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COMMON DEFECTS IN THE CONSTRUCTION STAGE OF REAL ESTATE DEVELOPMENT PROJECTS IN NIGERIA: A CRITICAL REVIEW

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Abstract

Development defects are the major bane confronting real estate development projects. They can occur at any stage of the life cycle of an estate. Real estate development industry always views development defects as the most difficult issue. However, accurately identifying the type of development defects can be tasking, which makes it difficult to determine their causes and potential mitigation strategies. Several studies have been conducted to identify the various types of development defects but with little information on the defects at the construction stage of real estate building. This paper examines the categories of defects that occur mostly at the construction stage of real estate projects with a view to improving the accuracy of detecting their causes and ensuring effective mitigating techniques against them. Based on the examination and descriptive analysis of previous studies, this study classified defects based on nature, occurrence time, functionality, based on the building process. The [redacted] study recommends that stake holders be given more awareness on the classification of development defects so as to help the identify potential causes of the defects at the construction stage and offer preventive strategies during the design stages, which may eventually sustainability in the occupancy stage.

Keywords: Development Defects, Real Estate Projects, Construction Stage, Classification, Mitigation Strategies.

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Introduction

Real estate projects are fundamental to human existence as they furnish individuals with shelter and facilitate a variety of social, economic, religious, and recreational pursuits. Life without real estate is unthinkable in the contemporary age. Furthermore, to meet diverse intended needs and safeguard users, different countries have different real estate project/building construction policies and procedures (Imafidon & Ogbu, 2020). Real estate development entails several procedures to achieve the aforementioned goals; the construction process includes the following phases: preliminary preparation and brief concept design, design development, technical design, on-site construction, handover, and utilization (RIBA Plan of Work, 2020). Every aspect of building planning and processes, from architectural designs to construction and maintenance, necessitates proper and adequate supervision and quality input from real estate professionals and stakeholders (Getu *et al*., 2021).

Construction defects frequently occur during ongoing construction activities and can be related to various construction difficulties (Ahmed & Stephenson, 1997). It is estimated that such issues account for 95% of all defect items, emphasizing the need to prevent or eliminate them to improve the overall construction process and obtain better financial outcomes (Craig, 2006). Hence, the most common error in construction is improper installation, which accounts for 24.29% of all defects (Forcada *et al*., 2014). This is consistent with the definition of construction defects as flaws in a project's construction, materials, or systems that are not easily visible and result in a building, structure, or components that are unfit for the intended use (Gatlin, 2013). Moreover, inappropriate installation is defined as an installation that is inadequate for the intended functions; as a result, defects are developed during the building construction process. Furthermore, inappropriate installation refers to the improper placement of materials, elements, or items that fail to meet project specifications or lack the necessary characteristics. (Forcada et al., 2014; Ahzahar, 2011).

Literature Review

Overview of Development Defects

A development defect is a prevalent issue within the construction industry that can potentially diminish a structure's value. The timely prevention of a

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construction defect facilitates the project's timely completion in accordance with the designated schedule (Bagdiya & Wadalkar, 2015). Hence, classifying construction defects for proper identification will enable defects to be prevented in residential buildings. Therefore, by classifying construction defects for accurate identification, it will be possible to prevent the occurrence of defects in residential buildings. Determining the source and categorizing construction defects accurately constitutes the initial measure toward their prevention (Wahab & Hamid, 2011). Consequently, it is imperative to ascertain the classification that will provide an understanding of the origins of the construction defects to devise mitigating strategies for it (Ali A. S & K. H, 2011). It is essential to categorize construction defects in order to gain a better understanding of how to prevent them. Therefore, the categorization of construction defects is important not only by type (Alomari, 2022), but also by performance indicators (Assaf et al., 1995).

Consequently, the findings of earlier research on defects make it clear that most defects during the construction phase are unquestionably technical. Likewise, a number of researchers discovered that various construction defects could be classified according to their source or impact (Alomari, 2022). However, Lee *et al.* (2018) classified defects into eight categories based on their causes, which are as follows: water difficulties, surface appearance, fractured objects, abrasion, separation, inappropriate fitment, missing missions, and surface cracking. Additional research identified the following types of construction defects: material, design, and geotechnical concerns. Furthermore, Ali and Wali (2019) classified defects in technological implementation, building structural components, and technology utilization, among others, into seven distinct categories. The classification of defects into distinct phases of construction is a straightforward process, as supported by previous investigations conducted by Forcada et al. (2014), Lee *et al*.(2018), Ali &Wali (2019), and Alomari (2022).

According to the Building ACT 2006, defects are characterized by a danger of harm, including death or the possibility of significant financial loss. According to the visibility, there are apparent defects and hidden defects. Apparent defects can be detected during routine maintenance or visual inspection. Hidden defects are not detectable by routine inspection or by maintenance.

The building processembedded three important factors they are design, materials and construction. Defects can easily be generated as a result of these three factors. Hence, researchers classified the occurrence of defects in the building

process into four categories, namely: design flaws, material flaws, construction flaws, and subsurface problems (Marianne,2005; FindLaw,2012; Alomari, 2014; Georgiou, 2010; Macarulla et al., 2013). Therefore, this classification of construction defects aligns with the research's adopted definition of construction defects, which characterizes such defects as deficiencies in the design, construction, or utilization of materials that render a structure, building, or component unsuitable for its intended purpose (Gatlin, 2013).

Fuadie, *et.al.,* (2017) study revealed that design faults constitute a key sort of construction defect during the construction stage of the building process. As a result, the project development and construction stages will fail. Also, design defects are deviations from the plans and standards (Ali Haghani, 2015). Similarly, design defects are avoidable deviations from established standards of practice throughout the design of construction projects (Dosumu et al., 2017). When parties' conceptions of a design are misunderstood, it will result in design flaws, which can lower the calibre of building work. Moreover, structural failures are sometimes caused by design defects. Architects and engineers are professionals in design; they create structures and systems. Even experts do not always complete tasks exactly as instructed, frequently resulting in defects. Commonly, architectural deficiency pertains to structures that are not part of the designated building. codes. Improperly designed roofs are an example of a design defect that can result in water penetration, intrusion, poor drainage, or inadequate structural support.

Ayodele (2017) also agreed with the report that 56% of all contract modifications are made to design deficiencies. These will result in defects in the construction site, which are considered the most severe because they stem from the designer's blatant errors due to lack of training, expertise, or experience. Similarly, deficiencies in architects' designs amount to 60% of defects in construction projects based on a survey of 250 building projects (Vachara, 2015).

Proper design during the design stage is crucial in the building construction process. Proper planning during this stage will minimize the occurrences of construction defects. Consequently, a number of studies identified design defects as one of the primary causes of construction issues. Similarly, almost 55% of building defects are related to design errors, which could have been avoided with better design (Alomari, 2022). Similarly, studies have indicated that the design of a building influences building defects, building maintenance, and building project

performance (Hauashdh et al., 2020). Defects in the design stage were influenced by a lack of awareness, incomplete knowledge, wrong expectations, and ignorance (Khalid, 2019; Wali & Ali, 2019; Ali Haghani, 2015; Vashishtha *et al*., 2020). Yoon. Son & Kim (2021) revealed that the type of building defect that frequently arises during construction is a material deficit. The materials or components (both natural and man-made) utilized to create buildings in a selected location are referred to as building materials (Bamigboye et al., 2019). According to Elkhalifa & Shaddad, construction materials comprise the largest percentage of input in the building components (2018). Various materials are utilized in the building, and all users are responsible for guaranteeing their appropriate usage. This is to prevent specific types of defects from happening on the building site. To do this, it is necessary to have solid information and understanding of building materials (Ahzahar et al., 2011).

Similarly, the majority of buildings are constructed with readily available local resources. Such building materials include timber, stone, brick and plaster. Moreover, to prevent defective materials and reduce future maintenance waste by using these local materials, it is essential to check the materials' sustainability and quality during the building construction process (Coelho &. De Brito, 2012; Kanniyapan, 2019). Furtherance to monitoring the sustainability and quality of the materials is possible by providing enough monitoring to ensure the selected materials are of satisfactory quality. Hence, to ensure that, after the building's construction is complete, their fixtures will be safe to use and fit for use in various circumstances. (Asmone *et al*., 2019). Understanding the composition of building materials, together with proper defect identification, is crucial for the materials management of buildings. Moreover, as older people are vulnerable to certain illnesses, the same applies to buildings concerning defects. To address construction defects, architects, contractors, engineers, and those involved in building management should be familiar with common building materials and have a deeper understanding of proper materials and building preservation techniques (Ahzahar et al., 2011).

According to Ali & Wen (2011), Construction projects with poor quality of work are a worldwide phenomenon. Numerous disagreements over cases of construction defects occurred between clients, homeowners, and parties involved in the construction process (particularly contractors). Various types of construction defects are constantly a matter of concern in the construction industry.

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Furthermore, construction is a complicated stage of a building's life cycle, as Alomari (2022) established, because it involves a lot of interconnected tasks that require efficient operation to manage within the necessary parameters without compromising the quality of the structure and its components. Consequently, when different covering to some sections of work is carried out incorrectly, the structure is exposed to several defects that inadvertently affect other tasks like painting and plastering. In addition, construction defects usually result from incorrect assessment of designs and standards. Construction defects become prominent at the construction stage once there is non-performance of this construction indicator: damaged formwork, excavation tools close to the building, painting in an unsuitable condition or on unsuitable surface, inadequate waterproofing and drainage, insufficient reinforcement concrete cover, cold joints loss in adhesion between materials, early formwork removal, Poor soil compaction, inadequate curing, lack of communication.

Methodology

This study cross examined several previous studies pertaining to the classification of construction defects. The classifications from the review literature were extracted and were used to draw up the findings and conclusion.

Findings and Discussion

The study review identified the various classifications of development defect occurrence in a real estate structure. The review shows that rel estate project defects can be divided into four categories. This supported the findings of Georgiou (2010) and Macarulla et al. (2013), who proposed that construction defects in the building industry can be classified based on factors such as severity, construction stage, types, cause, and more. The review also shows the stage at which construction defects appear in the building. This should shed some light on the underlying cause of the building's construction defects. Finding the precise moment when a defect occurs and manifests itself increases the likelihood that its causes will be known, and if that cause is identified, mitigating the problem will be a simple effort. This matched the findings of Nabihah et al. (2016) and Tayeh et al (2021).

Additionally, the review shows that the majority of problems occur more frequently during the real estate project process' construction stage than during

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the occupancy stage, suggesting that further research is needed to determine methods to prevent construction defects during this period. By doing this, the consequences of issues arising when the building is occupied will be significantly decreased. This is consistent with the findings of Chong & Low (2006).

The prevalence of defects during the occupancy phase as revealed in the review, on the other hand, emphasizes the importance of defect classification based on the building process. Throughout the building process, special attention must be paid to the materials, design, and construction used (FindLaw, 2012). Construction materials must meet the required standards. This increases their durability within the building structure and protects against premature defects caused by external factors (Chong & Low, 2006).

Conclusion

From the findings of this study, real estate development project defects are classified into four major categories. The results showed that there are four major categories of defects: those based on defect nature, those based on defect occurrence time, those based on defect functionality, and those based on building process. These results may be used for the following purposes: Finding the specific flaws shared by different defect classification categories will help determine the root causes of construction defects and the most effective ways to mitigate them. It will also provide better information about when specific building defects occur during construction or the occupancy stage.

Recommendations

It is imperative for professionals to exercise diligent oversight during the design and construction phases to avert incurring additional costs and time required to rectify defects during the occupancy phase.

The building owner is responsible for ensuring that standard and appropriate materials for the building's construction are procured through a representative present on the construction site. In the long run, the owner bears the financial and temporal or permanent consequences.

Real estate development professionals should ensure to take cognizance of the various classes of defects in order to overcome the incessant problem of development defects for sustainability in real estate project development.

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