

## BUILDING FAILURES IN NIGERIA: AN ARCHITECT'S PERSPECTIVE

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### Abstract

*Incidents of building failure have been on the increase in Nigeria in recent times, leading to avoidable losses in human lives and property. The effects are far-reaching, encompassing emotional, psychological, economic, and environmental effects among others. This paper is a review of the stages in the building production process, highlighting the role of the architect through the stages. It addresses the issue of building failure from the perspective of the architect, who is the prime consultant charged with the conception of the design of the building. The aim of the review is to highlight the architect's duty of care in building production, which has the likelihood of reducing incidents of building failures in Nigeria. The research methodology involved review of newspaper reports and scholarly studies on building failure. The findings of the paper show that notwithstanding other issues that may contribute to building failure in Nigeria, unprofessional administration of the building delivery process remains a key contributor to the failure of buildings in the country. The findings further show that there are well defined laws, that if adhered to by all parties concerned can address positively the issue of building failure, and that the architect has a continuing role in building production, and can work in synergy with other built environment professionals to reduce building failures to the barest minimum. The paper concludes by advocating an adherence to true professionalism by all actors involved in building production. These actors which include clients, design and construction professionals, logistics professionals, specialist consultants, building materials and equipment manufacturers, and development control agencies must function in their defined roles for there to be seamless delivery of buildings that will forestall ugly incidences of building failures.*

**Keywords:** building collapse, built environment, building failure, building lifecycle

### INTRODUCTION

Buildings fulfil a number of functions, one of which is providing a safe enclosure for people and their activities. Advancement in human activities have brought with it, advancement in the nature and form of buildings. Man has continued to plan his life around his buildings, such that buildings are expected to always be there to fulfil the functions imposed on them by man. Building design and construction have evolved over time, and building materials have moved steadily from reeds, straw, sticks and earth, to more durable materials with more complex construction methods to ensure their longevity and fitness for purpose. Notwithstanding the best efforts to make buildings more durable, sometimes they fail, and come short of their

expected output. A building is said to have failed when it loses its ability to perform its intended or designed function (Rosetto, 2013). This definition stretches building failure to include failures in intended performance as well as failures in the physical structure. This suggests that a building can fail even when it has not collapsed.

Douglas and Ransom (2007) aptly categorised building failure into structural (physical) failure and performance failure. Structural failures have to do with extensive physical damage to the building, requiring repairs, the costs of which are high relative to the replacement value of the building. This also includes partial or total collapse of the built structure. Performance failure on the other hand is a reduction in the designed functions of the building due to a deficiency in a part or whole of the building, but not including a total collapse. Performance failures involve an intolerable difference between anticipated and existing design and construction. This can create an inability to effectively use the whole or part of the building. Even though performance failure as described can constitute a nuisance to the users of the building, the buildings may still appear to the public not to have failed due to the absence of a total collapse. Additionally, some performance failures may not be as a result of defects in structural performance of the building, but rather incongruence between space requirement for a particular function, and actual designed space (Borgstein et al, 2018; Khalil & Kamaruzzaman, 2018). This type of failure, though very real to the direct users of the building, may be considered intangible by others (Erickson & Wilson, 2014). This perception forms the conceptual understanding of building failure explored in this paper. This paper focuses on building failures that involve the total collapse of the whole or part of a building, which renders the building unfit for all other functions.

The consequences of building failure are wide ranging and always negative. Buildings are modified environments made for man and his activities using vast amounts of economic resources. When they fail, the consequences, as identified by Janssens, O'Dwyer, and Chryssanthopoulous (2012), include injury to persons, loss of lives and psychological trauma. The environmental consequences include release of toxic substances and CO<sub>2</sub> emissions into the air, while economic losses include cost of making good, legal fees, and other attendant costs. Chendo and Obi (2015), identified consequences that relate directly to professionals on the job, beyond the human, environmental, and economic costs. These include loss of reputation and integrity, loss of new commissions and contracts, and withdrawal of practice licenses. There is also the possibility of prosecution for criminal negligence. These consequences are far reaching, and should agitate the minds of all stakeholders in the building industry on ways of combating the menace of building failures.

Building failures appear to be more prevalent in developing countries (Ede, 2011). This lends credence to an increased likelihood of human error as the major driver of the failures (Dimuna, 2010), an aspect largely under control in developed countries through enforcement of relevant codes and legislations. Nigeria with its largely undeveloped physical infrastructure (World Bank, 2018) is expected to invest heavily in new buildings in the coming years (Igbinoba, 2022). These buildings must be appropriately safeguarded from avoidable failures, as the cost of failure on a fragile economy such as Nigeria's, would be a very heavy social, economic, and environmental burden. A clear understanding of the factors responsible for

building failures in the country is therefore necessary as a precursor to targeted solutions that can curb future occurrences.

The architect is one of several stakeholders in the production and delivery of any building (ARCON/NIA, 2011). Other stakeholders include the client, services professionals, product manufacturers, regulatory agencies, direct users, and others. The architect can be considered a major stakeholder here, as his expertise is required at all stages of the building production process, from the preliminary stages up until final disposal at the end of a building's life cycle (ARCON/NIA, 2011). This critical role undertaken by the architect, places a huge responsibility on him to ensure that through informed interactions with other stakeholders in the building delivery process, a proper building that is durable and fit for purpose is ultimately delivered.

This aim of this paper is to outline the 'duty of care' required of the architect at every stage of the building production process, being his informed and professional contribution towards stemming the tide of avoidable building failures in Nigeria.

## **DISCUSSION**

### **Recent Incidences of Building Failures around the World**

In recent times, building failures involving total collapse of the building have been recorded all over the world. Notable incidents include the April 2013 collapse of the 8-Storey high Dhaka garment factory in Bangladesh. The incident claimed at least 1,134 lives, with over 2,500 injuries (International Labour Organization, 2013). The immediate cause of the collapse was attributed to cracks seen in the building a day before the building finally gave way. A warning to evacuate the building was reportedly ignored by the owners (Nelson, 2013). The building was in use on the day of the collapse as in other days, and the resulting event led to tragic loss of lives. In July 2019, a 4-Storey building in Mumbai, India collapsed. Early reports after the collapse pointed to the age of the building; the building was 100 years old at the time, and also the possibility of having been affected by the recent monsoon flooding at the time (Yeung et al, 2019). Another notable building failure incident is the partial collapse of a proposed Hard Rock Hotel in New Orleans USA on 13th October 2019. The immediate cause of the collapse was not determined, but the upper floors of the building were reportedly collapsing on top of each other before one side of the building fell to the ground below (Burke & Samandi, 2019). It was said that the workers were vocal with questions about health and safety measures as well as structural integrity of the building (Valentic, 2020). All these incidents led to loss of lives as well as heavy economic losses. Also, these incidents involved buildings at different stages of their life cycle, from construction stage, to full operational phase, to near the end of useful life of the building.

### **Building Failures in Nigeria**

Nigeria has had its fair share of building failures over the years, many of which have claimed lives. A report from the Federal ministry of Power, Works and Housing put the number of collapsed buildings in Nigeria from 2012 to 2016 at 54 (Ojoye, 2017). A total of 61 buildings were officially reported to have collapsed in 2022 (Nigerian Tribune, 27th December 2022), and more collapses have been recorded in 2023 (Odunsi, 2023; Akoni, 2023), while many have gone unrecorded.

Building failures can occur as a result of natural causes or unforeseen disasters that may not have been anticipated at the time of erecting the building (Amadi et al, 2012). Notwithstanding this, precautionary measures can be taken at the early stages of building production to reduce the severity of such occurrences on the structural integrity of the building. Where this is not done, it can be appropriately classified as human negligence even though the immediate cause of the failure may not have been as a result of human action. On the other hand, failure can be solely as a result of human error on the part of any one or a combination of stakeholders in building production. Several studies on building failure (Hamma-adama & Kouider, 2017; Oseghale et al, 2015; Chendo & Obi, 2015; Okah, 2022) agree with this assessment. Table 1 shows a list of recent building collapses in Nigeria, none of which was as a direct result of any natural or unforeseen disaster.

**Table 1 – Selected incidents of building collapse in Nigeria from 2016 to 2019**

S/n	Date	Building type	Location	Casualties	Source
1.	8 <sup>th</sup> March 2016	5-Storey building (under construction)	Lekki. Lagos	34 dead	Vanguard, 8 <sup>th</sup> March 2016
2.	10 <sup>th</sup> December 2016	Church auditorium (roof collapsed)	Uyo, Akwa Ibom	At least 100 dead	The Sun, 11 <sup>th</sup> December 2016
3.	13 <sup>th</sup> August 2017	3-Storey building (under construction/ conversion from 2 to 3-Storey)	Egbu road opposite Police station Owerri	4 dead	Channels Television News report, 13 <sup>th</sup> August 2017
4.	23 <sup>rd</sup> November 2018	Uncompleted 7-Storey building	Woji road New GRA, Port Harcourt	At least 4 dead	Daily Post, 25 <sup>th</sup> November, 2018
5.	13 <sup>th</sup> March 2019	3-Storey building (school building)	Ita Faaji Lagos	At least 20 dead	Channels Television News report, 14 <sup>th</sup> March 2019
6.	26 <sup>th</sup> May 2019	2-Storey building (uncompleted abandoned for up to 20 years)	10 Amaram Ext Owerri	4 dead	Punch Newspapers, 26 <sup>th</sup> May 2019
7..	11 <sup>th</sup> July 2019	4-Storey building (secondary school)	Mini Ewa Road Rumubiakani, Obio Akpor Rivers state	None	BBC News Report, 11 <sup>th</sup> July, 2019
8.	2 <sup>nd</sup> September 2019	Single floor building (Mbaise campus of IMSU)	Mbaise, Imo state	None	Imo Trumpeta Newspaper, 2 <sup>nd</sup> September 2019

*Source: compilation from news reports, 2020*

The spate of building failures in Nigeria according to Ukpata (2006) in Ebehikhalu and Dawam (2014) can be traceable to unsafe practices by parties involved in the building process. These practices may include incompetence, negligence, absence of adequate controls, and corruption. These manifest in the use of poor quality and substandard materials, particularly steel reinforcement in building construction (Hamma-adama & Kouider, 2017), poor design input together with poor technical specification by design and services professionals (Chendo & Obi, 2015), and poor quality control and supervision by relevant personnel. Other factors include change of use of building after construction, and modification of building structure either during construction, or at the operational phase of the building to accommodate previously unaccounted for features in the original design. A study reported by Ebehikhalu and Dawam (2014) identified heavy rainstorm as contributing only 7.1% of recorded building collapses in Nigeria. Ignorance on the part of clients, including interference from their family members contributed another 1.94%. The remaining identified causes of building collapse namely structural failure, poor supervision, poor workmanship, substandard materials, faulty design, illegal alteration of building plans, poor maintenance of already existing buildings and non-compliance with building regulations accounted for the balance of 90.4%. A further study by Akande (2016) showed that the combined effects of substandard materials and poor workmanship accounted for 45% of all building collapses in Nigeria. In a previous study by Oloyede et al (2010), the bulk of the reasons for failure in buildings were identified to be related to quality of construction materials, and personnel involved in direct construction and supervision. These studies reveal a dominance of professional and regulatory factors which clearly showcase varying degrees of negligence on the part of the different stakeholders involved in the building delivery process, as being responsible for building failures in Nigeria.

### **The Building Life Cycle**

The process of producing buildings is guided by a number of actors who have varying and clearly defined roles. These are the client who initiates the building project, the various professionals that plan, design, programme, and erect the buildings, product manufacturers, and all other actors who have the responsibility of ensuring that design and construction are in line with relevant laws. Seamless and efficient operation between these persons should expectedly yield high quality buildings which are fit for purpose and not susceptible to avoidable failures.

A building's life cycle involves three identifiable phases. These are the pre-building phase, the building/construction phase, and the post construction/operational phase. At the end of a building's useful life, it can be refurbished, re-adapted to other uses, or demolished (disposed). This can be classified as the fourth phase, as resources used in the production of the original building may be used in new construction. However, the focus of this paper is on the useful life of a building which encompasses phases one to three.

The architect as the prime consultant in building projects has an important role to play throughout the different phases of a building. The pre-building phase includes all actions prior

to commencement of actual construction works. As outlined in the Architects' Registration Council of Nigeria and Nigerian Institute of Architects' Conditions of Engagement and Remuneration for Architectural Services (ARCON/NIA, 2011), the normal services of the architect at this phase upon commissioning by the client include development of conceptual design, and production of detailed construction drawings. These services involve the architect receiving the client's information including brief, site information, and project budget. It also involves appraisal, analysis, and synthesis of the information into workable design solutions that conform to relevant local codes and bylaws. The architect is also expected to advise the client on the need to appoint other consultants. As part of his normal services also, the architect is expected to spatially co-ordinate the designs of other consultants and specialists, to achieve harmonious design solutions.

The second phase of a building's life cycle involves construction documentation, tendering and award, and actual construction of the building on site. The architect is also expected as part of his normal duties, to co-ordinate construction documentation with the other consultants and specialists on the job (ARCON/NIA, 2011). The architect can also help with selection of appropriate conditions of contract, pre-qualification of contractors, tender analysis, and supervision and coordination of the construction works and inputs by other consultants. This is together with his role of preparing and submitting quarterly reports to the client, as well as coordinating and presiding over monthly site meetings, technical meetings, and other site visits. At completion of the building, the architect manages handover of works to the client, prepares schedule of defects, and certifies practical completion at the end of the defects liability period.

The post construction phase of a building signals the end of actual construction, and the commencement of use or operation of the building. Expectedly, this is the longest period in the life cycle of a building. The building elements, components, services, and fixtures are subjected to different kinds of stresses as a result of use. Also, the building elements are exposed to the vagaries of weather, which also exert considerable wear and tear on the building. The ability of the building to withstand these stresses will largely depend on the quality of design, materials, and construction employed in the building, the quality and regularity of maintenance, and the severity of use the building is put to. The architect has no continuing role at this phase of the building's life cycle, but should prepare 'as-built' drawings, and possibly a maintenance manual, in consultation with other specialist consultants.

## **The Role of The Architect through a Building's Life Cycle**

### *Design/Pre-building phase*

Clearly, the architect is one of the key professionals involved in a prospective building project. It is the architect that creates the spatial organization of spaces that eventually becomes a building design. The final design is a synergy between deep conceptualisation on the part of the architect, and collaboration with other services design consultants, whose inputs help the architect interpret his ideas into fully workable solutions. Specialist design

consultants on a building project include structural engineers, electrical engineers, and mechanical engineers for smaller projects, and for bigger projects, can include specialized lighting, acoustics, and interior design professionals among others.

The design/pre-construction phase of a building marks the inception of the life-cycle of a building. This phase involves substantial information gathering on all aspects that can influence the outcome of the building. Analysis and synthesis of the information so gathered will determine the final decisions as regards placement of building on site, preferred design solutions, material choices, construction methods etc. It is the duty of the architect to ensure that all designs by all the consultants on the project align with his own design, such that they are complementary to one another.

The stability of a building is not dependent on the architectural design, but on the structural design of the building. This however does not altogether absolve the architect from culpability in cases of inappropriate structural design, because the architect is expected to co-ordinate the works of the other consultants as the design process progresses. As contained in the ARCON and NIA Conditions of Engagement (2011), it is the duty of the architect to advise his client on the need for specialist consultants. This is especially necessary with residential building projects, where the client may not understand the need to involve other professionals. Where architects insist on this, the likelihood that clients will begin to engage qualified structural engineers at the early stages of a project will increase. The expected impact will be an increased professional approach to structural detailing in buildings, which should expectedly reduce to a minimum, errors in design due to incompetence, ignorance or both. There is also an increased likelihood of the final drawings conforming to statutory regulations and building bylaws. Where the architect appropriately exhibits the required duty of care in the choice of other relevant consultants on the job, there would expectedly be better quality buildings, and a resultant reduction in avoidable building failures due to human error.

### *Construction/Building phase*

The services of the architect extend beyond the design, to include the construction phase of the building. As enumerated in the ARCON and NIA Conditions of Engagement and Remuneration for Architects Services (2011), the architect can offer standard services and supplementary services in a building project. Supplementary services are additional services for which the architect is given a special commission to undertake, apart from his normal duties on the project. As part of the architect's supplementary services, he can offer project management services. While this role does not place on the architect, the responsibility for the performance of the other consultants, it however requires him to take charge of co-ordinating project logistics, cost control, and every other activity that harnesses human and material resources for the successful execution of the project (Yadollahi et al, 2014). This grants a measure of oversight to the architect to follow up on performance of the consultants and relay same to the client. The architect can leverage on this role to ensure compliance with rules, and adherence to professional decorum in the course of constructing the building.

The standard services rendered by the architect at the construction phase are equally very important, as it allows him far reaching influence in the oversight of construction processes

on site (ARCON/NIA, 2011). As part of the architect's standard services, he is to supervise and co-ordinate the construction works and the inputs of other consultants. It is also his duty to co-ordinate, and preside over site meetings. In addition, the architect has the duty of preparing and submitting quarterly reports, issuing approval for material tests and components for the works, and overseeing and supervising the testing and commissioning of equipment. All these activities if properly undertaken, can significantly regulate the quality of materials and workmanship on site, and reduce to a minimum the possibility of failures in buildings.

#### *Post Building phase*

As stated earlier, the architect does not have a continuing role at the post building phase. However, decisions and actions taken at the first two stages will largely determine how successful the third and longest phase of a building's life cycle will be. Properly prepared as-built drawings and maintenance manuals will allow for well-informed maintenance decisions that will better safeguard the integrity of the buildings. This is an often-neglected aspect of the architect's duty in the building delivery process. This can lead to uncoordinated maintenance protocols that may ultimately undermine the building structure, and result in avoidable failures.

### **CONCLUSION AND RECOMMENDATIONS**

Several studies have been conducted on building failures in Nigeria. Recommendations from these studies have focused on the need for improved professionalism among design and construction professionals (Chendo & Obi, 2015), better enforcement of standards of both local and foreign materials by Standards Organisation of Nigeria (Dimuna, 2010), and improved regulation of the approval and construction process by relevant development control agencies (Ebehikhalu & Dawam, 2014). These recommendations are in line with the identified causes of building failures in Nigeria, and this study adds to the discourse by focusing specifically on the duty of care required of the architect in the quest for improved professionalism as generally recommended in these studies.

The architect as a critical player in building delivery supply chain can apply his professional expertise to ensure that the building construction process is safeguarded and devoid of avoidable errors. In the discharge of his duties, the architect can directly or indirectly influence positive changes that can redirect building delivery in Nigeria. Building failures in Nigeria will continue unabated unless concrete actions are taken to truncate the ugly trend. The architects' recommended duties of care are outlined below. While it is clear that some of the recommendations are not directly controlled by the architect, however, if the architect plays his role properly in the building delivery process both as a coordinator of the activities, and in the supplementary function of a project manager in larger projects, he will have a greater overview of all building activities, and ability to enforce strict compliance with the recommendations. The recommendations are as follows:

***Adherence to true professionalism in the building industry*** - Professionals in the building industry should strictly operate within their areas of competence, and work together as a team.

In Nigeria, it is not uncommon to see professionals in the built industry venturing into areas where they do not have expert training for (Omeife & Windapo, 2013; Yusuf, 2007). The architect undertaking the duties of other key professionals in the built industry is as bad as other professionals usurping the duties of the architect. In such cases, most times, the professionals overreach their core competences and may make mistakes along the way. Instead of seeking to usurp the duties of other professionals in the industry, built environment professionals should seek inclusion of all actors, and allow them room to operate, as this is one way of ensuring standards in the industry. True professionalism will keep every professional within his area of expertise, and by working together, can produce a synergy that is good for the industry.

***Enforcement of planning laws and penalties upon contravention*** – There are already existing protocols for control of quality of buildings and physical infrastructure in Nigeria (Federal Republic of Nigeria, 2006). Where extra legislation is required, there are also relevant agencies charged with that responsibility (e.g., federal and state development control agencies). In the absence of political will, development control offices quickly transform from avenues for the regulation of development in the interest of the public, to mere revenue generation outfits (Vivian et al, 2013), or worse still, agencies for extension of political patronage. Where effective regulation is sacrificed for revenue, standards will not be upheld, and risky practices that can lead to building failures will more easily creep in. Enforcement of relevant regulations by development control agencies is therefore critical in ensuring that buildings are designed, constructed and administered to the highest level of professionalism and competence.

***Effective clampdown of quackery in the building industry by professional associations and government agencies*** – Unqualified personnel involved in building production pose a significant danger to the quality of the output. Adherence to adequate quality of personnel and staff should be enforced through the combined efforts of the development agencies and the different professional associations involved in the building industry. Penalties for non-compliance should be heavy enough to serve as deterrent to intending perpetrators.

***Regulation of standards for materials, components and equipment used in building construction*** – Nigeria's reliance on mostly imported materials for its construction industry throws up challenges of quality. Influx of substandard construction materials and components into the country could greatly endanger buildings, as material quality on its own is one of the main contributors to building failures in Nigeria (Hamma-adama & Kouider, 2017). If government agencies charged with regulation of standards in the country are effective, then substandard materials can be intercepted before they get into the country. Clearly, regulation of standards is critical as it ensures that materials and components meet up with their assumed properties and performance capabilities, making it easier for end users to access good quality materials for their buildings.

***Clients should be informed of best practices in the industry*** – Clients largely have overall control of the types of men and materials involved in their projects. Where there is no effective monitoring of regulations, clients may choose to discountenance the use of

professionals on their projects because of cost or convenience or both. They may also choose to use low quality materials for the same reasons, and to get greater return on investments. However, where the buildings fail, then everything is lost. It is important therefore that clients are compelled to use the right kind of men and materials for their jobs, through appropriate monitoring by development control departments and agencies involved in quality control of standards and materials. In addition, it is also necessary that professional associations push their advocacy to the public, enlightening them on best practices in building procurement and the benefits derivable therefrom.

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