



Cost of Implementing Health and Safety Measures in Construction Projects in Abuja, Nigeria

Hassan, K.M.^{1a}; Mohammed, Y.D.^{1a} & Nmadu, H.G.²

¹Department of Quantity Surveying, Federal University of Technology, PMB 65 Minna Niger State, Nigeria

²Department of Building, Federal University of Technology, PMB 65 Minna Niger State, Nigeria

^akhairatmamman@gmail.com; ^bvaksmoves@yahoo.com; ³helen.nmadu@futminna.edu.ng

Corresponding author: khairatmamman@gmail.com

Abstract:

The high rates of construction accidents as well as increase in construction cost due to accidents have been an issue of concern. The cost of health and safety during forecasting the construction cost is given little or no emphasis. This has become a threat to both contractors and their clients and has also posed great challenges in project executions with its multiplying effect on incurring additional cost in completing the project, and as such certain contractors and sub-contractors pay little or no attention in implementing health and safety measures. Hence, the aim of this study is to determine the cost of implementing health and safety measures in construction projects. The study is a criteria – based study, in which certain criteria were outline for the selection of the construction firms. The study largely derives quantitative measure in order to determine the cost of implementing health and safety measures on construction projects. Quantity surveyors with vast knowledge of health and safety in the construction firms were considered for this research. Correlation analysis was conducted in order to determine the relationship between cost of implementing health and safety measures and cost of construction projects and the result was found to be significant ($P < 0.005$). This relationship was modeled using simple linear regression and from the model the result shows that the cost of implementing of health and safety measures have little or no effect on the total cost of construction project. The findings recommend the need for contractors to implement an effective and efficient health and safety cost management system in the Nigeria construction industry, as this will help them in achieving an improvement on construction site safety performance.

Keywords: Accidents, Cost, Health, Safety, Measures.

INTRODUCTION

The laws governing construction health and safety requires full action and implementation to protect workers at their work place as well as the general public who might be affected. Occupational health and safety Act (OSHAct) of 1994 obligates employers to make good and adequate provision of health and safety measures in work places, and also maintain a safe and healthy workplace for all its employees. According to Aneikwu, (2007), more than hundred million people in various part of the world part take in construction works as a profession.

The implementation of health and safety measures in construction projects remains one of the integral parameters to which successful projects delivery can be obtained. This fact is buttressed as health and safety plan/policy is one of the parameters in prequalifying suitable contractors for the award of construction projects in Nigeria (Windapo, 2013).

The growing rate of construction accidents has increased the awareness of construction health and safety, thereby involving its inclusion as part of project performance criteria. Adekunbi *et al.*, (2017) opined that the absence to make adequate provision of health and safety regulations and bye laws on construction projects may be one of the contributing recipe to high cost of construction. This indicates the necessity for adopting a reasonable health and safety plan during budgeting for construction projects.

LITERATURE REVIEW

Construction Health and Safety Measures

Ahmad, Iqbal, Rashid, Iqbal and Roomi (2016) defined safety as unique event that is paramount to continuous attainment of productivity. In the same vein, Ahmad, *et al.*, (2016) opined that

safety focus on curbing accidents at work setting and its negative effect on the workers in all manner. Assessment of various researchers such as: Aniekwu (2007); Idoro (2011); Okolie and Okoye (2012); Idubor and Oisamoje (2013); Dodo (2014); and Umeokafor *et al.*, (2014); on provisions and management of safety in construction project reveals that adoption and compliance with health and safety provision served as catalyst in optimizing construction production process. On the other hand, without compliance to health and safety practices, more accident will result in pains, accidents and legal actions thereby escalating production cost. Based on this, Famakin & Fawehinmi (2012) stated that safety practices are parameter to measure successful project delivery which is most paramount to the client because they greatly influenced in achieving efficiency and effectiveness amongst professionals and even workers in the construction industry.

The anomalies as seen in the construction firm's failure to comply with minimum requirement of health and safety measures might cause the victim waste of time and loss of money to the firms. Although construction firms may be covered with life assurance for their staffers from certain direct costs resulting from injury suffered, however some tectonic cost may be involved which cannot be insured against, such as loss of trained personnel, loss of production hours due to other operatives stopping the progress of the work out of concern or assisting the injured persons (Aniekwu, 2007). Thus, the lack of adherence to safety measures will delay the production process of construction activities.

Kolawole (2014) assessed safety measures on building sites: a case study of Minna, North Central Nigeria. The study examined safety approach adopted in Minna construction firms, it also evaluates if implementation of safety regulation will reduce workers claim for accident on sites or motivate them for better performance. Population needed for the study were randomly selected among building construction firms through copies of structured questionnaire. Result from the analysis noted that site workers embraced "safety training" as this enhances their performances and reduced accidents on site and also government did not have well defined safety act for construction activities. The study recommended training and re-training of their workers on the relevance of safety practices, while government should develop and enact "safety act" for controlling site based injury.

Cost of Health and Safety Measures

In order to maintain a healthy working environment, the cost of health and safety are those incurred in order to comply with legal requirements with respect to accident prevention, to implement measures to prevent accidents during work and to improve health and safety conditions in all areas of the work performed. The cost of health and safety was generally perceived as a necessary and beneficial business expense (Okoye and Okolie, 2014). According to Haefeli *et al.* (2005) avoidance or reduction of accident and work-related ill health costs per se does not appear to be the primary motivating factor for effective health and safety management. However, Haefeli *et al.* (2005) acknowledged that health and safety failures might ultimately impact on the financial performance of an organization through any of the higher level factors like customers and client expectation, workers morale, productivity, efficiency and service delivery etc. in view of the above position Guha and Biswas, (2013), argue that safety investment cannot be absolute and a rational judgment for safety cost is required and maintain that costs associated with safety parameters in developing countries might simply be unjustifiable and that the stakeholders cannot bear the safety cost for economic survival if the real cost of accident is too low in the economy.

RESEARCH METHODOLOGY

According to Creswell, (2003) that the factor to be consider in selecting the best research methodology should be the influence that such method has on the research problem and objectives. The study largely derives quantitative measure in order to determine the cost of implementing health and safety measures on construction projects. Quantity surveyors with vast knowledge of health and safety in the construction firms were considered for this research.

The study is a criteria – based study, in which certain criteria were outline for the selection of the construction firms. Those criteria are:

1. The construction company must be built/civil engineering, construction.
2. The location of the study is Abuja, the Nigeria federal capital.
3. The contract sum must be at least or above 100 million.
4. The construction firm or company must be more than twenty (20) years in civil/building construction work.
5. The quantity surveyors selected for this study must at least be with the construction firm for not less than fifteen (15) years.
6. The construction firm must be a large firm. The reason is that large construction firms tends to have records to safety standard requirements.
7. The construction projects are within a period of seventeen (17) years 2001-2018.

Table 1: Sample Population

| S/N | CONSTRUCTION FIRMS | TOTAL NO OF PROJECTS |
|-----|--------------------|----------------------|
| 1 | A | 8 |
| 2 | B | 5 |
| 3 | C | 7 |
| 4 | D | 9 |
| 5 | E | 4 |
| | TOTAL | 33 |

Source: - Researchers survey 2019

Five (5) construction firm were identified that meet the study criteria and as such five (5) of the construction firms were selected for the study. A total of thirty-three (33) construction projects with the implementation of health and safety measures also meet the research criterial which was drawn from the five (5) construction firms.

There was no any sample selection rule adopted this was to make the result reliable and valid because according to Tim Edwin Colbourn of the University College London (2013) that many researchers opined that “the confidence interval surrounding a statistical test results tells you how much you can generalize your results to the whole population as it will tell you the likely range the result will take in the total population, so the larger your sample, the narrower your result which makes your statistical tests more powerful”. The analysis of the data was undertaken using the statistical package for social science (SPSS) version 20. Which is a software package used for statistical analysis. It is now named “IBM SPSS Statistics”. It is manufacture in Chicago USA, by SPSS Inc. The SPSS Inc. is a leading global manufacturer of software used in data analysis, reporting and modeling. In social science study.

RESULT AND DISCUSSION

Correlation analysis was conducted in order to determine the relationship between the cost of implementing health and safety measures and cost of construction projects. Table 2 shows the result of the correlation analysis.

Table 2: Total cost of building construction projects (TCBCP)

| Component | R | P |
|-----------|-------|-------|
| CIMHSM | 0.030 | 0.001 |

listwise N=140

Source: Researcher analysis (2019)

Where;

CIMHSM =Cost of implementing health and safety measures.

CCP =cost of construction projects.

Table 2 reveal the correlation of cost of implementing health and safety measures and cost of construction projects, and their correlation is significant at the 0.01 level (2- tailed). N = 140. The Pearson's correlation of the table reveals a positive, strong and highly significant relationship between; Cost of implementing health and safety measures and cost of construction projects.

The Pearson's correlation (r) from table 2 is 0.030 while its $P < 0.001$. This means that the implementation of health and safety measures has a weak relationship on the cost of construction projects or implementation of health and safety measures will only have little or no significant effect on the cost of construction projects. Following the existence of a positive relationship between the variables, there is a need to predict the outcome of the variables. Therefore, simple linear regression was adopted, the simple linear regression seeks to examine the effect of implementing health and safety measures on the cost of construction projects. In the simple linear regression model develop cost of construction projects is the dependent variable while cost of implementing health and safety measures is the independent variable. The results of simple linear regression analysis are presented in Table 3

Table 3: Model Summary (Total cost of building construction projects)

| Model | R | R square | Adjusted R square | Std. error of the estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .698 ^a | .486 | .486 | 1.54887 |

a. Predictors: (Constant): CIMHSM

b. Dependent Variable: CCP

Source: Researcher analysis (2019)

Table 3 shows that 48% ($R^2 = 48$) of the proportion of variation in total cost of construction projects by the level of cost of implementation of health and safety measures. The R^2 adjusted is 0.486 implying that the model explains 49% of the variation in the cost of construction projects within the population leaving 51% unexplained. The cost of implementation of health and safety measures fail to explain all possible variation in the cost of construction projects. Failure to comply with minimum requirement of health and safety measures which might cause

the victim waste of time and loss of money to the firms, are responsible for such knowledge failure.

CONCLUSION AND RECOMMENDATION

The cost of implementing health and safety measures and cost of construction projects was determined. The study concluded that cost of implementation of health and safety measures have little or no consequences on the cost of construction projects. It was revealed that a reasonable correlation exists between cost of implementing health and safety measures and the cost of construction projects as ($r = 0.030$, $P < 0.001$). This means that cost of implementing of health and safety measures has little or no effect on the cost of construction projects. The regression models finding indicates that the analysis of the data also revealed that implementing health and safety measures tends to have little or no increase on the cost of construction projects but instead non-conformance to the implementation of health and safety measures which often result to accident will in turn increase the overall total cost of construction projects. In line with the findings of this research, the study recommends that Severe measures and punishments should be meted out to contractors who violate safety policy, and where there is a recurring violation of policies, the contractor certificate may be rescinded, appointment of a safety officer by a construction company to primarily ensure or enforce health and safety measures e.g., ensuring that workers wear safety boots and helmets etc. and lastly on the job as well as off the job training should be provided to the employees on their health and safety impact on the output of the project.

REFERENCE

- Adekunibi, A., Amusu, O.R.O., and Salvador, K.A. (2017). The significance of health and safety on construction personnel in Lagos State. Proceedings of 7th West Africa Built Environment Research (WABER) Conference, 16-18 August, 2017, Accra, Ghana, pp. 1366-1373.
- Ahmad, S., Iqbal, M, Rashid, M. D., Iqbal S. A., &Roomi M. (2016). Productivity improvement focusing on investigation of injuries, accidents and hazards occurred in a garments manufacturing: *Bangladesh Research Publications Journal*.8, (4), 256-264.
- Aniekwu, N. (2007) Accidents and safety violations in the Nigerian construction industry. *Journal of Science and Technology Ghana*. 27(1), 81-89.
- Creswell, J. (2003). J. 2003. Research Design Qualitative, Quantitative, and Mixed Methods Approaches. *Handbook of mixed methods in social & behavioral research*, 209-240.
- Dodo, M. (2014). The application of health and safety plan in Nigerian construction firms. *Jordan Journal of Civil Engineering*. 8, (1):81-87. doi:10.14525/jjce.8.1.2631.
- Famakin, I. O. & Fawehinmi, O. S. (2012). Quantity surveyors' perception of construction health & safety Regulation in Nigeria: *Journal of Building Performance*, 3. (1).
- Guha, H. & Bishas, P. (2013). Measuring construction site safety in Kolkola, *India International Journal of Scientific Engineering Research*, Volume 4, Issue 5.
- Haefeli, K., Haslam, C., & Haslam, R. (2005). Perceptions of the cost implications of health and safety failures. Health and safety Executive Research Report 403, Available at <http://creativecommons.org/licenses/by-nc-nd/2.5/assessed/15/3/2013>.
- Kolawole M. J. (2014). Assessment of Safety Measures on Building Sites (A Case Study of Minna, North Central Nigeria): *Greener Journal of Environmental Management and Public Safety*. 3. 001-008.
- Idoro, G. I. (2011). Comparing occupational health and safety management efforts and performance of Nigerian construction contractors. *Journal of construction in developing countries*. Preview manuscript.

- Idubor E. E. &Oisamoje M. D. (2013). An exploration of health and safety management issues in Nigeria's efforts to industrialize. *European Science Journal*, 9:154-169.
- Okolie, K. C., & Okoye, P. U. (2012). Assessment of national culture dimensions and construction health and safety climate in Nigeria. *Science Journal of Environmental Engineering Research*.12:1-6.
- Okoye, P.U., &Okolie, K.C. (2014). Exploratory study of the cost of health and safety performance of building contractors in South-East Nigeria. *British Journal of Environmental Science* vol.2, no.1, pp.21-33, (March).
- Umeokafor, N., Isaac, D., Jones, K., &Umeadi, B. (2014). Enforcement of occupational safety and health regulations in Nigeria: An exploration. *European Scientific Journal*.
- Windapo, A. 2013. Relationship between Degree of Risk, Cost and Level of Compliance to Murie, F. 2007. Building Safety – an International Perspective, *International Journal of Occupational and Environmental Health*, 13 (1), 15-11