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Assessment of Quality Management Practices and Building Collapse in Osogbo, Osun State, Nigeria

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Abstract: The study assessed the quality management practices as it affects the building projects in Osogbo, Osun State, Nigeria with a view to determining the causes of building failure. The work involved the distribution of questionnaires and a follow-up study on respondents. The questionnaires were designed to extract information from the stakeholders: professionals from Ministry of Works and Housing, contractors, and direct users of the projects on the general causes of building collapse in relation to quality management. To have a good representation of the study area, one hundred and twenty (120) copies of questionnaire were administered using Taro Yamani method of sample size determination. A total of 92 questionnaires were retrieved and the results were subjected to descriptive and inferential statistical analysis. The study revealed that handling of the construction process by unqualified and quacks, possession of approved drawing without compliance and usage of substandard building materials were the major causes of building collapse. It was recommended that there should be constant evaluation of contractors and other players to determine the level of compliance to quality standards as prescribed by the regulatory bodies to curb the incidences of building collapse.

Keywords: Quality Management Practices, Building Projects, Building Collapse

I. Introduction

In recent times, there has been an increase in the incidence of building collapse causing a lot of physical and psychological trauma to the populace due to the loss of huge investment on building, properties and human life. In Nigeria, cases of building collapse are enormous in which Osun State is not exempted. This rising case has created a great concern for the construction industry and the entire citizenry [1].

A building is said to have collapsed when its structural component states have failed and could not support the intended loads. In this situation, such a building is no longer safe to live in and therefore becomes a nuisance to the environment [2]. A collapsed structure anywhere in the world is a nightmare because of the time, energy resources wasted and possibly, loss of lives [3]. The failure can be of various types and can occur during, immediately, after or later in its design lifespan. Studies have shown that inadequate and inefficient management of construction process, noncompliance to rules and regulations guiding the building industry, as well as natural disaster arising from floods, earthquakes and hurricanes are the major causes of building collapse [4] [5]. In Osun State, most cases of collapsed building reported were connected to bad workmanship, usage of substandard building material, faulty design and non-adherence to specifications. This implies that every phase of building production requires proper supervision and quality participation of professionals in the building industry [6].

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Lack of quality control measures and quality assurance policies by the construction team members have been identified as major causes of project failure [7]. A lot of time, money and resources are wasted on construction projects without the existence of quality management procedure [8]. The fulfilment of expectations of every project participant is the success of the project as well as the quality of construction of the project [9]. It has been discovered that some design and production team members do not adhere strictly to many codes of practice established for different aspects of works in the industry, thereby compromising quality standards.

Total quality management entails the participation and dedication of the client, contractor and the constructor in the process; to ensure the project's success [10]. Total quality management is the piece of duty which ensures that construction is performed according to plan and specifications, within the stipulated time and defined budget and a safe work environment [11]. The term quality management is a concept which encompasses quality control, quality assurance, quality improvement quality standard among others [10]. Total quality management brings about customers' satisfaction, products free of defects, avoidance of rework, cost-effective training and re-training of the workforce [12] [13]. In order to develop a total quality culture in the construction industry, team of construction professionals, contractors and suppliers who would be committed to the quality process with true quality attitude must be developed [14].

If construction clients and the end-users of completed building projects are to get the best value for their money, the concept of quality management must be emphasized in the industry to enhance the quality of product and services [10]. Findings have shown that majority of construction firms in Nigeria are more concerned about the number of hours worked with the quantity of work done, while lesser attention is paid to the quality of work performed [12]. For the construction industry to improve its performance there must be a change of orientation of all the players of building production process [15].

There is need for the construction industry to take up the practice of the concept of total quality management (TQM) as it occupies the forefront among the factors that can be used to rate the level of success or failure of a project [16]. This study is aimed at assessing the quality management practice as it affects building failure in Osogbo, Osun State, Nigeria with a view to suggesting a lasting solution to building collapse arising from inadequate quality management practices in the study area.

II. Methodology

The study design for this work was based on a survey method which accommodates the use of questionnaires to elicit information from the respondents involved in Osogbo, Osun State, Nigeria. The respondents were categorized into three namely: the professionals from the Ministry of Works and Transport, the contractors, and the direct users of the projects. A total population of 145 was surveyed. From the total surveyed, the sample size was determined using Taro Yamani's method of size determination. A combination of random and purposive sampling was used to select the final 120 target population. The questionnaire was designed to address the general causes of building collapse in relation to quality management practices.

The mean of 2.50 was used as a decision point for every questionnaire item. Consequently, any item with mean responses of 2.50 and

above was considered to be agreed. Any item with a mean response of 2.49 and below was equally considered to have disagreed respectively.

III. Results and Discussion

Table 1 shows the demographic information of respondents. Respondents' profession: Civil Engineering has the highest percentage of 27.2% followed by Building with 22.8%, Project Management with 18.5%, Architecture and Estate Management with 10.9% each, contracting with 4.3%, while other professions have 5.4 % of the population of the respondent. This implies that majority of the respondents are Engineers and Builders which implies that they are professionals and have adequate knowledge of the subject matter. Also, from the analysis of the respondent, 42% were from government parastatals, 35% were from contracting firm; consulting and property firm has 15% and 8% respectively. This shows that most of the complex structures are done by the governments. Moreover, respondents with a Bachelor's degree have a percentage of 56.5% followed by those with a Master's Degree and others. This shows that the respondents have an adequate level of education and knowledge about the research and its relevance to society. The study also shows that the respondents comprise various memberships of professional bodies: Members of the Nigerian Society for Engineers (NSE) have the highest percentage of 27.2%, while those of the Nigerian Institute of Building (NIOB) and others have 22.8% and 50% respectively. This indicates that the majority of the respondents are engineers and builders which imply that they are professionals and therefore acquire adequate knowledge of the subject matter. Relevant work experience was also considered; those with an average work experience of 6-10years have 34.8% and 11-15 years with 23.9%. This shows that they possess a wealth of experience required for the study.

Table 1: Demographic Information of Respondents

Demographic	Frequency (N)	Percentage (%)
Respondents' Profession		
Architecture	10	10.9
Building	21	22.8
Civil Engineering	25	27.2
Project Management	17	18.5
Contracting	4	4.3
Estate Valuer	10	10.9
Others	15	5.4
Total	**92**	**100.0**
Type of Organizations		
Contracting firm	32	35
Consulting	14	15
Property firm	7	8
Government parastatals	39	42
Total	**92**	**100.0**
Highest Qualification		
HND	15	16.3
B.Sc.	52	56.5
M.Sc.	24	26.1
Ph.D.	1	1.1
Total	**92**	**100.0**
Professional Membership		
MNIOB	21	22.8
MNIA	10	10.9
MNSE	25	27.2
MNIESV	12	10.9
MNIQS	10	10.9
OTHERS	16	17.4
Total	**92**	**100.0**

Table 2 presents the causes of building collapse in relation to quality management practices. The three causes of building collapse that were rated higher include: handling of construction process by unqualified and incompetent craftsmen, possessing the approved drawing but noncompliance with it and usage of sub-standard building materials. This is in accordance with the studies of [17, 4 and 18]

that many infrastructures are built with approved plans but do not comply with laid down quality standard and building regulations. This is because, despite all the effort by the Nigerian government, the rate of infrastructural failures and building collapse is still on the increase. After all, compliance with approved quality standards is not properly enforced [18]. When an approved plan exists, the developers and owners still refuse to follow standards and specifications as contained in the plan [17].

Table 3 presents the total quality management processes and activities. The findings show that the processes and activities of the construction firms can help in ameliorating building collapse as it was rated higher above other variables. This is in accordance with [6] [19] who were of the opinion that many of the problems in buildings might be lessened by giving greater attention to standards of performance and quality at briefing, design and construction stages of the building process..

Table 2: General Causes of Building Collapse in Relation to Quality Management

S/N	General Causes of Building Collapse in Relation to Quality Management practices	Mean
1.	Handling of construction process by unqualified or wrong people	3.24
2.	Non – compliance with approved drawing	3.19
3.	Usage of sub-standard building materials	3.16
4.	Lack of compliance with specification by developers	3.15
5.	Illegal conversion and alteration of existing structures	3.09
6.	Construction activities not monitored effectively	3.06
7.	Inability to possess approved drawing	3.01
8.	Usage of incompetent contractor and quacks	2.95
9.	Defective design and construction	2.94
10.	Lack of supervision, inspection and monitoring	2.94
11.	Lack of approval of building plan before commencement of construction	2.91
12.	Structural deficiency	2.87
13.	Inadequate preliminary works	2.85
14.	Lack of approved structural design	2.83
15.	Defective construction methodology	2.78

Table 3: Total Quality Management Processes and Activities

S/N	Total Quality Management Techniques	Mean Rating
1	processes and activities of the construction firms determine the quality requirements of the project	3.4
2	processes and activities of the construction firms help in ameliorating building collapse	3.1
3	total quality management techniques are too technical to management of construction firms	2.6

Source: Field survey 2020

Table 4 shows the cases of building collapse in Osun State between 2010 and 2020. The major causes include: faulty design, usage of substandard building materials, non-adherence to specifications and poor workmanship among others. All these causes can be linked to human error and carelessness. This is in accordance with [5] who reiterated that inefficient management of the construction process and non-compliance to rules and regulations guiding the building industry are major causes of building collapse

Table 4: Cases of building collapse in Osun State (2010 - 2020)

S/N	Building Location	Type of Building Structure	Date of collapse	Causes of Building collapse
1	Ikirun, Mobubeje area	Residential building	2010	Design fault
2	Oke Ayepe, Osogbo	Residential building	August 2013	Use of substandard materials
3	Osogbo	Convocation arena	August 2013	Faulty construction and non-adherence to specifications
4	Osogbo	Residential building	August 2014	heavy downpour
5	Ejigbo Osun State	Mega school	October 2014	Poor workmanship
6	Iwo, Osun State	3 storey residential building	August 2020	use of substandard materials and shoddy workmanship

Source: Field survey 2020

IV. Conclusion and Recommendations

From the analysis of the result of the effects of total quality management practices on building collapse, the following were deduced: It was observed that the extent of adoption of total quality management measures has significant effects on building collapse in the study area. The main findings of the study revealed that the level of compliance with the approved building plans is very low. It has also been observed in some cases that the design and production team failed to adhere strictly to the various codes of practice set out for different aspect of works in the industry. It is recommended that there should be effective adoption of total quality management practice measures at the execution stage of the project and there should be constant evaluation of contractors and their organizations to determine the level of compliance to quality standards as set down by the regulatory bodies and government agencies in other to curtail the incidences of building collapse.

References

[1]. Oyebode, O., Wasiu, J. and Adebayo V.B. "Causes of Building Collapse and Prevention in Nigeria", A paper delivered at the: *Conference of the Nigerian Institute of Civil Engineers (NICE)* (2014), Sheraton Hotel, Ikeja Lagos.

[2]. Adeniran, A.J. "Environmental Disasters and Management: Case Study of Building Collapse in Nigeria", *International Journal of Construction Engineering and Management,* vol. 2, no. 3, 2013, pp. 39-45.

[3]. Babatunde, S.O. and Opawole, A. "An Assessment of Failure of Building Components in Nigeria", *Journal of Building Appraisal*, vol. 4, 2009, pp. 279-280.

[4]. Chinwokwu, G. "The role of Professionals in Averting Building Collapse", *Proceedings of workshop of the Nigerian Institute of Building, Lagos State on Building Collapse, causes, preventing and remedies,* 2000, pp. 12-28.

[5]. Hillary, I.O., Chukwuemeka, O.O., Nkolika, J.P., James, D.O., Patienc,e I.A. and Abiodun, A.O. "Systematic Review of Building Failure and Collapse in Nigeria", *International Journal of Civil Engineering and Technology*. vol. 9, no. 10, 2018, pp. 1391-1401.

[6]. Griffith, A. "Quality Assurance in Building", *London: macmillan*, 1990.

[7]. Gana, A.J. and Olorunfemi, K.O. "Human Elements and Factor Contribution and Consideration in Construction Projects Towards Completion (The Nigeria Experience)", *International Research Journal of Engineering Science, Technology and Innovation* (IRJESTI), vol. 4, no. 1, 2015, pp. 12-18.

[8]. Battikha, M.G. "Quantity Management Practices in Highway Construction", *Emerald*, 2002, pp. 532 – 550.

[9]. Hoonakker, P., Carayon, P. and Loushine, T. "Barriers and Benefits of Quanlity Management in the Construction Industry", *An Empirical Study, Total Quality Management*, vol. 21, no. 9, 2010. pp. 953-969.

[10]. Arikkok, M. "Total Quality Management: The Way to Achieve Quality Excellence", Kajaani University of Applied Sciences, https://www.researchgate.net/publication/312054032 accessed on October, 2019.

[11]. Shofoluwe, M., Ofori-Boadu, A., Waller, L. and Bock-Hyeng, C. "Quality Improvement Practices of Award-Winning Residential Builders and Housing Developments", *International Journal of Industrial Engineering & Production Research*, vol. 23, no. 1, 2013, pp. 7-12.

[12]. Aham, M., Gtrerrez, L.J. and Nunoz, J.F. "Total Quality Management Practices, Competitive Strategies and Financial Performance: The Case of the Palestinian Industrial SMEs", *Total Quality Management of Business Excellence*. vol. 25, no 5/6, 2014, pp. 635-649.

[13]. Project Management Body of Knowledge 'PMBOK Guide' "Quality Assurance in the Construction Industry", StudyModc.com. (2008*) 4th Fid. PMl Inc. Available: Http:www.studymode.com/essays/Quality-Assurance-Construction-Industry-129387.html (Accessed on 2nd September, 2019.

[14]. Low, S.P. and Peh, K.W. "A Framework for Implementing Total Quality Management in Construction", *The TQM Magazine*, 1996, pp. 39 – 46.

[15]. Ayuba, P., Olagunju, O.R and Akande, O.K "Failure and Collapse of Buildings in Nigeria: The Role of Professionals and other Participants in the Building Industry", *Interdisciplinary Journal of Contemporary Research in Business*, vol. 4, 2012, pp. 1267 – 1272.

[16]. Arditi, D. and Gunaydin M. "Total Quality Management in the Construction Process", *International Journal of Project Management*, vol. 15, no. 4, 1997, pp. 235-243.

[17]. Ebehikhalu, N. and Dawam, P. "Spatial Analysis of Building Collapse in Nigeria: A Study of the Causes and Problems", *Journal of Economics and Sustainable Development*, vol. 5, no. 25, 2014, Encyclopedia Britannica. (2004). Delux edition.

[18]. Oyegbile, O.B., Tat, T.N. and Olutoge, O. "Management of Building Collapse in Nigeria", A Lesson from Earthquake Triggered Building Collapse in Athens, Greece" *Civil and Environmental Research*, vol. 2. no. 6, 2012, pp. 36-42.

[19]. Jambol, D.D. "Curbing the Incidences of Building Collapse in Nigeria", A paper delivered at the 42nd *Nigeria Institute of Building (NIOB) National Conference*, August, 2012, pp. 19- 34.