment	0.50	11
Careless usage of tools	0.50	11
Stepping on sharp object	0.49	13
Use of faulty scaffold	0.49	13
Construction site supervisor negligence	0.48	15
Careless welding accident	0.47	16
Non usage of safety equipment	0.47	16
Exposure to electrical dangers	0.47	16
Working on slippery platform	0.47	16
Exposure to chemical substance	0.46	20
Structural defect of building	0.44	21

5.3. The health and safety risk response strategies

The study sought to know the response strategies adopted in responding to the identified health and safety risk. Relevant data collected in this regard is presented in Table 3. The result establishes that the most effective risk response strategy is use of personal protective equipment (ROI = 0.81), The findings agree with Tappin et al. (2001), Health and Safety Executive (H.S.E.) (2007) and Occupational Safety and Health Administration (O.S.H.A.) (2005) who outlined provision of first-aid and personal protective equipment to workers as health and safety risk response strategies. Using right tool/equipment ranked second (ROI = 0.78). Use of banners, posters, signs, colours and symbols ranked third (ROI = 0.78). This validates the argument of Hampel (2006), who described signs and symbol as risk communication tool.

Table 3. The Health and Safety Risk Response Strategies

	Contractors	
Risk response strategies	**ROI**	**Rank**
Use of personal protective equipment e.g. Boot, helmet, gloves etc	0.81	1
Using right tool/equipment	0.78	2
Use of banners, posters, signs, colours and symbols	0.78	2
Communicate with workers about health and safety risks in their tasks and control measures, (using posters, signs and symbols)	0.76	4
Provision of first-aid to workers for minor injuries and to make the necessary arrangements for major injuries to be treated in hospital.	0.74	5
Safety monitoring	0.73	6
Mounting of safety signs	0.73	6
Using of guard rails/barriers	0.73	6
Distribution of ppe to workers, according to the task performed by them	0.72	9
Provision of standby vehicle	0.71	10
Holding of health and safety meeting	0.71	10
Health and safety training	0.69	12
Identification of hazards from everyday activities (tasks),	0.65	14
Safety enforcement	0.68	13
Examine the causes of incidents	0.66	14

6. Conclusion

Based on the aim of this study, which set out to examine contractors' response strategies on health and safety risk with a view to enhancing a safe construction working environment, the following conclusions were made from the results of the analysis of data contained in the previous discussions. Three of the identified risk factors were significant, which are working in an unsafe environment, working on high rise building (working at height) and accidental struck by object. Furthermore, use of personal protective equipment, using right tool/equipment and use of banners, posters, signs, colours and symbol are the most effective response strategies to health and safety risk factor. It is therefore recommended that contractors in

Southwestern Nigeria are thus encouraged to embrace the effective response strategies to health and safety issues on site. This will enhance a safe construction working environment

References

Ahmed A., Kayis B. and Amornsawadwatana S. (2007), "A review of techniques for risk management in projects", *Benchmark*, Vol. 14 No. 1, pp. 22-36.

Dey, P.K. and Ogunlana, S.O. (2004), "Selection and application of risk management tools and techniques for build-operate-transfer projects", *Industrial Management and Data Systems*, Vol. 104 No. 4, pp. 334-346.

Graham, J.P., Corella-Barud, V., Avita-Diaz, R. and Gurian, P. (2005), "The in-home environment and household health: a cross-sectional study of informal urban settlements in Northern Mexico", *International Journal of Environment Research and Public Health*, Vol. 2 No. 3, pp. 394-402

Hampel, J (2006), "Different concept of risk- a challenge for risk communication", *International Journal of Medical Microbiology,* Vol. 296, pp. 5-10

Jaafari A, (2001), "Management of risks uncertainties and opportunities on projects: Time for fundamental shift", *International Journal of Project Management*, Vol. 19, pp.325-335.

Kalantari, K, Fami, H.S., Asadi, A. and Mohammed, H.M. (2007), "Investigating factors affecting environmental behaviour of urban residents: A case study of Tehran City-Iran", *American Journal of Environmental Sciences,* Vol. 3 No. 2, pp. 67-74.

Makui, A., Mahdavi, I. and Farrokhian, F. (2009), "A model for sharing the costs of uncontrollable risks among contracting parties", *Journal of Industrial and Systems Engineering*, Vol. 3 No. 2, pp. 125-139.

Murie F. (2007), "Building safety-an international perspective", *International Journal of Ocupational Safety and Environmental Health,* Vol. 13 No. 1, pp. 5-11.

Tappin, D., Ashly, L., Moore, D., Parker, R., Hide, S., Bentlyel, T. and Legg, S. (2004), "Slip, trip and falls in residential construction", *Journal of Centre for Human Factors and Ergonomics*, Vol. 5 No. 4, pp. 1174-1234.

Zou, P.X.W., Zhang G. and Wang J. (2007), "Understanding the key risks in construction projects in China", *International Journal of Project Management*, Vol. 25 No. 6, pp. 601–614.

Zwikael, O. and Sadeh, A. (2007), "Planning effort as an effective risk management tool", *Journal of Operation Management*, Vol. 25 No. 4, pp. 755–767.