

Vernacular Architecture of Northern Nigeria in the Light of Sustainability

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Abstract. Nigeria, a country located in the Western part of Africa has been the site of numerous kingdoms and tribal states over the millennia and is divided into Northern and Southern parts with the Hausa-Fulani's, a diverse but culturally homogeneous people living in the northern part of Nigeria. The vernacular architecture of the Northern Nigeria (VANN) is perhaps one of the least known but most beautiful of the medieval age, over the centuries a tradition of fine architecture has flourished in the area, the variety and quality of buildings are bound to generate much delight and enthusiasm in anyone who is interested in buildings. Many of their early buildings such as mosques and palaces are bright and colorful. This architectural style is known as *Tubali* which means the traditional architecture in the Hausa language and globally known as Vernacular Architecture (VA). VANN has many unique features which distinguish it from any other architecture. All buildings, be it modern or old have an impact on the environment; hence the need for sustainable measures and practices regarding such buildings. The aim of this research paper is to examine the features of VANN in the light of sustainability. Reviewed literatures were used to identify the various features of the Vernacular Architecture in the Northern Nigeria which were critically examined in the light of sustainability and its concept. The result showcased the various features of VANN in the light of sustainability and also discussed the factors hindering the sustainable endeavors of VANN with respect to such features.



1. Introduction

1.1. Background to the study

Moving towards sustainability is also a social challenge that entails international and national law, urban planning and transport, local and individual lifestyles and ethical consumerism. Ways of living more sustainably can take many forms from reorganizing living conditions (e.g., eco-villages, eco-municipalities and sustainable cities), reappraising economic sectors (permaculture, green building, sustainable agriculture), or work practices (sustainable architecture), using science to develop new technologies (green technologies, renewable energy and sustainable fission and fusion power), or designing systems in a flexible and reversible manner,[1][2] and adjusting individual lifestyles that conserve natural resources.[3]

"The term 'sustainability' should be viewed as humanity's target goal of human-ecosystem equilibrium (homeostasis), while 'sustainable development' refers to the holistic approach and temporal processes that lead us to the end point of sustainability"[4]. Human attempts to achieve environmental sustainability has been, and continues to be, questioned—in light of environmental degradation, climate change, overconsumption, population growth and societies' pursuit of indefinite economic growth in a closed system.[5],[6]

The term sustainability has divergent view because it involves all disciplines. Each discipline views it from its own perspective. However, it is defined as: the endurance of systems and processes covering various domains such as ecology, economics, politics and culture [7]; the study of sustainable development and environmental science [8]; the development that meets the needs of the present without compromising the ability of future generations to meet their own needs [9]; the development that does not compromise the ability of future generations to meet their own needs [10]; Sustainable development consists of balancing local and global efforts to meet basic human needs without destroying or degrading the natural environment [11],[12],[13]; something that improves "the quality of human life while living within the carrying capacity of supporting eco-systems"[14]; presumes that resources are finite, and should be used conservatively and wisely with a view to long-term priorities and consequences of the ways in which resources are used." [15].

Therefore, the emergence of sustainability (in the last century ago) transcends disciplinary or industry boundaries as attested from the few definitions above especially making sure that present actions do not compromise the ability of future generations to meet their own needs. This entails conserving and preserving traditional buildings based on sustainable practices within the Vernacular Architectural (VA) field; which will enable the future generations to embrace or have a link with their past histories, traditions, cultures and heritages based on the preserved ancient buildings and structures.

The term "Vernacular Architecture" (VA) is not an easy term to define. Many professionals define it in many different ways as; the 'idea and technology' of a particular group of people[16]; Adharcist's approach to architecture [17]; A true reflection of how generality of people want to build [18]; A "native science of building"[19]; As architecture that is the outcome of anonymous design period [20]; design and construction techniques using locally available resources based on the environmental, cultural and historical background of people [21], [22],[23]; VA is an architectural style reflects local traditions [24]; the unconscious "realization" and "embodiment" of the culture of the society with the requirements of the people in nature [25],[26].

From the above definitions, this research work simply defines VA as “*a building/structure or a constructed shelter of a group of people according to their ethnicity, culture, traditions, religion and environment which is constrained by their climate, locally available materials and their unique features*”. The particular area of interest for this research work will be limited to VA practices covering Traditional / Historical buildings of the Hausa-Fulani people in the Northern part of Nigeria. The Hausa-Fulani are diverse but culturally homogeneous people living in the northern part of Nigeria with a civilization dating back to a millennium; which was evident from their cultural heritages and ancient buildings/ structures.

1.2. Research Problem

Vernacular Architecture in Northern Nigeria (VANN) has suffered a great deal, be it from human negligence, socio-economic conditions, weather and climatic factors or modernization. According to Oneh and Ati (2010), the present day traditional architecture of a place usually results from solutions to climatic problems through reasoning, countless experiments, experiences, and accidents as well. This usually takes the effort and generation of builders who make use of whatever works for them while discarding what did not [27]. Fatty (2006), also states that in the tropics, only scientific evaluation of new ideas will save its traditional architecture [28]. In Nigeria, the relics of earth buildings are seen in our traditional city centers as reminiscences of history, the old earth buildings are being replaced by modern structures [29]. Mud buildings always suffer from common defects such as surface erosion, partial crumbling, humidity, and hallowed bases [30]. It is apparent that the state of quality control for earth construction hangs in critical balance with very limited tolerance for satisfactory performance; that is why people use sand-cement wall system because they have been very useful in term of durability and wider tolerance in tropical environment and performs satisfactorily [29]. The combination of these challenges further compound the sustainable practices within the VA especially that of Northern Nigeria which may gradually erode and diminish conservational practices of the historical / ancient buildings or structures. Hence, the need to examine sustainable measures and practices regarding such buildings.

1.3. Research Aim

The aim of this research paper is to examine and discuss Vernacular Architecture of Northern Nigeria in the light of sustainability based on its few selected features.

1.4. Research Methodology

The main sources of data were journals, conference / seminar / workshop papers, text books, newspapers, magazines and the internet sources etc., which were used to review literatures in the VA field and help in identifying and narrowing some features of the VANN. These features were examined and the factors impeding their sustainable application within the VANN were identified and discussed in relation to the global context.

2. Literature

2.1. Vernacular Architecture of Northern Nigeria

The architecture of the Hausa/Fulani is perhaps one of the least known but most beautiful of the medieval age. Many of their early mosques and palaces are bright and colorful, including intricate

engraving or elaborate symbols designed into the façade [31]. Traditional buildings of Northern Nigeria have a special aura around them and they are of various shapes and sizes. Some of which are seen over the centuries. A tradition of fine architecture has flourished in the area.

The variety and quality of buildings in Northern Nigeria are bound to generate much delight and enthusiasm in anyone who is interested in buildings. Indeed, the manner in which the buildings are constructed, and the sheer artistry that is deployed in the effort, combines to reveal aspects of a people's development, their history and culture, and assists in projecting the precise conditions of a people's soul [32]. Hence, the need to sustain and preserve these sheer artistry, history and culture for future generations especially in the Northern Nigeria.

2.2. Features of Vernacular architecture of Northern Nigeria

Vernacular architecture of northern Nigeria has many unique features which distinguish it from any other architecture. Some of the notable features are the engravings on the façade of the building walls, use of building materials such as mud, reeds, stones, and timber within the structures like foundations, walls, columns, slab, beams, doors, windows, plastering, and process of renovations. These features form an intricate, diverse and colorful form of architecture which can only be found in northern Nigeria. As such this research will discuss the above features of VANN in the light of sustainability.

2.2.1. Engravings. Engraving is the practice of incising a design onto a hard, usually flat surface, by cutting grooves into it. The result may be a decorated object in itself. This feature dates back to hundreds of millennia BC [24], [33] In northern Nigeria, the wall engravings are designed by traditional builders, professional artisans and highly experienced hand engravers who are able to draw out minimal outlines directly on the wall surface just prior to engraving. Hausa traditional architectural decoration is categorized in to three groups, namely surface design, calligraphy and ornamental [34]. Hence the façade decoration usually demonstrates wealth and social prestige [35]. Unfortunately, these earth buildings are considered as relics for they are being replaced by modern structures. Figure 1 below shows engraving symbols carved and or designed into the building facades in Northern Nigeria's VA.



Figure 1. Engraving works (as a unique feature of Vernacular Architecture of Hausa-Fulani in Northern Nigeria).

Source: [36]

2.2.2. Building materials. The materials used in prominently in the building traditions of Africans are; stone, straw, and earth which have been independently and jointly used and skillfully applied [37]; in Hausa land, the four major building materials are: earth, timber, reeds/grasses, and stones. Though in most cities, stones are less used, apart from this mud is more tolerant to climate because of its poor conductivity. [38], [39], [40] None of the materials used by traditional architecture was company manufactured, processed or fabricated [41]; Examples of local materials used to achieve outstanding architectural monuments are: Bight of Benin (stabilized mud brick and plaster, thatch, timber, shingles); The Kano wall (mud and vegetable mat); Centenary Hall, Ake, Abeokuta (stone, mud, timber) [42].

2.2.3. Earth as a building material. Earth as a building material date back to 12000 BC [43]; the basic house walls in most of traditional architecture in Nigeria were built of 'earth' in simple low-cost and self-help construction arrangement [29]; Very little of adobe / earth / mud / brick architecture have lasted, apart from some of the monuments, temples and mosques. Nevertheless, the enduring cultural practices of rural people indicates that adobe or mud surely has been one of the most common and abundantly obtainable material [37]; the generally employed method was wattle-and-daub earth technology [37] [39] [44]; As soon as it is plastered and properly covered with overhanging roofs, these earth buildings were structurally firm, environmentally sound and could exist for years as long as the day to day maintenance was adhered to [37]; the building earth greatly differs in quality from the excellent brown clay to the blackish type [27]; the development of the adobe brick, a performed modular masonry unit of sun dried mud, came in to existence with higher civilization levels [45]. Unfortunately, modernization affects the sustainability of these earth buildings as they are being replaced with new ones made of modern building material like sand-cement, concrete and glass etc. Some of the earth buildings are abandoned and therefore crumbled due to lack of proper preservation and conservation.

2.2.4. Stone as a building material. Stones as a building material in Northern Nigeria has been discussed in many studies, some of which are; the basic form of the use of stones/rock for dwellings had begun with the habitation of naturally occurring caves about which walls and roofs are in mud or thatch, bricks and straws were erected converting them in to livable places [37]; The deliberately planned and built shelters began around the same time around the world. Even those times, similar to the present scenario, development involves many levels based on the social evolutions stage [45]; the main materials in traditional houses are stones, wood, bricks and metals. Stones are the most utilized materials; some of them prevent moisture and humidity which are used in building foundations etc. [46] [26]; in some parts of Northern Nigeria, stones are used in building foundations because of its moisture proofing property. In some areas with heavy rainfall, layers of stones or un-coursed rubbles are used in other to reduce the amount of the moisture movement from the foundation upwards [27]. With the emergence of modern materials such as sand-cement block, and reinforced concrete which can be used conveniently, local artisans and building industries have abandon the use of stones as the main building material and therefore the use of stone as a building material is receding greatly which affects the sustainable use of this material in VANN.

2.2.5. Thatch and Grass as building materials. Grass is a building material with a wider usage in VANN. The grass and earth forms a composite material. While the grass is the reinforcement, the earth serves as a matrix or binder as it surrounds the straw or thatch. The thatch/ straw possess a tensile strength while the earth has compressive strength [47]; thatch is one of the oldest of building materials known; grass is a good insulator and easily harvested. Many African tribes have lived in homes made completely of grasses and sand year-round [24]; thatch construction uses matted or baled straw from wheat, oats, barley, rye, rice and others as wall or covered by earthen or lime stucco [37]; thatching methods have traditionally been passed down from generation to generation, and numerous descriptions of the materials and methods used over the past three centuries. Thatch is still employed by builders in developing countries, usually with low-cost, local vegetation [24]. Sadly, with the emergence of zinc, aluminum roofing sheets, and cement (used as a binder in building practices), the use of thatch as a building material was greatly affected and diminishes its use in the VANN.

2.2.6. Timber as building materials. Timber as a building material has a wider usage also in VANN. The best timber used in Hausa traditional buildings are obtained from the trunks of male palm tree (Daleb or Giginya). The timbers are commonly called “Azara” beams. They are rigid and heavy, resistant to termite attack, and very durable because they took several decades if not a century without signs of decay. They serve as wooden reinforcement to strengthen the structures of the wall and pillars [27]; the “Azara” beams are also used to make frames constructions, beams, brackets and corbels as elements for carrying flat and domed roofs. The ashes of the timber are often used as an insulating layer when spread on top of flat roofs, treated with infusions from pods or roots to water proof the top of flat roofs [27] [39].

Hausa people usually harvest their timber from the locally available tree trunks mostly male palm trees (Daleb or Giginya) and use them in construction as beams and columns. They also use the ashes for insulation and water proofing on flat roofs. Due to the availability of modern construction materials such as steel rods and other steel sections with concrete, the use of Azara as building material has vanished completely; invariably affecting the VANN sustainable practices.

2.3. Factors Hindering Sustainability of VANN

Various architectural concepts have certain factors hindering their sustainability and vernacular architecture of Northern Nigeria is no exception, some of the factors are; human neglect such as neglect of heritage buildings, forgetting and ignoring of traditional architectural element [48], [49]; socio-economic conditions such as financial wherewithal, social class factor, and high cost of maintenance of traditional buildings [29], [37]; modernization such as replacement of the old buildings with new ones using modern building materials, poor social acceptability of traditional buildings, and societal advancement somehow had downgraded these practices of using traditional building materials in favoring the machine intensive [29], [50]; discontinuity such as lack of qualified artisans and master builders, disappearance of traditional buildings in the cities, and many of the traditionally significant buildings of earth have weathered badly and are partially derelict [29], [48]; weather and climatic conditions such as surface erosion, partial crumbling, unhealthy conditions due to constant humidity and hollowed bases and wear and tear of the buildings, constant humidity, and moisture from underground [29], [51] . The main factors Hindering the sustainability of VANN were shown in Table 1 below.

Table1: Factors hindering sustainability of VAAN and their Impacts

S/N	Factors hindering sustainability of VAAN	Impacts	Sources
1	Human neglect	Neglect of heritage buildings; Forgetting and ignoring of traditional architectural element.	Osasona et.,al(2009), Ibrahim (2015)
2	Socio-economic conditions	Financial wherewithal; Social class factor; and high cost of maintenance.	Egenti et.,al (2014), Ejiga et.al,(2012)
3	Modernization	Replacement of the old buildings with new modern ones; Poor social acceptability of traditional buildings.	Egenti et.,al (2014), Khalil (1999)
4	Discontinuity	Lack of qualified artisans and master builders presently; Disappearance of traditional buildings in the cities; Traditionally significant buildings of earth have weathered badly and are partially derelict.	Egenti et.,al (2014), Osasona et.,al(2009)
5	Weather and climatic conditions	Surface erosion, partial crumbling, unhealthy conditions due to constant humidity and hollowed bases; Wear and tear of the buildings; Constant humidity, and moisture from underground.	Egenti et.,al (2014), UNCHSHabitat (1986).

Source: Authors, 2017; from literature review

3. Discussion, summary and conclusion

This study discusses the VANN in the light of sustainability; some desirable features and characteristics were identified and the factors hindering the sustainability of VANN with respect to such features were identified (in table 1 above) and discussed. Thus, the following conclusions were made:

- The main features of VANN are identified as: engravings on the building facades and use of building materials such as earth, grass, stones and timbers etc., which are unique to the VANN.
- Earth is the prominent building material used in VANN because it is easy to use; it is the most abundantly obtainable building material and therefore became the most utilized building material. It is used as a binder when mixed with grass to form a composite material and also used to make the best possible use of other materials.
- The main factors hindering “the sustaining of VANN” were identified as: Human neglect, Socio-economic conditions, Modernization, Discontinuity and Weather and climatic conditions.
- The emergence of modern building materials such as Cement (used in concretes and plasters), steel (used as reinforcement rods or in structural steel section), Zinc and Aluminum roof covering sheets, glass and other composite materials etc., really impede and hampered the continuity of the concepts and construction processes used in VANN while also diminishing its conservation, preservation and socio-cultural relevance within the Hausa-Fulani tribal communities in Northern Nigeria.

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