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Assessing the Causes of Defects in Heritage Building towards Safeguarding Cultural Heritage in Hausaland Milieu: A Case Study of Nasarawa Palace, Kano

Bashir Umar Salim* and Uzairu Suleiman

Department of Architecture, Faculty of Earth and Environmrntal Sciences, Bayero University Kano. Nigeria

Corresponding Author: sbumar.arc@buk.edu.ng,

ABSTRACT

Nasarawa Palace is a heritage building of mud architecture, embodying intricate artistic expression, craftsmanship reflecting the rich cultural heritage of Kano people. Currently, the palace is undergoing deterioration and transformation. Hence, this study aimed at examining the causes of defect influencing the Nasarawa Palace. Case study design approach was involved as a strategy in achieving the research aim, whereby purposive sampling technique was engaged in eliciting data from the palace stakeholders through semi-structured interviews. Photos, voice record and observation were also conducted during the fieldwork. It was found that, the frontline causes of building defects in the Nasarawa Palace are related to heavy rainfall which causes waterlog, deterioration and minor flooding. Secondly, the findings revealed that, Nasarawa Palace had undergone significant changes from its initial traditional construction to the shift towards the use of modern materials. In conclusion, the transformation of the Nasarawa Palace is shaped by a combination of cultural, economic, governmental, community-driven factors. The study recommends professionals in the building industry including architects and engineers to take cognisance of preserving and reviving cultural identity when embarking on heritage buildings of traditional architecture. Hence, this paper recommends for further research to ascertain the level of awareness of cultural significances to professionals in royal palaces of Northern Nigeria.

Keywords: Heritage Building, Safeguarding Cultural Heritage, Hausaland Milieu, Nasarawa Place.

INTRODUCTION

Heritage buildings worldwide hold immense historical, cultural, and architectural value, symbolizing the legacy and identity of various societies. UNESCO World Heritage Centre (2023) report indicated that, these buildings are not only a symbol of the history and culture of a place, but also reflect the architectural achievements of a particular era. These structures often face numerous challenges, including environmental degradation, urbanization, and inadequate maintenance. The deterioration of heritage buildings is a global concern as it leads to the loss of cultural heritage and historical knowledge. Factors contributing to the defects in heritage buildings include climate change, pollution, natural disasters, and neglect. The UNESCO World Heritage Centre emphasizes the importance of safeguarding cultural heritage, promoting initiatives to preserve and restore these structures through international cooperation and policy frameworks.

In Africa, according to African World Heritage Fund (2022), heritage buildings reflect the continent's rich and diverse history, encompassing ancient civilizations, colonial influences, and post-independence developments. The African Union and various regional organizations have recognized the need to protect and conserve heritage buildings to preserve cultural identity and promote tourism. In many African countries, including Nigeria, heritage conservation efforts are often hampered by limited funding, lack of expertise, and insufficient legislative support.

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Initiatives such as the African World Heritage Fund aim to address these challenges by providing financial and technical assistance for heritage conservation projects across the continent.

In Nigeria, according to Adamu (2020), heritage buildings in the Hausaland are significant representations of the Hausa culture and history. These structures, often constructed using traditional materials and techniques, are vulnerable to defects due to several factors. Environmental conditions such as extreme weather, erosion, and termites pose significant threats to the structural integrity of these buildings. Additionally, socio-economic challenges, including poverty and lack of awareness about the importance of heritage conservation, contribute to the deterioration of heritage buildings in Nigeria. Similarly, this study will examine how environmental factors and socio-economic challenges influences the Nasarawa Palace.

LITERATURE REVIEW

Every building has a life cycle from conception to decommissioning; every heritage building begins like every other building. It is often after the passage of time and significant events that heritage attachments are then placed on certain buildings. Osasona (2017) asserts that heritage buildings are historical buildings with cultural significance to a people, place, or period. A building achieves heritage status when it becomes widely accepted by members of a particular community (large or small, local or international) begin to accord historical, cultural, religious, economic, scientific, and other significant values to it.

Factors Causing Defect to the Physical and Functional States of Heritage Buildings

Heritage buildings are historical buildings, and historic buildings tend to be neglected over time and become dilapidated, which in turn affects the functional performance and condition of the buildings (Aksah *et al.,* 2016). This view was supported by Vicente *et al.* (2018), whose research efforts focused on the conservation and structural retrofitting of historical buildings. The research paper identified three main factors contributing to deteriorating conditions of heritage buildings; "material deterioration", "urbanization is driven by people", and "environmental and climatic changes".

Preservation and conservation in an optimal working state remain the goal of Maintenance Management in Heritage buildings (Idrus et al., 2013). Akinbamijo and Alakinde (2013), in a study on conservation challenges and prospects of 18th Century Buildings in Calabar, Nigeria, found the following among the factors affecting the preservation of heritage buildings: "lack of adequate maintenance" and "inadequate government funding of agencies tasked with preserving heritage buildings". Other factors and challenges affecting the physical and functional states of Heritage buildings include "Inadequate and unenforced Laws", "Neglect and Lack of Maintenance", and "Outright Demolition" (Folasiji, 2022).

Table 1: Factors affecting the physical and functional states of heritage buildings

S/N	Factor affecting preservation of heritage buildings	Authors
1	Inadequate Maintenance	Akinbamijo and Alakinde (2013), Illiyasu (2014)
2	Inadequate funding	Akinbamijo and Alakinde (2013), Illiyasu (2014), Onyima (2016)
3	Inadequate legislation	Illiyasu (2015), Onyima (2016)
4	Inadequate enforcement	Akinbamijo and Alakinde (2013), Illiyasu (2014), Onyima (2016)
5	Poor physical planning mechanism	Illiyasu (2014)
6	Poor Community Participation	Illiyasu (2014)

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7	Commerce	Illiyasu (2014), Onyima (2016)
8	Urbanization trend	Illiyasu (2014), Onyima (2016)
9	Vandalism	Onyima (2016), CNN (2017)
10	Christianity and Iconoclasm	Onyima (2016)

Source: Folasiji (2022)

Environmental Factors Affecting Heritage Buildings

Environmental factors, including climate change, extreme weather conditions, and pollution, significantly impact heritage buildings worldwide. UNESCO reports that climate change poses a substantial threat to World Heritage sites, with increasing temperatures, rising sea levels, and more frequent extreme weather events accelerating the deterioration of these structures. The adverse effects of pollution, particularly air pollution, have also been well-documented, as pollutants cause chemical reactions that degrade building materials (UNESCO World Heritage Centre, 2023). Brimblecombe & Grossi (2010) demonstrated that increased levels of sulfur dioxide and nitrogen oxides contribute to the corrosion of stone and metal in historical structures, leading to significant damage over time. Similarly, Cassar (2005) found that temperature fluctuations and humidity variations cause expansion and contraction of building materials, resulting in cracks and structural weakening.

In Africa, heritage buildings are particularly susceptible to environmental challenges due to the continent's diverse and often harsh climatic conditions. Ndoro & Wijesuriya (2015) emphasized that extreme weather events, such as heavy rainfall and droughts, are common in many African regions, intensifying the deterioration of heritage structures. Additionally, termites and other pests pose a significant threat to buildings constructed using traditional materials like wood and thatch. Garba (2016) found that termite damage was a primary cause of structural defects in traditional Hausa buildings in Kano State. Additionally, heavy rains and poor drainage systems were identified as significant factors leading to the erosion and collapse of mud walls in these structures.

Heritage Building in Hausaland

The history of Hausa traditional architecture in Northern Nigeria is rich and deeply intertwined with cultural, climatic, and religious factors. Over the centuries, Hausa traditional architecture has evolved to embody a unique blend of artistry, functionality, and cultural symbolism that continues to shape the architectural landscape of Northern Nigeria. Hausa traditional architecture in northern Nigeria is known for its use of locally acquired building materials such as earth and clay. The walls of the buildings are made thicker to meet structural requirements and to ensure safety. The traditional architecture features lofty reinforced-mud domes built with the assistance of indigenous structural and constructional techniques. The architecture has undergone transformation due to the introduction of contemporary designs and construction techniques that use imported foreign materials. The building types of Hausa traditional people include mosques, city walls, houses, public buildings, and gates. Hausa architectural forms are characterized by vaults, piers, beautifully decorated walls, archways, and motifs in various proportions. Hausa builders have considered the roof as the most challenging part of the construction, both (Popoola, 1984).

Traditional Architecture of Kano City

Kano heritage buildings are also characterized by vaults and piers, beautifully decorated walls, archways, and motifs in various proportions. The main materials used in construction are earth, stone, and straw,

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skilfully utilized in combination. The architecture is influenced by Islam, resulting in a highly organized spatial structure. The roof is considered the most challenging part of the construction, both technically and decoratively. The traditional architectural decoration is carried out by skilled builders, and the technology and skills needed to build them are transferrable to the next generation. Hausa architecture is an enduring cultural practice among rural communities, with buildings serving as a mechanism and symbol for communicating concepts of power, religion, and visual arts (Abubakar, 2019). In city planning, Kano is renowned for its impressive historical structures, including the ancient city walls that once served as formidable fortifications. These walls, constructed from laterite, feature architecture influenced by North African styles and are regarded as some of the most notable monuments in West Africa. Inside the Nasarawa Palace, you can find a range of traditional and historic features. The palace's interior includes richly decorated gates and courtyards, decorated with colourful designs and traditional art .The palace's exterior showcases traditional Hausa architecture, with large gates and walls that reflect the region's rich history. The palace is adorned with wall paintings and intricate wooden carvings. These features not only highlight the artistic heritage of the area but also serve as a testament to the cultural and political significance of the emirate system in northern Nigeria.

MATERIALS AND METHODS

For this study, qualitative approach was engaged in collecting data. Then case study approach was engaged as a strategy to achieve its aim. The data collection procedure for this study engaged purposive sampling technique in choosing its respondents, semi-structured interview, photography and videography through observation. In essential, the purposive sampling technique was adopted for this paper towards identifying traditional builders who possess knowledge and safeguarding the palace through construction, maintenance and restoration. Thus, the main respondents of this study are the palace traditional builders and historians. Information including influential factors that causes the transformation and causes of building defects on the Palace were elicited from the traditional builders during interview.

RESULTS AND DISCUSSION

Findings and Discussions

The conversations of the semi-structured interviews were recorded, transcribed and analysed using thematic analysis. Moreover, content analysis was conducted in analysing pictures taken during observations in the fieldwork. It was found that The Nasarawa Palace is not only merely a physical structure but a repository of cultural heritage and historical significance. It embodies the artistic expression and intricate craftsmanship reflecting the Hausa cultural elements and identity, all originally constructed in mud architecture, built with locally source building material. An interview was conducted with Abdulkadir Muhammad, Chief Builder's in Kano Emirate, born in 1940 who has been working in the palace since 2014 to date. The report of the interview section asked by the researcher on the material used in the initial building of Nasarawa Palace revealed the following responses:

The initial construction of the Nasarawa Palace utilized traditional materials characteristic of Hausa architecture. These materials included: Mud bricks, locally known as *tubali*, were a primary building material in walling construction. These bricks were made from a mixture of mud and water, sometimes reinforced with straw to increase durability. The roof was made of Thatch and Wood. In some cases, stone were also as a building material in foundation construction.

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Conservation process takes place in terms of maintenance

The conservation of the Nasarawa Palace involves a meticulous and continuous process of maintenance that balances traditional methods with modern preservation techniques. Regular inspections are a cornerstone of this effort. Skilled artisans routinely examine the palace to detect signs of wear and tear, such as cracks in the mud walls or damage to the thatch roofs. When issues are identified, prompt repairs are carried out using traditional materials like mud bricks and thatch, ensuring the repairs are in keeping with the original construction.

The findings point out that palace had been undergoing restoration for a long period of time using the traditional building materials while maintaining and preserving the cultural identity. Nevertheless, heavy rainfall as a climatic factor poses danger and threat to the conservation-preservation of the Nasarawa palace due to the composition of the fragile material:

Rain penetrates the monuments from the roof top once there is a minute tolerance within the yabe and dabe. Subconsciously, this is where we experience a collapse in the palace due to overtime deterioration.

Figure 1: Collapsed roof of an earthen monument in the Nasarawa Palace

The rainfall curse influences the building not at once but overtime. The roof structure is the most structural component that is vulnerable to the rainfall curse as it is the most receiving point of collecting water throughout the rainy season. Despite traditional method of waterproofing is provided for protection against the rainfall, however, the excessive rainfall curse overtime penetrates the building. Once penetrated, it will gradually contact the wooden members, azara, and begins to deteriorate and twist and loses dimension, causing structural failure in nearby future. At the same time, over the span of years, the compacted building soil also dries up and loses its plasticity. At the same time, the straw being the reinforcing material fades overtime as it decomposes by the soil reaction. These occurrences prompt the

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building to lose its structural stability leading to collapse as the glutinous property of the soil has vanished, the straw has faded and the structural wood has loses its dimension (see Figure 1). Hence, excessive restoration leads to reconstruction of part thereof of the palace to avoid injuries or loss of lives. In the meantime, during the colony period around 1930s, the advent of technology and importation of modern building materials became available in Nigeria, including the Northern Nigerian cities, such as cement, zinc roofing, glass and steel doors and so on. However, the palace authorities remain sceptic in accepting and incorporating the modern building materials at first. Due to the rigor process of conservation challenges, the traditional builders began making trial and error towards incorporating the modern building materials in the Palace conservation. The following were responses of the traditional builders on the issue modernisation of the conservation processes:

Despite there was availability of modern building materials such as cement and roofing sheet, the palace stakeholders did not allow any imported material to be incorporated in the preservation intervention of the palace earthen monuments. It was later it was finally agreed in the 1980s that such material can be integrated on the earthen monuments. The cement paste was used in form of sacrificial layer by plastering the earthen surface. However, overtime, the cement plaster layers peels-off.

The cement paste was integrated as a sacrificial layer by plastering the earthen wall surfaces purposely to protect the building from rain influence. However, this trial failed as the cement plastering buckles and forms crack over time. This is because the surface properties of the cement and that of the earthen surface are incompatible with each other. Hence, overtime due to tear and wear, the cement and the earthen surface separate apart. As the cement become swollen, it cracks due to lack of expansion tolerance. Once it cracks, rain easily penetrates and harm the monument and the plaster cements continue to deteriorate and collapse off the monument and falls (see Figure 2).

Figure 2: Collapsed cement plaster layer on earthen surface

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Due to the failure of the cement paste, Sandcrete hollow block wall is built upon the external surface of the earthen monument. Despite the transformation of the Nasarawa Palace over time, the palace ensured reflecting the cultural identity of the traditional architecture by reviving the cultural elements, styles and symbols in the restoration despite using modern building materials (see Figure 3). This process balance between preserving and restoration in the conservation processes. The palace has managed to maintain its historical essence while incorporating the modern building materials Due to the causes of the deterioration that leads to collapse and tedious maintenance, the monuments are rebuilt using completely with modern building material but reviving the cultural elements (see Figures 4 & 5):

Yes, modern building materials are used in the conservation of the Nasarawa Palace because they provide essential benefits that traditional materials alone may not offer. One primary reason is structural reinforcement. Traditional materials like mud bricks and thatch, may not provide sufficient strength and durability to withstand modern environmental challenges. By incorporating modern materials such as cement, zinc/aluminium roofing sheet, cement plastering, introducing reinforced concrete columns in walls where necessary enhanced the structural integrity and sustainability of the palace, ensuring it remains stable and safe for future generations. These materials help prevent the collapse of walls and roofs, especially in areas prone to structural weaknesses, without compromising the palace's historical appearance.

Figure 3: Reviving of cultural elements and symbols on constructed wall on the earthen mud

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Figure 4: Reviving of cultural elements and symbols on constructed wall on the earthen mud

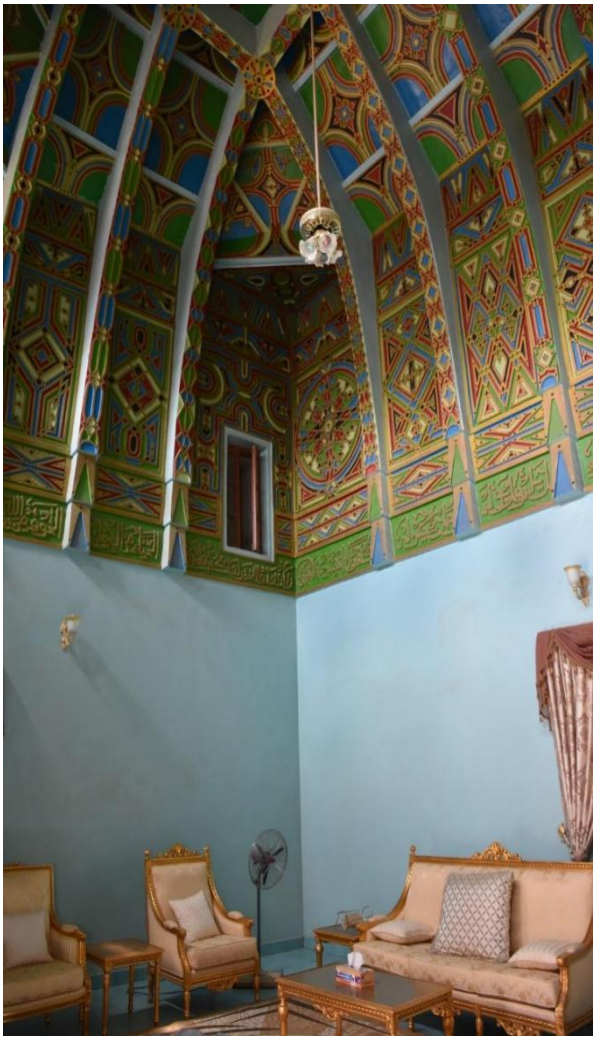

Figure 5: Reviving of cultural elements and symbols in interior of palace chambers.

In the few remaining earthen/clay monuments of the palace, modern building materials were used for its environmental protection. For example, modern waterproofing agents and pest control treatments play a crucial role in preserving the palace. These agents protect the mud bricks and wooden elements from water damage and insect infestation, which are common threats in the region's climate. Waterproofing agents, for instance, provide a sacrificial layer that shields the structure from rain and humidity while allowing moisture to escape, thus preventing deterioration. Pest control treatments safeguard the wooden components from termites and other insects, ensuring their longevity. These modern interventions help maintain the palace's structural and aesthetic integrity in the face of environmental challenges. The transformation of historical buildings, such as the Nasarawa Palace, can be significantly influenced by socio-political, economic, and environmental factors.

CONCLUSION

The Nasarawa Palace has undergone significant changes from its initial construction of being an earthen heritage to the present day embracing modern building materials. The study revealed that the root

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causes and frontline issue of building defects in the Nasarawa Palace are related to heavy rainfall which caused waterlog, decaying of building materials and weaken structural components, floods, maintenance practices, construction quality and restoration practices. Moreover, socio-economic changes, urbanization. These influential factors are inevitable to control due to natural phenomenon and modernisation. Over time, modern influences have introduced contemporary building materials like cement and concrete. These transformations reflect broader socio-economic and cultural shifts within the region. In recent times, there has been a shift towards the use of modern materials such as use concrete and steel rods offers greater durability and strength. The integration of modern materials and techniques has been driven by the necessity to prevent building collapse and extend the lifespan of the palace whilst restoring its cultural identity. Thus, monuments are dependent upon decision-making and agenda of the palace community at the expense of safeguarding its cultural heritage. This means that in living spaces, priority is given to upholding the cultural significances including spiritual, cultural and social values than the fabric material.

In conclusion, places that are of living heritage and undergo climatic adversity with fragile monuments undoubtedly had to undergo transformation and embrace of modern building material. The trajectory to the modernisation is to mitigate building collapse and loss of lives. Despite transformation, the cultural elements are reflected. Hence, professionals in the building industry including architects and engineers to take cognisance of preserving and reviving cultural identity when embarking on heritage buildings of traditional architecture. Hence, this paper recommends for further research to ascertain the level of awareness of cultural significances to professionals in royal palaces of Northern Nigeria.

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