Learning from Tradition for Future: Green Building in Kano State, Nigeria

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Abstract

Green building can be considered as a building design through a method that is environmentally friendly in both construction, usage and energy consumption. Culture is yet to be included into the sustainable development pillars making it the fourth pillar of sustainability after social, economic and environmental aspects. Traditional Architecture can be regarded as beliefs, customs, or ways of life (culture) in building construction that have existed for a long period and involve the art of designing, planning, and traditional building style. These traditional buildings were copied and used in contemporary buildings in Kano state, Nigeria. Therefore, most of the contemporary building design and structure has their roots in a traditional building. Nigeria's traditional buildings across the country were affected by climate and landform all over the geographical zones, which were recognised to demonstrate a detailed solution to the building's culture, socio-economic, local technology and climatic condition of the environment. This study compares the past and the current building style based on the façade or floor-plan pictures, and green or sustainable building using relevant kinds of literature of Hausa traditional building around Kano state. It is concluded that Hausa traditional architecture should not be forgotten, rather it should be encouraged and improved based on green sustainable features, traditions and enhance the durability of the building materials. It is recommended that culture should be include into the pillars of sustainability so as to make sustainability complete especially in the field of building construction. Lastly, further research is recommended in order to explore ways of improving the quality of the local building materials and the methods used during the construction process.

Keywords: Hausa traditional architecture; sustainability; green building; culture; traditional housing; vernacular; Kano state, Northern Nigeria.

Gelecek için Gelenekten Öğrenme: Nijerya, Kano'da Yeşil Bina

Özet

Yeşil bina, hem yapımında hem kullanımında hem de enerji tüketiminde çevreye duyarlı bir yöntemle yapılan bir bina tasarımı olarak değerlendirilebilir. Kültür, sosyal, ekonomik ve çevresel yönlerden sonra onu sürdürülebilirliğin dördüncü ayağı haline getiren sürdürülebilir kalkınma sütunlarına henüz dahil edilmemiştir. Geleneksel mimari, uzun süredir var olan ve tasarım, planlama ve geleneksel yapı tarzı sanatını içeren yapı inşasında inançlar, gelenekler veya yaşam biçimleri (kültür) olarak kabul edilebilir. Bu geleneksel binalar kopyalandı ve Nijerya'nın Kano eyaletindeki çağdaş binalarda kullanıldı. Bu nedenle, çağdaş bina tasarımı ve yapısının çoğunun kökleri geleneksel bir binadadır. Nijerya'nın ülke genelindeki geleneksel binaları, binanın kültürü, sosyo-ekonomik, yerel teknolojisi ve çevrenin iklim durumuna ayrıntılı bir çözüm gösterdiği kabul edilen tüm coğrafi bölgelerdeki iklim ve yer şekillerinden etkilenmiştir. Bu çalışma, Kano eyaleti çevresindeki Hausa geleneksel binasının ilgili literatür türlerini kullanarak, cephe veya kat planı resimlerine dayalı olarak geçmiş ve mevcut bina stilini ve yeşil veya sürdürülebilir binayı karşılaştırmaktadır. Hausa geleneksel mimarisinin unutulmaması, bunun yerine yeşil sürdürülebilir özelliklere, geleneklere dayalı olarak teşvik edilmesi ve geliştirilmesi ve yapı malzemelerinin dayanıklılığını artırması gerektiği sonucuna varılmıştır. Özellikle bina inşaatı alanında sürdürülebilirliğin tam olabilmesi için kültürün sürdürülebilirlik sütunları arasına alınması önerilmektedir. Son olarak, yerel inşaat malzemelerinin kalitesini iyileştirmenin yollarını ve inşaat sürecinde kullanılan yöntemleri araştırmak için daha fazla araştırma yapılması önerilir.

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Anahtar Kelimeler: Hausa geleneksel mimarisi; sürdürülebilirlik; yeşil bina; kültür; geleneksel konut; yerel; Kano, Kuzey Nijerya

1. INTRODUCTION

Green building can be considered as a building design through a method that is environmentally friendly through resource-efficient construction process and less consumption of public resources and waste generation in the entire life-cycle of the building. Green building might begin from site analysis to architectural design, construction processes, to operating or maintaining the house, and renovating and demolishing of the building (Li et al., 2015). An Italian-American architect called Paolo Soleri created the concept of "arcology" around 1960s, he combines "architecture" with "ecology" which he express it as "green building" (Zhang, 2011). Over the past decade, researchers discusses on green building to expresses their interest in resolving economic, social and environmental challenges. It was found that societal behaviours and opinions regarding green building can affect its demand and usability in the community, though research on consumers' cognition were hardly conducted. The social and cultural issues are connected to green building through public attitudes, social and basic shelter needs, consumers' basic comprehension, purchase intention, acceptance and behaviours; which all of them might be affected by the landform and climate condition of an area (Zhao, He, Johnson, & Mou, 2015). This show clear relationship linking green building and traditional building.

The Hausa Kingdoms was said to have existed long before the 7th to around 11th century (Encyclopedia-Britannica, 2021). Hausa as a tribe and a language was the biggest African ethnic group having about 78,000,000 persons. African Facts Zone reported that Hausa language was the 2nd greatest indigenous spoken language having 120,000,000 speakers (Tunde Ososanya, 2020). Kano is one of the Hausa speaking states in Nigeria, in which the Hausa language is spoken in Northern Nigeria and even outside the country; this is referred to as the Hausaland, for example Nigeria, Chad, Cameroon, Benin Republic, Central African Republic, Togo, Equatorial Guinea, The Gambia, Eritrea, Senegal, Gabon, Sudan, Ghana and Niger republic, etc. were among the countries have has Hausa speaking regions; while Nigerian northern states that speaks the language include states like Kano, Katsina, Sokoto Kebbi, Zamfara, Kaduna, Jigawa, Bauchi, Yobe, Niger states etc. All these northern Nigerian states shares similar cultures and similar building style. This captures the interest of the researcher to explore more on the ancient traditional building in comparison with the contemporary building style.

Nigeria's traditional buildings across the country were affected by climate and landform all over the geographical zones, which were recognised to demonstrate a detailed solution to the building's culture, socio-economic, local technology and climatic condition in the environment which they exists upon. The different traditional building body origin is associated with the availability of natural materials and its accessibility by the local builders to utilize it in addition to cultural and taboos, along with religious beliefs. The beginning of Nigerian colonialism (which lasted from 1900 to 1960) has transformed the traditional and cultural lifestyle of Nigerians which brings about the existence of contemporary architecture in the country. Majority of the contemporary designs of buildings across Hausa lands along with their construction techniques nowadays were constructed with imported foreign materials (like bricks, glass fittings, furniture, machineries etc.) and contemporary construction process in the country. The traditional architecture should not be forgotten and abandoned, rather; experts' attention should be drawn towards the comprehension

of its purpose and origin (Paul & Zango, 2014). Though, the traditional building materials and methods are very weak, leading to poor quality of the ancient traditional buildings, and therefore the traditional buildings are easily destroyed by natural forces such as rainwater washout, wind and sun heat.

Hausa culture at initial stage rejects the contemporary conventional buildings, but because of so many advanced reasons, western knowledge and awareness the contemporary building were accepted gradually. The elements found in the Hausa cultural building were usually Zaure (first entrance room, usually for receiving male guests), tsakar gida (courtyard), ciki da falo (bedroom and sitting room) while toilet and kitchen were called bandaki da dakin girki respectively, which were built closer to each other. The house usually has room for boys which has an access door at either at the Zaure or even at the outside façade of the house along with their toilet. These traditional houses were usually attached to the neighbouring houses with one wall separating them. The contemporary buildings nowadays does not have most of these parts of the traditional building, example of these missing parts might include zaure, soro (2nd entrance room, just like Zaure), tsakar gida and many other parts of traditional building. This might lead to loss of privacy, religious beliefs among many other religious, culture and traditions activies and life style. Courtyard is traditionally a prominent portion of a residential houses in Nigeria and reflects a cultural lifestyle (Adegun, Adedeji, & Adedeji, 2019). It serves a series of purposes starting from the sociocultural to climatic functions. Currently, newly constructed residential buildings were built without courtyard; also houses with availability of courtyards were transformed from traditional form to conventional structures.

The aim of this research is to compare between green traditional and contemporary conventional building architecture based on sustainability, culture and social interactions in Kano State, Nigeria. Kano was chosen because of its historical nature, strict cultural and religious practices. It is also considered as the commercial centre in Northern part of Nigeria because of its gigantic commercial activities and mega-markets in Nigeria. Kano also accommodates ancient houses, relic, strict culture and religion since the past 7 centuries. However, the ancient city-wall of Kano state that protects the city round from neighbouring horse-riding armies in the history. The city-wall was built around 14th century to provide security to the city against attacks, this beautiful architecture provides significance archaeology and attract tourism market (OKPECHI, 2018). Therefore Kano were well known in traditional building construction. However, the population of Kano makes it unique being it the Nigerian states with the highest population (10,401,288 people in Census, 2006) in Nigeria followed by Lagos state (7,113,605 people in Census, 2006).

2. LITERATURE REVIEW

Traditional Architecture can be regarded as beliefs, customs, or way of life (culture) which have existed for a long period and may not change in the art of designing, planning, and buildings construction. The notion "cultural or social architecture" is not a simplemindedly linked to contemporary architecture (Eneh & Friday, 2010). Though, culture might slightly change and adopt other neighbouring cultures, but in most cases those adopted cultures will be regarded as borrowed traditions of a specific group of people, which might later become part of a culture after being practiced for very long period of time. Porphyrios, (2006) stated that 'ideas and technologies' is related to the certain cultural construction process of housing guided by the scarcity conditions of materials and effective construction methods: an Adhoc approach to

Architecture. Cultural architecture is usually developing as well as adopting novel methods and materials used in construction (Fatty, 2006). The use of novel techniques and materials in safeguarding the traditional construction of a cultural building should not be regarded as a taboo, if it displays a regular reasoning, comfort, durability, efficiency and approach to the society. The contemporary vernacular architecture of an area may be affected by the climatic conditions, cognitive cultural thinking and beliefs, uncountable experiences, accidents and experiments. This is frequently taking perseverance and efforts of the current generation engineers, constructors and contractors who utilizes anything that is good for their piece of career, whereas disposing what fails them. While in the tropical scientific assessment of innovation alone can recover traditional architecture (Fatty, 2006). All the styles and methods to re-establish traditional architecture must be investigated and use concepts which may increase meaning and significance to a sustainable environment (Eneh & Friday, 2010). These styles and methods may include vault, dome and round arch. Round Arch creates a tunnel form that is called a "barrel vault". While a Vault is regarded as a roof-structure or curved-ceiling, made with stone blocks, or bricks, a roof in the shape of an arch or multiple arches, common example are mosques, churches, bigger governmental buildings etc. Dome is a structure of a building making a rounded arch vault of the roof, normally the base is circular in shape and the vertical axis makes 180o (Don P. & Gabriel Connor Salter, 2010).

When culture is incorporated into sustainable development (SD) has remained a continuous research focus, nonetheless it were yet to be of the green building community's concern. Current programs of green building, including auditing, standards and certification schemes, emphasises on technical assessment. Building is assumed to be a cultural entity, it represents the past, the current and directs the future of a given society, cultural sustainability were added to green buildings by identifying the 3 roles of cultural sustainable development proposing COST Action (Cooperation in Science and Technology; funding society in Europe) Cultural Sustainability involves:

Culture in sustainable development – a four-dimension to be protected, these 4 dimensions are cultural, social, economic and environmental;

Culture for sustainable development – dimensions to a balancing and mediating elements; and

Culture as sustainable development – an important background to attain sustainable development (Wu, Fan, & Chen, 2015).

Indicators and criteria of cultural sustainability were suggested as an adopted structure approved by green building communities with the use of an in-depth review by the various ecosystem services, indicator systems, existing green building programs, sustainable urban, and regional planning bodies.

2.1 Concept of Cultural Sustainability and Overview of Relevant Indicators Instead

The concept of territory, place, and region were entirely terminologies that underpin critical concepts in the procedures of cultural development. These concepts had been engaged on precise consequences concerning varied general, scientific and disciplinary models that have prospered each other over the sequence of period (Dessein, Battaglini, & Horlings, 2016). The multifaceted uses of related words inside diverse languages and cultures, having strongly or slightly dissimilar meanings, shows the problems that were faced in trying to discuss cultural development.

The appeal for culture has become stronger aim towards the attainment of sustainability together with the growing social, ecological, and economic problems. The United Nation's Sustainable Development Goals (SDG), that substituted the Millennium Development Goals (MDG) around 2015, culture were included in four out of the seventeen goals in the zero draft of this approach (UN, 2014). Soini et al., (2015), in his summary on sustainability and culture, he explained 7 dissimilar theory based on cultural sustainability. These theories differs from conservative opinions concentrating on preservation of cultural heritage towards further progress, deep-seated visualisations towards eco-cultural cultural evolution and resilience (Dessein et al., 2016). In an effort to define cultural sustainability, Dessein et al., (2016) divide culture along with its link to sustainable development (SD) into 3 thematic clusters. Culture needs to;

Involve a self-promoting and supportive part (i.e. culture in SD), which increases conventional sustainable development treatise by including culture the 4th pillar of SD. In this case culture is seen more closer to the natural wealth which must be distributed and preserved equally intra/inter-generationally (Throsby, 2003). Considering culture as the 4th element of SD leads to taking culture as a functional and concrete orientation of sustainability (Baumgartner, 2009). At this stage of observable cultural level– conveyed by technology, language, products, and architecture, fashion, design and emotional display.

Contextualize, mediate, balance, and frame the 3 pillars further (that is 'culture for SD'), this suggests culture as an enhanced significant force which may operate above itself. The comprehending is to view culture among its invisible and visible levels – the standards at practical level that assist in interpreting the artefact levels (Baumgartner, 2009). Culture is a mediator connecting the numerous sustainability dimensions (Dessein et al., 2016).

Coordinate, guide and integrate entire features of sustainable actions (that is 'culture as SD), considers culture as the vital grassroot and element for achieving the SD goals. This resembles to initial thinking of scholars, that views culture as a pre-condition for sustainable development (Hardoy, Mitlin, & Satterwaite, 1995). Culture in this context denotes to its less visible, deeper level that is the basic levels of assumptions, those taken-for-granted, unconscious beliefs.

It has been stated by Soini et al., in 2015 that all the three grassroots of sustainable models – economic, environmental and social directions of Sustainable Development (SD) – is essentially defective if culture is missing and not considered. Perhaps, the 4 important factors of Gross National Happiness GNP were 'promotion and conservation of an original culture in a society'. Certainly, culture is experiencing gradual changes and assimilation of western cultures, which has remained an unambiguous matter in many international policies and frameworks in previous decades, like the Florence Declaration' and the 'Hangzhou Declaration'–'Position culture at the core policies of sustainable development', 'this provides commendations on exploiting the roles of culture in the process of attaining Sustainable Development achievements (Soini et al., 2015). Recently, the new initiatives is a 4 year European Union-based project COST Action Cultural Sustainability directed to fit in culture as a major factor in Sustainable Development.

2.2 Relationship between Traditional and Green building

Traditional building can be seen as a green building in so many ways. These may include cost saving in the construction process and construction materials used in traditional building, through the use of local technology and materials available. This cost saving in construction is seen as the major achievement of green building. Also the behaviour of the people in using the house in the society in terms energy saving through the use of local gadgets in cooling drinking water with

mud-pot (known as Randa in Hausa, see fig. 1), cooling the room with water spray on the walls and the surrounding floor among many other social behaviours of traditional green buildings usage (Rohracher & Ornetzeder, 2002).

Fig.1: Mud-pot (Known as Randa in Hausa) used in cooling drinking water in traditional building.

However, water sources in most of these traditional buildings were usually fetched from the well, which is sustainable for a while, because the well water dries-up around January to march in northern Nigeria. This is because most of the well were hand-dug and shallow, when the water table level is below the well-depth the water cannot be found (Egboka, Mbanugoh, Nwogute, Uma, & Okpoko, 1988). Though, a deep borehole is more sustainable in terms of water supply in northern Nigerian region.

The necessity to decrease the problems of powerful segregation along with severe harmattan breeze penetrating through indoors, joined with light requirements for visual and privacy makes the traditional Hausa building window sizes reduced greatly, so also other opening and window usage in Hausa traditional buildings. Sustainable issues regarding indoor temperature and wall insulations is not mainly depending on thick walls made up of mud and air exchange through openings, but not depending on the cross-ventilation within the rooms (Umar, Yusuf, Ahmed, & Usman, 2019).

3. MATERIAL AND METHOD

The materials required for this research were past published literatures related to the various parts of the aim and objectives of this research. The search was majorly conducted electronically using computer that was well equipped with internet and typesetting software i.e. Microsoft word. However, Mendeley Desktop was used as the reference and citation software which has its plugin installed in the Microsoft word software to ease citation and manage reference. The research begun around October, 2021 to February, 2022; throughout this period the researcher was trying to figure

out the problems of the research and how to minimise them. Though, the pandemic situations makes the research difficult, because of the recent coronavirus omicron-variant wave.

The keywords used in this research were almost all the relevant words (sentence, phrases and clauses) related with the topic and aim of the research. Some of these keywords may include culture and space, green building and culture, Hausa traditional architecture, Northern Nigerian architecture, green building and traditional architecture, influence of climate to traditional architecture and so many other keywords.

However, the books, articles and websites used in the research were all presented in the reference sections of this paper. Similarly, some published materials used in the research were summarized in the table below:

Table 1: Reviewed Literature

S/N	Publication Title	Authors	Publisher
1.	Whither the courtyards? Understanding disappearance and transformation of courtyards in residential buildings in Akure, Nigeria	Adegun, O. B., Adedeji, J. M., & Adedeji, Y. M. D. (2019)	IOP Conference Series
2.	Certificate Physical and Human Geography.	Areola, O., Ahmed, K., Iruegbe, O. I., Adeleke, B. O., & G.C. Leong. (2005).	University Press Plc., Ibadan
3.	Organizational culture and leadership: Preconditions for the development of sustainable corporation	Baumgartner, R. J. (2009)	Sustainable Development
4.	Cultural Sustainability and Regional Development Meeting	Dessein, Joost., Battaglini, Elena & Horlings, Lummina (2016)	Routledge: Taylor & Francis Group
5.	The Influence of Rainfall on Hausa Traditional Architecture	Eneh, Anselm E. O., & Friday, Ati Ojonigu (2010)	Maxwell Scientific Organization
6.	Research on social and humanistic needs in planning and construction of green buildings	Li, Fen., Yan, Tao., Liu, Junyue., Lai, Yupei., Uthes, Sandra., Lu, Yuanyuan., Long, Yingqian (2015)	Elsevier B.V.
7.	A Lesson from Vernacular Architecture in Nigeria.	Lodson, J., Ogbeba, J. E., & Elinwa, U. K. (2018).	Journal of Contemporary Urban Affairs
8.	The practice of Hausa traditional architecture: Towards conservation and restoration of spatial morphology and techniques.	Umar, G. K., Yusuf, D. A., Ahmed, A., & Usman, A. M. (2019).	Elsevier
9.	Incorporating Culture Into Sustainable Development.	Wu, Susie Ruqun., Fan, Peilei., Chen, Jiquan (2015)	John Wiley & Sons, Ltd and ERP Environment

10.	Social problems of green buildings: From the humanistic needs to social acceptance.	Zhao, D., He, B., Johnson, C., & Mou, B. (2015).	Elsevier
11.	Development of traditional architecture in nigeria: a case study of hausa house form	Paul, A. O., & Zango, M. S. (2014)	International Journal of African Society Cultures and Traditions

3.1 Location

Nigeria is comprised of 6 zones of different climates (Webby, 2002); The Swamp Forest, Mangrove Swamp, Guinea Savannah, Sudan Savannah Sahel Savannah, and Rain Forest. Latitude 8º North to Latitude 12º North of the Equator, includes the Sudan Savannah approximately in Nigeria (Anuforom & Okpara, 2004). Kano is included in this region, which was situated on Latitude 12.000000 (DMS Lat = 12° 0' 0.0000" N) and Longitude 8.516667 (DMS Long = 8° 31' 0.0012" E), though some part of Kano state falls under guinea savannah (Ragatoa, Ogunjobi, Okhimamhe, Browne Klutse, & Lamptey, 2018). All kinds of architectural designs must consider climate and culture of the people in that region as a significant elements that determines the building construction.

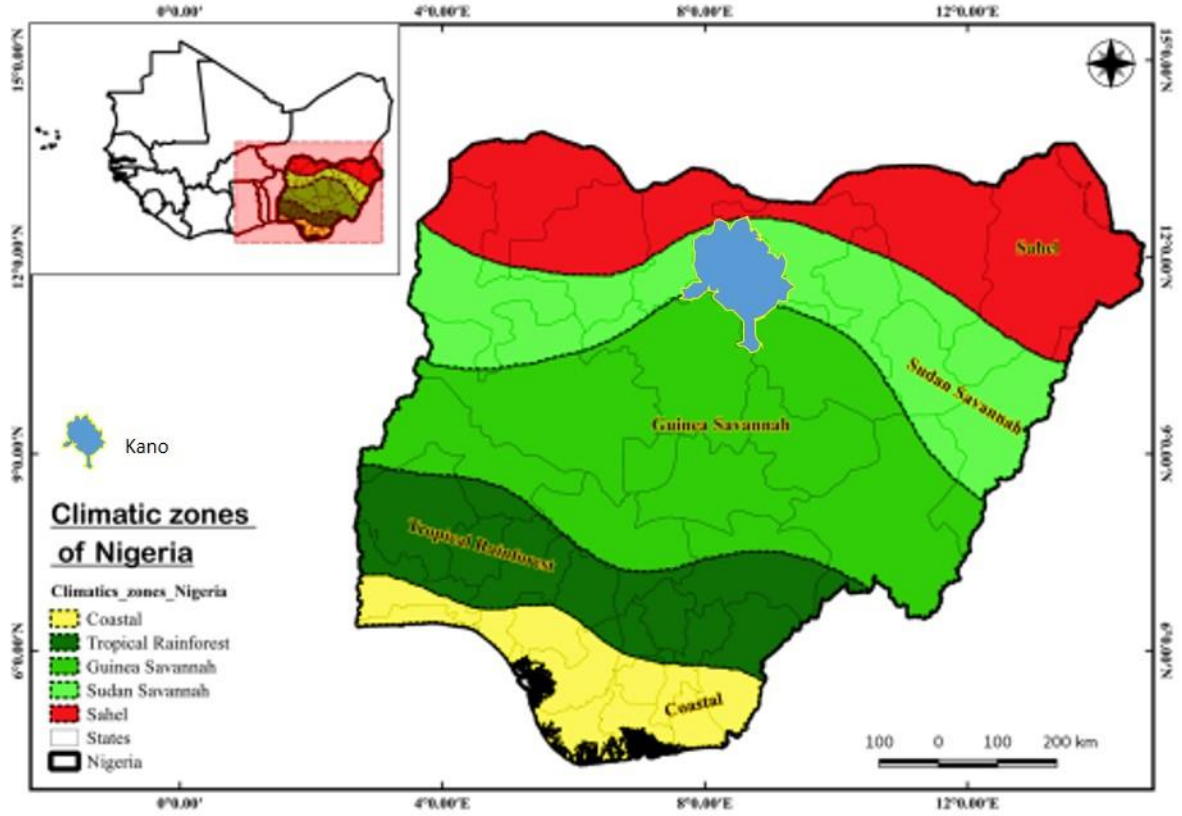


Fig. 2: Climatic Zones in Nigeria (Ragatoa et al., 2018)

The Hausa society is located in northern Nigeria also situated in northern Savannah climate type (Cliff Moughtin, 1985). There is less than 1000 mm annual rainfall that last for about 5-6 months in this region, usually between May and October. The intensity of rainfall in Kano is at peak during the month of July to August. During the dry season, Harmattan (which is a certain season where Wet and Hot weather occurs). Rainfall hardly occurs during Harmattan season, while the daily temperature is between 16oC to 35ºC in October to February, usually clear sky. Around December to January in Kano the weather comes with the suspension of whitish fine particles or dust in the surrounds all over the state, this happens because of Harmattan breeze which brings surface turbulence. During this harmattan the overall unclear visibility, distorting the air aviation and navigation whereas the sun-rays hardly surface the ground. This condition leads to low temperature at night up to 14ºC or below, and hours of sunshine is during 8.7 to 9.5 hours a day. Maximum daily temperature during harmattan season is 31ºC, resulting to 17ºC variation. This high diurnal range of temperature is the major characteristic of the Savannah climate type (Areola, Ahmed, Iruegbe, Adeleke, & G.C. Leong, 2005). Relative Humidity, ranges from 68%, 36% to 35% in October, November and January respectively. Regular building repair, new construction and maintenance is usually done during this season in Kano. February has about 20% Relative Humidity, and may rise to about 31% around the month of April, which was regarded as the hottest annually, and when measured with dry-bulb thermometer the surrounding temperature ranges between 36-41ºC (Areola et al., 2005). The wind storms comes with very high speed at the beginning of rainy season which in most cases rips-off sagging or poorly-hinged roofs from the top of buildings. Therefore it becomes regular each year to repair roofs of buildings in this region before the wind begins to strike (Eneh & Friday, 2010). The repair of the roofing sheets are carried out by properly securing or alternating arrangement of sandcrete blocks or granite boulders placed at edges of roof gables, to serve the relative weight required to repel the speedy wind.

4. RESULT AND DISCUSSION

4.1 Comparison between Cultural and Contemporary Building

In this section cultural and contemporary buildings were presented and explained using selected pictures from both parts, while the comparison will be shown also in summary. Starting with the cultural buildings, about 11 buildings were paired (i.e. A & B) based on their function and structures, however similar pattern was adopted in paring and selecting pictures presented in the contemporary buildings. Also, floor plan elevations of each building was shown with clear difference between them as shown below in this research.

a. Cultural Buildings

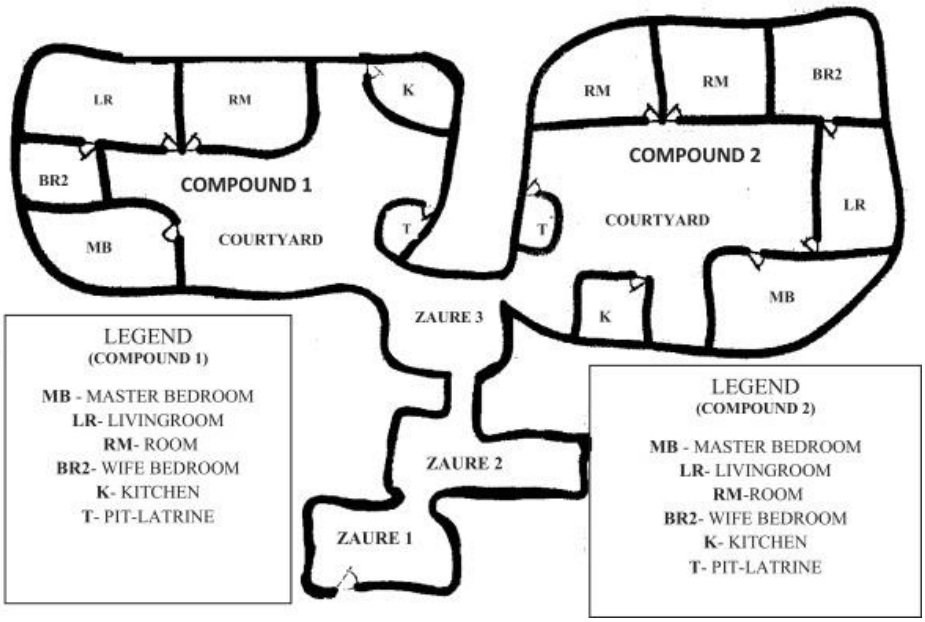


Fig. 2: Sample traditional Floor-plan 1 (Typical Hausa Traditional Compound at Dan-Dago, Kano Municipal, Nigeria) (Umar et al., 2019)

Figure 1 (sample floor plan 1) were sample floor plan of the ancient building structures in Hausa Land, which shows 3 passage rooms, known as Zaure in hausa. This Zaure is a room that provides privacy to the main building compound. It reduces the visibility from pedestrians passing by the building. However, kitchen and toilet were constructed separately, even though some ancient buildings do not even has a toilet neither kitchen as room, but as open place for cooking and the bush or farmland as the toilet. Likewise, it is common character of Hausa building style to have a courtyard, living room and bedroom (ciki da falo) of the wives linked together using only one entrance door, other features may include female children bedroom and a master bedroom for the husband. Also the toilet pattern is usually a pit-latrine type, where both bathing and excretion can be done.

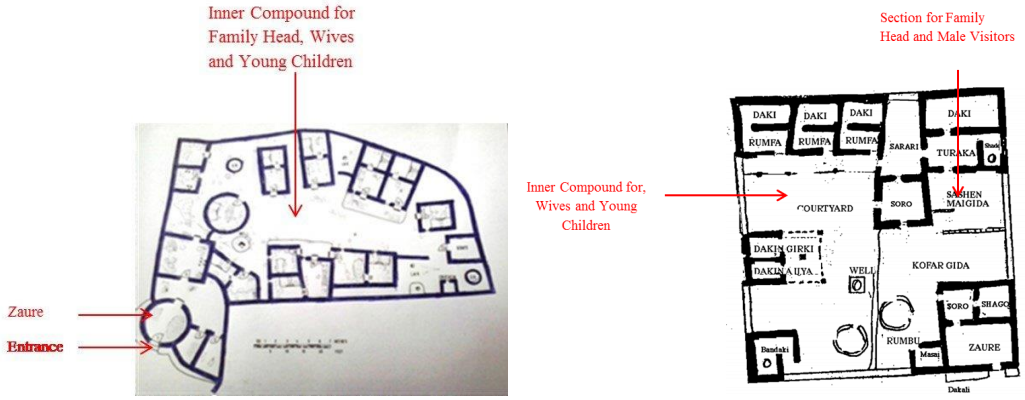
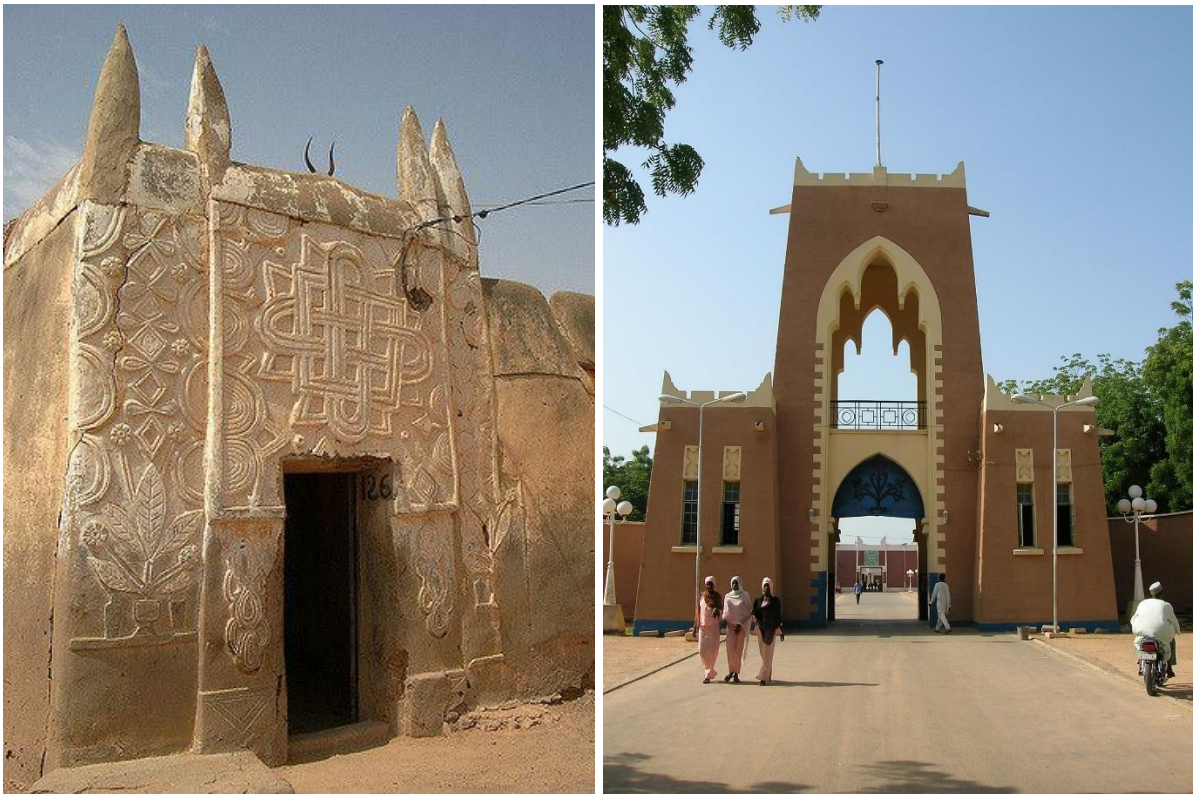


Fig. 3: Sample Traditional Floor-plan 2 (Lodson, Ogbeba, & Elinwa, 2018)

Similarly, Fig.3A is an old traditional building pattern like Fig.1, they both has an irregular shape. The only addition to it is that most of the room that were merged with both living room and bedroom signifies that it is owned by a housewife, when there are more than 1 rooms like that means there are more than one wife in the house. In Fig.3B has lots of science we can derive from it, 1st and fore most the layout of the land, which was almost square in shape, this may indicate a newer version of traditional building compared with the other two types of floor-plan (i.e. Fig.2 & 3A). Daki da Rumfa means Ciki da Falo in other words bedroom and living room, which were about 3 of them. This signifies three (3) wives living in this building along with husband's quarters (Sashen Maigida, Turaka and Daki) (Umar et al., 2019). The term Turaka according a Hausa dictionary called Kamus, it means a husband's personal room separated from rooms of his family. Soro and Zaure means same thing in traditional buildings which indicates a passage room through the entrance of a house, which provides privacy as explained before. Bandaki means toilet, Rumbu means silo and Dakin Ajiya means store room according to the floor-plan (i.e. Fig.3B).

A B

Fig.4: Hausa traditional Facade Decorations – Pinnacles (Zankwaye) & Engraving (Umar et al., 2019)



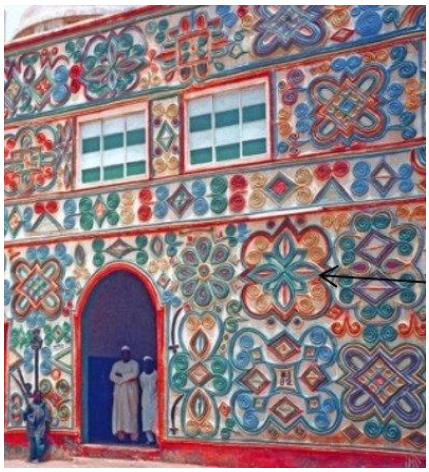
A. Beautiful traditional Hausa relief work on the facade of a house in Kano (Scott Ewart, 2003)

B. Kano state Emir's palace (main entrance gate called Kofar Kudu) (Source: Author)

Fig. 5: Sample building 3

Fig.4-6 both shows a different pattern of traditional building façade in Hausa land, except fig.4B which was the Kano state emirate house main entrance door formerly known as "Kofar Kudu" which means the southern door. Most of the façade of a traditional Hausa building were characterized with flat roof and the horn-like structures on top of the roof or the façade of the building is known as "Zanko" in Hausa language (Lodson et al., 2018; Umar et al., 2019). These buildings were usually constructed with mud bricks locally made with dried-grass, mud, sand and Dorawa powder in Hausa (Parkia Biglobosa also known as Locust Bean), which were mixed together to create firm and strong mud-bricks for construction (Lodson et al., 2018). As the technology improves in the traditional construction the building might later be plastered with cement mixture to prevent erosion, cracks, wear and tear. Theses traditional building were well known in terms of temperature comfort within the rooms (Due to the insulation level of the sand and wall thickness), as the outside temperature varies, inside the room is comfortable and vice versa. The windows were usually tiny and usually one window per room, which brings the absent of cross-ventilation within the rooms. The courtyard is very significant in traditional buildings, trees were planted to provide cool air circulation and provide the space the family needed to play, chat and carryout all the house chores (Umar et al., 2019). The designs in the traditional building were unique in its nature along with the Hausa empire symbol, different shape-drawings and colourful nature.

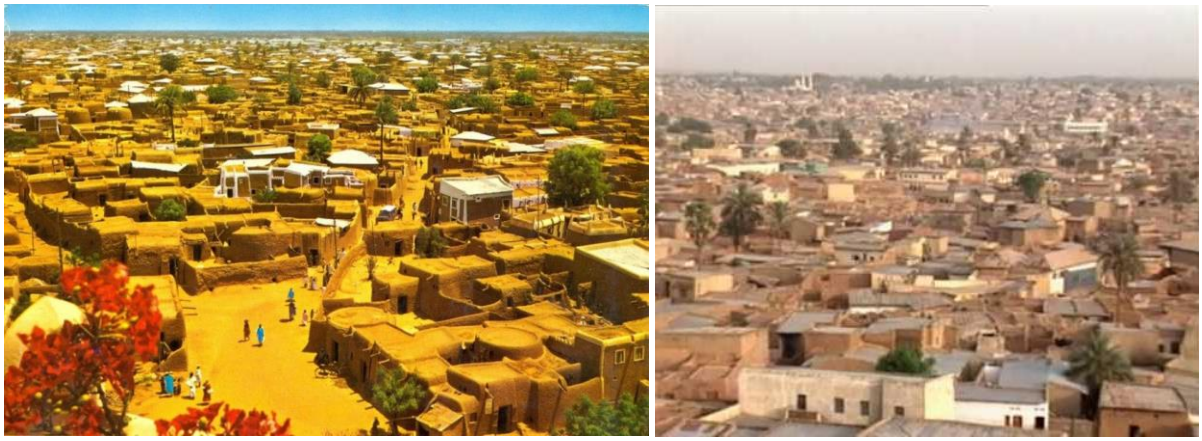
A. Kano History Museum
(Constructed at the beginning of 19th century)
(Blogspot, 2020)



B. Emir of Zazzau Palace in Zaria, Nigeria
(built 1995[2] Mural Facade Design)
(Lodson et al., 2018)

Fig. 6: Sample building 4

Fig.7: Sample buildings 5 (ABU Zaria Theatre) (Messynessy, 2020).

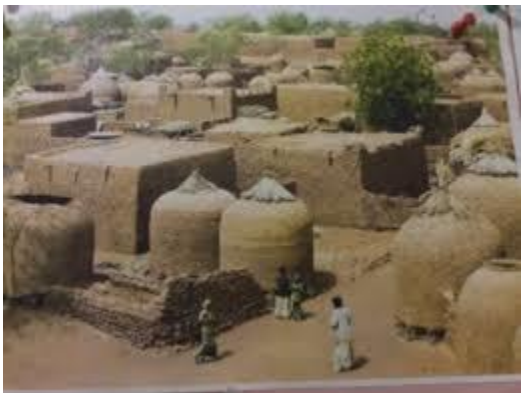


A. Historic Kano City, Northern Nigeria (Messynessy, 2020)

B. Hausa Architecture in Northern Nigeria (Tubali, 2009)

Fig. 8: Sample building 6

In these figures (fig. 7-8) the sample images shows an overview of a typical Hausa city, showing mainly solid buildings along with scattered palm and other type of trees that are few in number when compared with the overall landmass and number of buildings in the picture. The streets in the ancient settlement were very narrow without considering the size of a car passing through the streets. During those days cattle carriage and bicycle were the only vehicles considered when planning the streets in a typical Hausa neighbourhood. The building mostly has one or no suspended floor, but some building from richer family can have 3 storey building. However, irregular pattern of roads and drainages were related with the characteristics of an ancient Hausa community settlement. Fig. 7 both A & B were urban settlement while fig. 8 (A & B) were rural building; these two can be differentiated by the quality of the walls and the materials used in the finishing of the overall building. The flat roof structure here were designed to allow water passage through the allowed metallic gutter channels called Indararo in Hausa (refer to fig.9 & 10B) to avoid high water run-off eroding the walls of the building and rainwater harvest. This is because the rainy season in this region only last for few months, mainly 5 months. Another reason was that the majority the wells dry out during January to March, which were the beginning of rainy season. Being the only source of water during dry season people harvest rainwater especially at the beginning of the rainy season. After the rain becomes in abundance as time goes on, the well water begins to accumulate in it. Also there is belief that rainwater cures so many ailments, so the water has holy attributes in Hausa land.



B. Hausa Rural Settlement (Haruna, 2016)

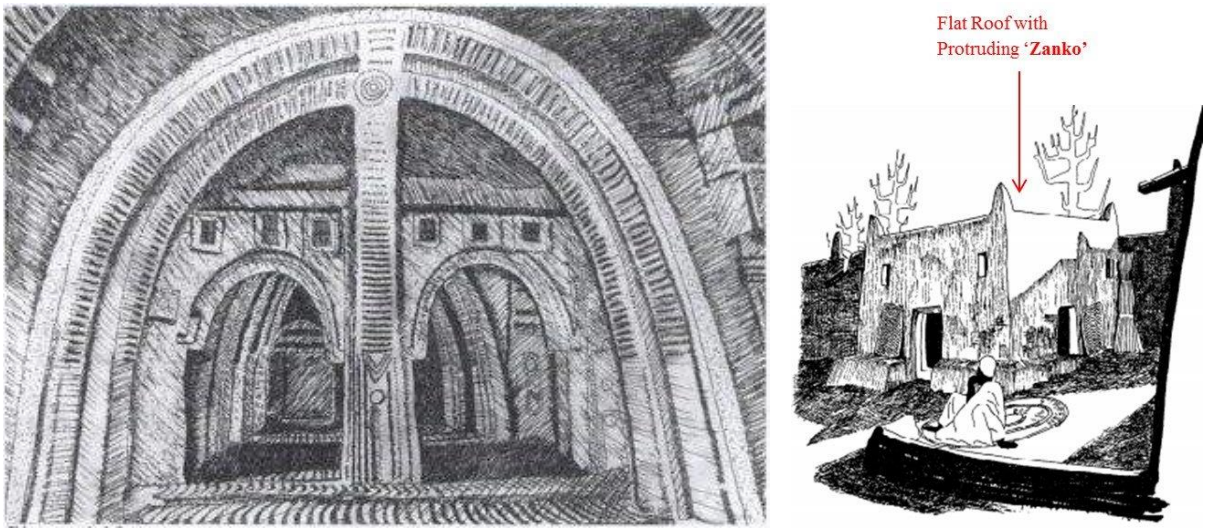
B. A colourful Decorated Hausa Building (author)

Fig.9: Sample 7

Hausa Traditional Architecture (WordPress, 2021)

Fig.10: Sample 8

The society of Hausa socialises and chat with each other while seated on a place called dakali in Hausa language. Dakali (as shown in fig. 9) is just a block-like structured piece placed in frontage of buildings in Hausa society. It culturally provide an enabling environment to sit and interact with friends and neighbours around.



A. Indoor Arches B. Outdoor Space for Relaxation

Fig. 11: Sample 9 (Lodson et al., 2018)

Although, Hausa construction may be olden version having poor quality, but there are amazing arches and round roof shapes, especially in royal traditional buildings. Fig. 10A shows and example of such building with reinforcements supporting it. This building is also similar to mosque structure which were constructed to contain many people inside.

b. Contemporary Building (years)

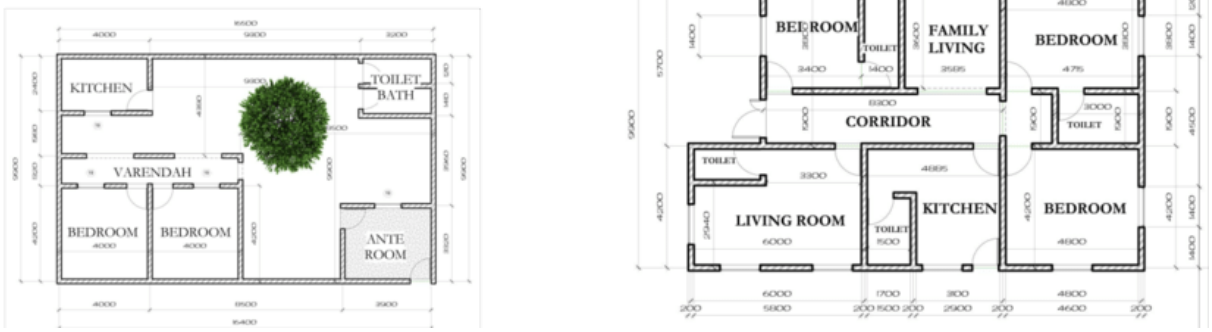
A. 4 Bedroom Floor plan B. Modern House Plan In 45X30 ft. Plot (2019)

Fig. 12: Sample contemporary building floor plan 1 (DK3Homes, 2022)

Contemporary architecture is simply referring to the present architectural style, such as buildings constructed based on the latest trending shapes, styles and forms were referred to as contemporary architecture (Kristin Hohenadel, 2020). The contemporary architecture era is largely said that it had begun the period later than the modern period, which was approximately the first-half of 20th century and the postmodern period which was began around the 1960s and proceed towards the

90s. Consequently, new houses built in the late 20th century to the current moment can be referred as contemporary architectural buildings (Charles Moffat, 2007). This a clear demarcation of period that contemporary building began in past.

In relation to the contemporary architecture in Hausa land was very similar with other country's contemporary building styles to large extent or parts of the house; though, there can be slight differences as well. Examples of these contemporary building were shown here in this research, showing only floor plans and façade of the buildings.



A. Floor plan of a 2 bedroom flat (2016) B. Floor plan of a 3 bedroom flat (2016)

Fig. 13: Sample contemporary building floor plan 2 (Maina, Abba, & Abba, 2016)

In this fig. 13 (A and B) an example of 2 and 3 bedrooms were shown, which shows how straight lines and curves were used to represent walls, windows and windows in the building's floor plan, for easy interpretation and understanding of the building's shape or structure. In fig.13A the building is among the old building of contemporary building which was similar to the traditional building in terms of the floor plan structure; the two bedrooms were isolated from the kitchen, the toilet and bathroom with no sitting room. Also the "ante room" is similar to "zaure" in traditional building. While on the other hand fig.13B which was 3 bedrooms was a self-contained flat having about 4 toilets, a kitchen and a sitting room. This house has no similarity with traditional building unlike fig.13A, because the Hausa culture was not given any consideration while planning the building.

Family Housing estate at Darmanawa Kano B. Private 1 Bedroom Studio ("Kano Vacation Rentals & Homes - Kano, Nigeria | Airbnb," 2021), (NPMB, 2021; FHF, 2019)

Fig. 14: Sample contemporary building 2.

These two pictures above fig.14 (A & B) shows the façade of the contemporary building in Kano, northern Nigeria. Though, the flat buildings in Kano can have both flat and pitched roof style (as it will be shown later in fig.16). fig.14A only has flat room as the similarity with the Hausa traditional building, while Fig.14B has indararo (roof drain) and Zanko (pinnacle) in the roof of the building, which was also similar to the Hausa traditional building style, but the building has windows and doors that were contemporary style in nature. So also the construction materials used in these building were majorly imported materials or copied from the western building pattern. The exclusion of so many traditional building parts here in these buildings will affect the culture (way of life) of the people that lives in the house.

A Duplex in Kano B. A Duplex in Kano

Fig. 15: Sample contemporary building 3 (MitulaHomes, 2021).

The 1 storey building above (fig. A & B) were among the example of contemporary building used in this research. The high-pitched roofing style were known as "Chinese roof" by local builders in northern Nigeria. The ownership of a contemporary building like this in Hausaland signifies the

wealthy status of an individual within the society. Similarly, in this type of building; most of the Hausa traditional architecture that can be identified from the exterior part, cannot be seen in the façade of the building.

Semi-Detached Modern Building in Sheikh Jaafar Adam city (formerly Bandirawo), Kano

Fig. 16: Sample contemporary building 4 (BHK, 2021).

This building (fig.16) was similar to the 2 buildings analysed before being it as a flat house without a suspended floor, though the high-pitched roof style differentiates it them. This building was built also without consideration of any Hausa traditions from what is seen in exterior part of it.

5. Conclusion

Culture is the way of life (tradition) of certain group of people whether large or small, in which one cannot talk about traditional building without talking about culture. Likewise, green building and social acceptance is linked with culture and tradition of the people living in an area. This because green building elements were found in traditional buildings, like well, courtyard, possibility of rain harvest from the flat roof gutters, and so many others. Traditional architecture was becoming a history now around the globe, as it is fading away as time goes on. People tends to demolish traditional building and replace it with contemporary buildings. However, new constructions were majorly building contemporary building instead of traditional type (Mehta, 2020). Similar scenario is occurring in northern Nigeria where both the stakeholders, architects and clients were building contemporary building, thereby neglecting the traditional architecture in the Hausa traditional region. Though, some few architects were trying to copy few traditional style, but it is still not enough to promote the culture. This research focusses on Kano state because almost all the people in the state speaks Hausa language and share majorly one culture. Hausa traditional architecture ought not to be forgotten, the purpose and meaning the building tradition should be given the attention it requires to improve in both the standards and quality of the material used. Most of the local construction materials has low quality in terms of standards and durability, therefore, they tends to deform easily. The construction method were green and sustainable because it causes low carbon effects. However, further research is recommended to explore ways of improving the quality of the local building materials and the methods used during the construction process and afterwards, so that the building will last longer and became safer. This is

because of so many incidences of traditional building collapse and killing people, many will think it is not safe to live in the traditional building. It is also recommended to include culture into the pillars of sustainability so as to minimize this problems the Hausa traditional building has, through improving the quality of the building structure, less maintenance efforts, cost saving, local readily available material provisions, incorporating green features into the building (like solar, rain harvest, well or borehole water provision etc.) and so on.

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