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Conserving Indigenous Geometries: A Vital Approach to Integrating Cultural Heritage into Architectural Education

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Abstract

There is growing awareness of various theoretical and applied native geometries and the weak strategies in preserving their uniqueness in the Global South. Hitherto, examination overlooked Nigerian examples for pedagogy. In contrast, attention is generally focused on the European prototypes in learning from schools with limited description of how they have evolved. Drawing from explorations across geopolitical zones in Nigeria, the study employs a mixed-methods approach and an interpretivist framework to develop an understanding of how schools can implement native extraction plans. Studies record increasing loss of homegrown patterns, symbols, graphics and histories that authenticate their traditional significance and general usage for society and learning. In response to these impacts, the study highlights patterns, shapes, and graphics rooted in traditional knowledge systems to collectively draw out models for architectural education and other creative vocations that preserve heritage geometries. Notably, indigenous geometries are deeply connected to cultural societies and religious groups; however, contemporary applications can engage with them as principles of 'art for art's sake'. Curricula could integrate Indigenous geometric practices with modern knowledge and technologies to facilitate various applications in learning, modelling, and 3D architectural rendering. To preserve heritage histories, decision-makers in local, regional and national government institutions could work to design multi-scalar interventions that support the integration of native hieroglyphs and contemporary knowledge, addressing the potential loss of local geometries across different scales.

Keywords: *Cultural Heritage, Architectural Curriculum, Indigenous Knowledge, Native Geometries.*

1.0 Introduction

Nigeria comprises six geopolitical zones and 250 ethnic groups, boasting a diverse cultural landscape richly woven with indigenous architectural expressions that reflect the identities, belief systems, distinct art forms, and lived experiences. There are symbols, signs, myths, and patterns that characterize their identities and worldviews. This study selected four of the six geopolitical zones, using population and socio-political significance as sampling methods. The three zones are, namely, the South West (SW), South East (SE), South-South (SS), and North West (NW). These regions comprise a total of 24 governing states; SW has six, SE has five, SS has six, and NW has seven states, respectively. These are indigenous groups primarily found in the regions of the country, having deep connections with the land and cultural identities shaped by centuries of interaction with the environment. The regions boast a significant historical background of indigenous geometries and a rich cultural heritage, which are still evident among the people and embedded in the traditional built environment. Omekwu (2003) defined cultural heritage as those attributes, behavioral patterns, lifestyles, social structures and norms that are passed on laterally or inherited from one generation to another. Interestingly, these geometries are not arbitrary but are deeply rooted in cosmological beliefs, environmental adaptation, social organization, and local knowledge passed down through generations. Unlike standardized Western architectural practices, indigenous geometries embody a profound understanding of space that is both utilitarian and symbolic. The study of indigenous geometries offers valuable insight into sustainable architectural practices, resilient community planning and the preservation of intangible cultural heritage in an increasingly globalized world. Therefore, preserving indigenous geometries is crucial because it helps maintain the cultural identity of a people and their place. This preservation fosters the transfer of knowledge, societal norms, and practices from one generation to another. It also provides a sense of place and ownership for a people or community, enabling its members to safeguard their knowledge against exploitation, misinterpretation or misinformation (Etefa, 2024; Nnamdi & Okafor, 2024)

1.1 Indigenous Geometries in Architecture and Their Cultural Significance.

The Nigerian Indigenous geometries in architecture reflect the diversity and cultural richness of the over 250 ethnic cultures that are deeply rooted in the traditional knowledge system and cultural philosophies of the people.

In the Yoruba-speaking culture of South West Nigeria, architecture is more than just a physical structure—it embodies an echo, ethos of culture, identity, and worldview. Indigenous geometries, deeply rooted in the traditions and cosmologies of native communities worldwide, offer a unique lens through which to understand the relationship between people, place, and design. These geometric forms are not merely aesthetic ornamentations; they are expressions of cultural heritage, spiritual beliefs, ecological knowledge, and socio-cultural organisation. Yoruba architecture serves not only as shelter but also as a vital expression of cultural identity, cosmological beliefs, and social structure. Traditional architecture is heavily influenced by indigenous geometries that emphasize harmony, balance, and sacred symbolism. These geometries are seen in the radial layouts of compounds, the symmetrical arrangement of courtyards, and the fractal patterns that reflect the community's connection to nature and the deity or ancestral worship. The spatial organization of Yoruba buildings, particularly the agbo-ilé (family compound), is governed by culture-based geometric principles that reflect essences in hierarchy, ancestry, and spiritual orientation. These local patterns are more than just visual aesthetics; they carry meanings rooted in cosmology, where geometry acts as a bridge between the physical and spiritual worlds. For instance, the central courtyard is not merely a family-communal space; it can symbolize the core that connects the household to the social, family deity, and the household to the spiritual. Yoruba geometries in architecture provide a window into how the public realm mirrors essences and preserves cultural heritage. In an era of rapid urbanization and architectural standardization, revisiting the memories of local traditional forms offers a compelling opportunity to establish contemporary architectural education in cultural consciousness and indigenous knowledge systems (Nnamdi & Okafor, 2024).

In the South East region, Igbo cultural values exemplify the people's rich beliefs, religion, social class, and climate. There are products of physical and cultural factors unique to Igboland and its society. They believe in the veneration of many gods (polytheism), including the supreme God, Chukwu, and they also value the practice of communalism, genuinely loving one another. (Oformata, 2002). Exploring the art of Igbo cultural heritage, social structures, and artistic expressions provides insight into the Igbo worldview, societal norms, and the historical context in which these artworks were created. This helped to preserve and appreciate the rich cultural traditions of the Igbo people, particularly during a time of civil unrest and transformation in Nigeria. Therefore, reviving Igbo culture in the modern context means sustaining and preserving the values and traditions that significantly shape and enrich the Igbo identity (Okoye & Ukanwa, 2019; Nnamdi & Okafor, 2024).

The South-South geopolitical zone of Nigeria comprises six different States that differ in language, culture, and historical backgrounds, and are made up of diverse ethnic groups. In a similar manner to the rich diversity of ethnic groups, the geometric patterns found within this region exhibit a similarly wide range of variations. This intricate relationship between cultural expression and geometric design reflects the multifaceted nature of the region's identity and heritage. Some native geometries, geometric forms and patterns in the region are noted to have been influenced by environmental factors, climate, culture, vegetation and religious rites and beliefs (Isiboge and Diapkaromre, 2015). The large mangrove forests with varieties of wood species engendered sculpting, carvings and woodworks such as the Benin carvings, the heavy wooden masks for the Ekpo masquerades of the Ibibio in Akwa Ibom State. Available mineral ore influenced smithing and fabrications of cultural and traditional items such as the 'Ada and Eben' crafted metal used as royal symbols in the Benin Kingdom of Edo State. The abundant raffia palm encouraged the use of raffia reeds for weaving into fabrics and raffia crafts. Palm fronds were a constant item in traditional rites and cultural ensembles. Native geometries, therefore, found expressions on the carvings, sculptures, weavings, blacksmithing, and as sculpted murals on walls to express cultural identity. Also, a few geometrical patterns were engraved on the human body as cultural marks, identification, and symbols of social stratification, such as the 'Amiero', 'Akpusi', and the 'Irhiawoho' patterns among the Urhobo people of Delta State. A major native geometric style is the Nsibidi, thought to have originated from the Ejagham people in the north of Cross River State and spread in use to the Efiks of South Cross River, parts of Akwa Ibom State, and some South East of Nigeria. The diversity and meanings of each pattern and geometry pointed to revered values and cultures worth documenting and studying for future referencing (Nnamdi & Okafor, 2024).

The Hausa, the largest ethnic group in northern Nigeria and one of the most populous on the African continent, have developed a distinctive tradition of geometric patterns and decorative motifs that adorn their architectural built forms (Moughtin 1985). Rooted in the community's social and cultural environment, Hausa indigenous geometry reflects a sophisticated interplay of art, design, and philosophy (Sa'ad 1981). A prominent feature of these architectural motifs is the integration of Islamic calligraphy, influenced by the region's deep Islamic heritage (Dmochowski 1990). Historically, such calligraphy was reserved for sacred spaces, including mosque walls, domes, and arches, where intricate inscriptions served both decorative and spiritual purposes, such as commemorating Qurʾānic teachings (Bargery 1934). Beyond calligraphy, Hausa geometric patterns are evident in architectural features such as niches, archways, and intricately plastered walls, showcasing repetitive, symmetrical designs that symbolise order and cultural identity (Moughtin 1985). These motifs, etched into the built environment, highlight the Hausa's architectural ingenuity and their enduring contribution to African aesthetic traditions (Nnamdi & Okafor, 2024).

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1.2 Aim & Research Objectives

This study aims to examine, document, and digitise indigenous geometries across diverse Nigerian cultures, serving as a tool for integrating and preserving cultural knowledge in architectural education. It proposes digital tools for conserving and teaching these geometries in architectural curricula. (Nnamdi & Okafor, 2024)

Problem Statement

The loss of indigenous architectural knowledge due to colonial intrusions, modernization, and the absence of digital documentation has prompted the exploration of questions: How can Nigerian indigenous geometries be effectively digitized? What is the impact of digitization on heritage conservation within architectural education? What challenges and opportunities arise in the digital documentation of indigenous geometries?

Area of Study

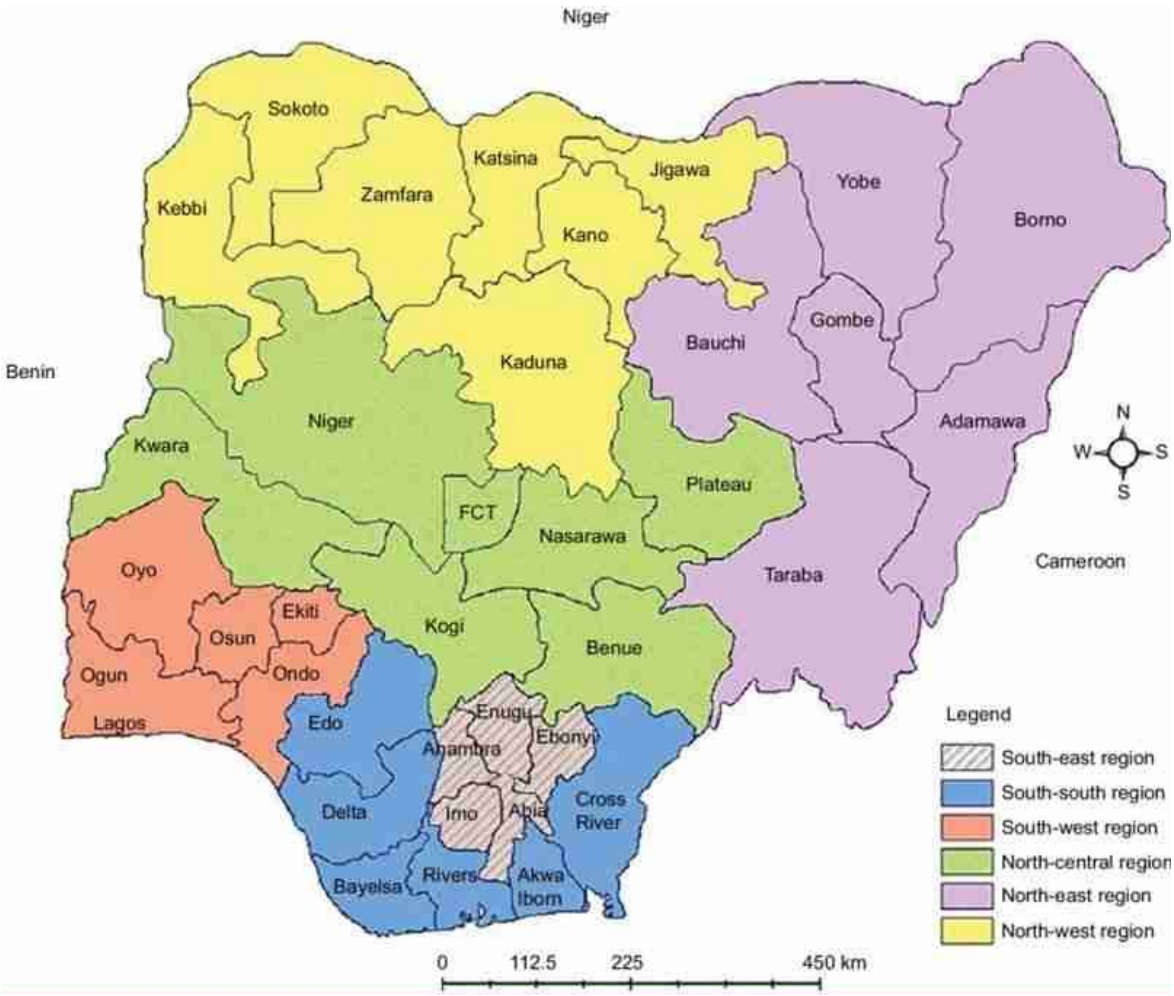

Figure 1: Map showing Nigeria's six geopolitical zones. Source: Online.

Literature Review

Traditional Architecture Geometric Patterns

In Northern Nigeria, the artistry of traditional Hausa architecture is expressed through elaborate wall engravings crafted by skilled decorators, known as Master Decorators, literally called magini mai zane. Decorative motifs are a defining feature of Hausa architecture, serving both aesthetic and symbolic functions (Sani, 2020). Decorative motifs encompass a range of patterns and designs, each carrying specific meanings and reflecting the artistic heritage of the Hausa people (Oloyede, 2021). Decorative elements in Hausa traditional architecture portray ornamentation, carrying significant cultural, historical, and symbolic meanings (Jibunoh, 2020). These elements contribute to the unique identity and aesthetics of Hausa buildings, enriching their visual appeal and preserving

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cultural narratives through intricate designs and patterns (Oloyede, 2021). In essence, motifs, decorations, and interior forms are an essential aspect of Hausa architecture, characterized by colourful designs, vaults, and piers that reflect the celebratory spirit of traditional builders. Hence, Surface decoration is central to Hausa traditional architectural aesthetics. Sa'ad (1981) posited that neither a ceiling can be splendid nor a façade can be called elegant if it is not richly embellished with decorative patterns. Typically, these embellishments encompass a variety of elements, including vaults, piers, decorative archways, and intricate motifs, all designed to capture and delight the eye of observers (Emusa, 2024). Decorative motifs are not merely decorative but are deeply rooted in local culture, beliefs, and the natural environment (Aliyu, 2018). In the Hausa culture, motifs serve multiple purposes, including beautification, storytelling, the representation of social status, and even protection against evil spirits (Bello, 2022). According to Adamu (2005), traditional Hausa architectural decorations are classified into three primary types: surface designs, calligraphy, and ornamental motifs. These elements may all appear together on a façade. Similarly, according to Jibunoh (2020) these motifs, the Hausa geometric patterns which appear in three forms: floral designs, calligraphy, and symbolic imagery, contribute to the unique visual language of Hausa architecture. Firstly, floral motifs, inspired by nature, incorporate elements such as flowers, leaves, and vines into the architectural decoration, adding elegance and beauty to buildings (Mohammed, 2019). These designs, often found on walls, windows, and door frames, symbolize growth, fertility, and the connection between humans and nature (Jibunoh, 2020). Floral motifs range from simple stylized forms to intricate patterns that reflect the region's biodiversity and the creativity of the artisans who create them. Secondly, Calligraphy inscription decoration, literally called zayyana, holds a special place in Hausa architecture, often used to convey religious, cultural, and poetic messages. They are Arabic script, particularly common due to the influence of Islam in the region (Aliyu, 2018). These inscriptions, often found on entranceways and prominent locations, include Quranic verses, blessings, and traditional aphorisms that reflect the spiritual and intellectual heritage of the Hausa people (Dawud, 2020). The integration of calligraphy into Hausa traditional architecture adds profound layers of meaning, connecting the building's aesthetic beauty to cultural and religious values. Lastly, Symbolic imagery also plays a significant role in Hausa architecture, representing concepts such as fertility, protection, spirituality, and social status (Sani, 2020). These motifs, which can take the form of animals, mythical creatures, or abstract symbols, are imbued with specific cultural significance. However, Islamic tenets prohibit the exhibition of figural representation of living objects, be it animals or humans. As such, in the post-Islam period, mason decorators discontinued engraving life objects in their geometric patterns (Sa'ad, 1981; Kurfi, 2017). Some motifs are believed to ward off evil spirits or bring good fortune to the inhabitants of a building (Hassan, 2021). Symbolic imagery thus serves as a visual language that communicates cultural values, historical narratives, and spiritual beliefs.

Igbo Art and Paintings: On the other hand, the indigenous Igbos' graphics narrate tales of historical events and often carry spiritual connotations. The patterns, employed as designs on walls, pottery, carvings, and fabrics, serve aesthetic functions that embody the histories, beliefs, and values of the Igbo communities, predominantly derived from natural forms, spiritual beliefs, and social structures. Indigenous patterns in Igboland are primarily observed in various items of their cultural expressions. Historically, in Igbo Art and Paintings, it was observed that before the arrival of Christianity and Western consumer goods, Igbo carvers crafted items for households, musical instruments, and ritual objects. Stools carved for everyday purposes were made for household use. Intricate stools, which served as symbols of office or status, were specifically created for members of title societies such as Ozo. There were wooden panels shaped like small doors, intricately carved and adorned with geometric designs, and made from sturdy African oak. These panels were placed at the entrances of compounds and houses primarily found in the homes of the relatively wealthy titled men and women. These designed doors served to showcase the owner's wealth and good taste. (Starkweather, 1966).

Wall painting and mural decoration: The Igbo people excel in creating different art forms, including traditional figures, masks, and metalwork that connect the past and the present. Notably, the use of carved wooden doors and Uli paintings formed an integral part of Igbo culture, evident in the artistic practices of Igbo women, where Uli wall painting and mural decoration were the most prominent (Onwuakpa, 2016). This is referred to as the Uli Igbo women's art tradition. The art of drawing these patterns on the body was widely practised before the colonial era. Uli refers to several species of plants in Igboland, processed to produce a dark dye traditionally used to draw geometric patterns of tattoo-like designs on the skin. It is the most significant body decoration culture among the Igbos in South East Nigeria. Many of the design motifs of this body art were also employed in murals, a form of graphic artwork often painted onto the mud or clay walls of shrines with complex features and patterns. The forms are abstract designs inspired by nature. Local mythology states that the practice developed as a gift from Ala, the goddess of earth, who blessed women with the ability to create art, as demonstrated through the creation of Uli. Historically, Uli paintings, motifs, symbols, and colours were used to determine the beauty of the wall decoration and symbolism. Animal and bird motifs were also employed as they were sacred and signified divinities. Many wall and panel decorations depict images that adhere to designs with the circle as the centre. Many artists derived inspiration from Uli paintings and body decorations of the Igbo people, which were evident in the quality, simplicity, linearity, spontaneity and direction. The introduction of this art form began in the 60s, with a prominent

Igbo artist, Uche Okeke, bringing innovations by experimenting with forms of Uli and introducing the design aspect as a means of expression. Uche Okeke created body art inspired by women and girls, often interviewing them when necessary to explore the art's rich implied and applied iconography of his work. His mother was the primary source for documenting Uli's art, teaching him to relax the rigidity of his wrist to produce fluid, swift, and elongated lines. Through extensive documentation of the Uli art medium, Uche Okeke successfully integrated non-verbal linear forms into his already popular drawings, which were uniquely graphic in form and compositional visualization (Emeka & Ehi, 2013). This traditional Uli was transformed into a teaching curriculum with different motifs and symbols. The great artist believed in organic transformation, where things grow from one into another. However, another great artist, Obiora Udechwuku, used Uli to respond to Nigeria's political and social conditions. Obiora posited that Uli was a heritage readily available for use, aiding in the understanding of self and as the basis for encountering other traditions. The background texture in the Uli wall paintings has geometric monochromatic patterns on which the motifs are situated (Nwanna, 2004; Emeka & Ehi, 2013).

Nsibidi Patterns and Geometries

The majority of indigenous geometries in Africa, and by extension in Nigeria's south-south geopolitical zone, have unrecorded graphic images, and most are restricted to the local communities from which they originate (Etefa, 2024). The informal, traditional methods of preservation of these geometries included carved works, blacksmithing, and ancient scripts. These geometries lose their original forms or essence during reproduction. It has become necessary to preserve such geometries in globally understood media to enable and encourage their extensive application, promote their engagement, and retain the original form and meaning. Digital technology has become the available medium for such elaborate methods. It allows for authenticity (Li, Du, Law, 2023). The Nsibidi is an ancient system of graphic communication, indigenous to the Ejagham people of South-South Nigeria. It is also used by the Ibibio, Efik, and Igbo people (Okpu, 2015; Ika, 2022). Aesthetically compelling and encoded, Nsibidi does not correspond to any one spoken language, rather, Nsibidi is a pictographic writing system, not an alphabet, which means that the symbols represent ideas or concepts rather than sounds. They are thus classified as pictograms, though there have been suggestions that some are logograms or syllabograms. It is regarded as one of the oldest organised systems of non-verbal human communication, dating back to at least 2000 CE (Hales, 2015). The Nsibidi consist of gestures, tattoos, symbols, signs and other markings. Ubom further stated that it was used for identifying labels, for public notices, private warnings, declarations of taboos, amorous messages, accounting for goods and money, keeping records, and as body decorations. It is said that some of the emojis we see in our handsets today are derived from ancient African writing systems, such as the Nsibidi. Oral narrations record that there are over 1800 different Nsibidi symbols, each with its own meaning. Media on which these symbols are used include printing on fabrics to be worn, making tattoos on bodies, decorations on walls and building items (Ika, 2022). Akpowu (2014) in a study on the application of Nsibidi Expression in the design of Tinapa Resort Apartment Hotel, Calabar, noted that only the decorative with a hint of mythical aspects of Nsibidi was used in the design of the Apartment hotel. The decline in the use of Nsibidi was ascribed to the limitation of its interpretation and use by members of a secret cult, and eventually to colonialism. The Yoruba traditional geometries also suffered the same fate due to colonial acculturation and obliterations. Meaningful patterns were lost due to external influences. Meaningful patterns were lost due to external influences. The Yoruba ethnic showcased patterns, signs, symbols and identities through diverse media such as household elements (windows, timber doors, facia-boards, poles, cornices, murals and mud art). Other media include fashion, body art, embroidery, crafts and ornamentations recognisable to the people. (Nnamdi & Okafor, 2024)

Importance of preserving indigenous architectural geometries

Preserving indigenous geometry is not merely about maintaining forms; it is about sustaining the wisdom, values, and adaptive intelligence embedded within the people and the community. The study of indigenous architectural geometries reveals, amongst other factors, a sophisticated understanding of cultural identity and continuity, architectural diversity and innovation, environmental sustainability, educational relevance, heritage preservation, social cohesion, and community resilience. (Nnamdi & Okafor, 2024)

2.0 Methodology

Using a case study approach, four geopolitical zones, South West, South East, South South, and North West, of Nigeria, were randomly scrutinised. Engaging in observation and collecting patterns and symbols from the communities, an interpretivist framework was employed to enhance the understanding of manual extractions of patterns, signs, and symbols. Additionally, the available drafting software, AUTOCAD, was utilised to digitise the graphical representations of native plans. Field surveys and documentation of indigenous geometries were conducted, along with interviews with architects, educators, and local artisans.

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3.0 Results and Discussion

The research revealed an increasing loss of homegrown patterns, symbols, graphics and histories that authenticate their traditional significance and broader applications in both society and learning. Furthermore, foreign architypes have gradually undermined local values, resulting in a significant decrease in the use of local graphics and principles in their deployment across media. It was found that there are two major classifications of geometric patterns in Hausa traditional architecture. They are known as Dagi (symbolic and floral design) and Zayyana (Islamic calligraphy inscription). The symbols or features found in dagi include sarka, literally chain, Gora, literally continuous horizontal and vertical strips (3), Jan-rawani, literally top skirting, Bundi, literally bottom skirting, Kwakular chafe, literally hand mud/cement engraving, tambari, literally round symbol, kan-kadangare or Kan-maciji, literally lizard head or snake head. Other architectural features regarded as decorative or geometric patterns include Giraa, a protruding wall; Zanko, literally a pinnacle; and Rawani, literally a parapet wall. Additional decorative motifs found include calligraphic writings on walls, entrance doorways, and both interior and exterior surfaces. The inscriptions are merely Qur'anic verses that convey messages regarding justice and communal protection from spiritual and temporal influences. It has also been discovered that the dagi geometric pattern is classified into two types: Dagi and Chafe. The distinction is that dagi was originally a geometric pattern intended for engraving on the interior walls of a building, while chafe is executed on the external wall surfaces alone.

Plate. 1: Chafe and Dagi geometric Pattern-image credit- Salim Bashir

Plate. 2: The Chafe symbolic features displayed on the external wall surfaces portray the patterns vividly divided or segmented by Goraa

Meanings and Symbolisms of Native Patterns

Uli motifs

Uli was celebrated primarily for its aesthetic appeal; a young woman adorned with Uli would garner the admiration of the entire community. Body graphics were not a daily routine; Uli was painted periodically during significant moments in a young woman's life. At the time of betrothal and marriage, at the naming ceremonies of a newborn, and with a young woman's untimely death, indigo designs were applied to the body (Lieber 1971:61; Basden 1966:222, 28) Many of the motifs used in the traditional decoration of Igbo Architecture are adapted from these Uli patterns. These patterns are artistic with a combination of abstract and geometric motifs. The designs attracted extreme admiration and keen curiosity from most artists, who exclaimed at the boldness and vigour in design and its extraordinary characteristics of curves, lines and techniques. Most artists wanted to know more about these designs. (Neaher, 1981; Nsude, 1987). Figs. 3 and 4 illustrate the distinctive Igbo styles in decorating the walls of their houses.

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Plate.2. A typical Igbo compound wall with a carved gate adorned with geometric patterns. Source: http://ukpuru.tumblr.com/

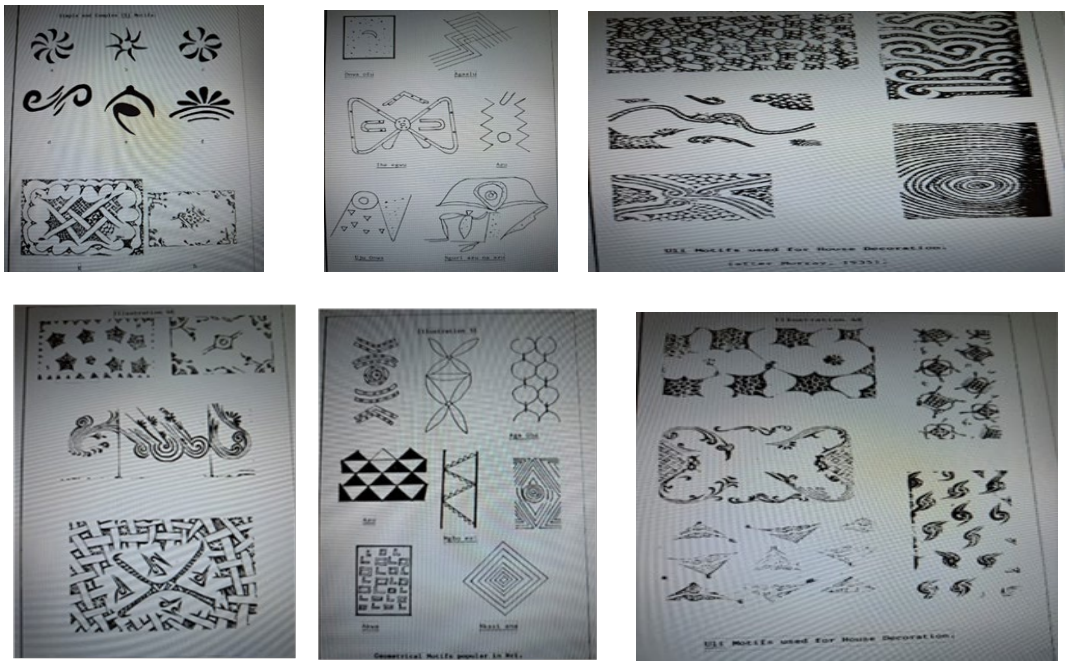

Plate.4: Simple and complex motifs arranged to create patterns. These items were used for decorative purposes in the Igbo household. Source: Online

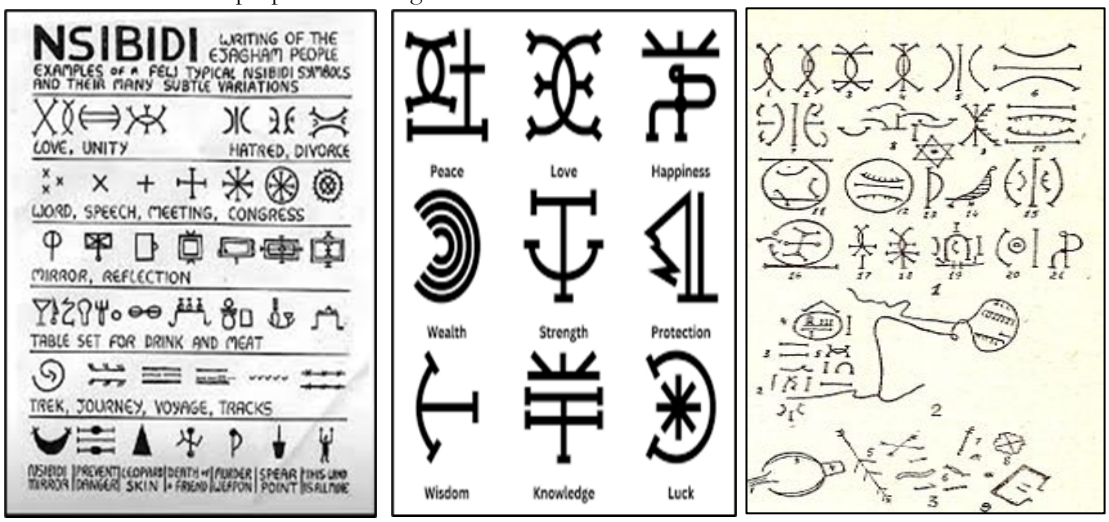

Plate.4 Nsibidi Patterns- Benson, Imaekop. 2020. "The Origin of Ekpe Masquerade and the Nsibidi symbolsin Southern Nigeria." IDOSR Journal of Communication and English. 5(2): 13

Igbo Geometrical Motifs

In the Southeast zone, geometrical patterns, such as lines, dots, curves, polygons and triangles found predominantly on traditional Igbo doors are not merely decorative; they signify membership in society, like the sociopolitical Ozo title in Igbo land. This significance can be likened to a relationship between the geometric motifs on the doors and the 'itchi' ritual marks worn by the northern Igbo. All the motifs are indigenous to the Igbo people (Nsude, 1987).

Plate 5: An Igbo woman's woven wrapper (popularly known as Akwete**).** The Igbo women's woven wrapper 'Ikaki bite' is a specific design or motif. Source: Http://ukpuru.tumblr.com/ Museum of Applied Arts & Sciences, Australia

Akwete patterns used on a head scarf by women. These geometric patterns of the Akwete symbolise wealth, status, and creativity. Source: Photocredit: Miriam I. Chukwuma-Uchegbu, 2025

Akwete cloth is a special hand-woven fabric made by Igbo women in the Akwete area near Aba in Abia State, Nigeria. The wrapper was first woven by an Igbo woman in Akwete using a women's vertical loom with a continuous warp design known as ikaki bite (tortoise cloth), and it is mainly ordered by coastal Ijo-speaking people, from whom it gets its name. The motif is based on the oni, crocodile, pattern of Ijebu-Ode aso olona traded textiles, which may reflect Akwete weavers conforming to the tastes of their primary customers. This cloth is a rich tapestry of tradition and innovation, patterned with motifs of symbolic designs telling stories of Igbo culture, beliefs, and history, making it a unique and valuable textile. The distinguishing feature of Igbo Akwete weaving consists largely of cotton, the most commonly used material in Akwete weavings, and is decorated with rayon supplementary weft patterning. Akwete weaving, originally referred to as "Akwa Miri" (cloth of the water, meaning Towel), is a unique form of textile production not practised elsewhere in Africa, primarily worn by Igbo women as wrappers. During the mid-1900s, weaving in Akwete shifted from being a part-time occupation for some women to a full-time occupation for most women. Consequently, girls are taught how to weave Akwete cloth from a very young age. This hand-woven cloth is part of a collection of West African textiles, spindles, hand-spun yarn, and thorn carving, collected by Dr C. Marion Petrie. Dr Petrie was an employee of the British Colonial Service in Nigeria and Ghana, in West Africa, between 1957 and 1966. Akwete cloth weaving is as old as the Igbo nation (Tonnani, 2015)

Yorùbá Àdìrẹ Patterns

Plate 7: A combination of various geometric shapes, figures in different local names and meanings.
Image credit: Mọ́kọ́ládé Johnson 2025

Elẹ́wé-mẹ́rin means four leaves in Yorùbá. *Elẹ́wé-mẹ́rin* pattern is believed to have been created by cultural custodians in the early 20th century. It was inspired by the agrarian culture, from the palm leaves were arranged in a particular way. The pattern followed four leaves arranged in a diamond shape. The basic shapes in the pattern include squares, circles, diamonds, semicircles, arcs and rotated squares. It is an intangible meaning pattern represents strength, determination, and creativity.

Geometric Patterns

The Akwete cloth is created in different colours and patterns. Due to its size, shape, and the versatility of its geometric motifs, Akwete cloth offers many uses. Although intended primarily as a woman's wrapper, it is frequently woven in matching pairs because women of this area often use an upper and lower wrapper. It has also been used for dresses and other garments, as well as for wall hangings, covers, drapes, bedspreads, and other decorative uses (Davis,1974). Some Akwete weavers often use more than three or four motifs in a single cloth, although they claim to know over one hundred different motifs. Many motifs are simple variations of each other. Any special circumstances surrounding the development of a new motif typically involve either the weaver or the wearer, and traditionally, the creator of a new motif receives an unwritten "copyright" (Davis, 1974). Traditionally, some families have unique motifs, although the same motif may be referred to in different names by various weavers. Davis (1974) stated that in some contemporary weavers, certain motifs were gifts of creative inspiration from a divinity to favoured weavers, and it was forbidden for other weavers to use such a motif. When that weaver died, the motif could no longer be created, and existing cloth containing it increased in value and prestige. (Nnamdi & Okafor, 2024)

Symbolic Motifs

Although the origin of motif ideas is no longer accepted as divine, a few older ones would be considered unlucky or disrespectful to reproduce. Motifs in Igbo culture often serve as significant symbols that embody traditional beliefs, legends, and practical tools. For instance, specific styles of motifs, such as the ebe, have historically been reserved for individuals of royal status or utilized as talismans intended to offer protection to pregnant women or warriors preparing for battle. This delineation not only reflects the cultural heritage and social hierarchy of the Igbo people but also underscores the integral role of artistry in the expression of identity and spirituality within the community. Other patterns were reserved for special families or occasions because of the circumstances

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surrounding motif origin. Nnadede cloth, named after a notable figure from the Akwete region in the 1860s known for his military victories, exemplifies one of the rare reversible designs of Akwete cloth. This unique fabric features a woven pattern that is identical on both sides. It has a symmetrical design composed of rectangles formed by intersecting vertical and horizontal thin stripes. A dot, or "star," is woven alternately in the center of the rectangles. Wider stripes divide the cloth into two sections. This beautifully designed and woven cloth was given to him by his father during one of his triumphal returns. For many years, that pattern was reserved as a status symbol and for ceremonial dress, but it gradually took its place among the commonly used traditional Akwete designs. To date, it is still highly regarded, due to its lore and the skill required to weave the reversible cloth. It is sometimes referred to as "star" cloth. A history of Akwete could be written using the evolution of terms applied to their cloth motifs. Though future extensions can be in the area of digitization strategies for Nigerian indigenous geometries, pathways can include, techniques and tools for digital documentation, photogrammetry, 3D scanning, CAD modelling, AI and machine learning in pattern recognition. This can be augmented by developing curriculum modules for integrating indigenous geometries and virtual and augmented reality for immersive learning experiences.

4.0 Conclusion

The study highlights a significant gap in the recognition and integration of indigenous Nigerian geometries within architectural education and other creative disciplines. By emphasizing traditional spatial patterns, symbols, and visual systems rooted in local knowledge, this research contributes to ongoing discussions about decolonizing curricula and enhancing culturally responsive teaching methods. The findings indicate that incorporating indigenous geometric practices into formal education—supported by contemporary technologies such as digital modeling and 3D rendering—can be an effective strategy for preserving intangible heritage. Additionally, the study calls for coordinated, multi-level initiatives by educational institutions and government agencies to institutionalize native geometries within modern design frameworks. These efforts are crucial for preventing the loss of localized knowledge systems and for fostering sustainable, culturally grounded innovations in architecture and related fields. Architectural curricula can enrich learning by including Indigenous design principles in textile patterns and symbolic carvings. This integration helps students grasp how traditional aesthetics influence spatial organization and cultural identity. The symbolism in spatial design within local architecture is deeply connected to native spiritual perceptions, for instance, through metaphors in doors, homes, and language. This connection opens up discussions on how these symbols shape spatial experiences and interactions. The use of digitization and artificial intelligence technologies, in conjunction with the Internet of Things, can inspire parametric design and algorithmic modelling. This allows students to reinterpret traditional motifs into contemporary forms using digital tools. Homegrown patterns, shapes, and symbols in architecture emphasize communal living, and future architects can learn to design spaces that promote social cohesion while honoring cultural traditions. By blending local architectural heritage with modern teaching methods, educators can establish a culturally relevant architectural education system. This study underscores the urgent need to reposition indigenous Nigerian geometries within educational and creative frameworks as a plan for cultural preservation and innovation. By integrating traditional knowledge with contemporary pedagogical tools and technologies, schools and institutions can foster a renewed appreciation for native forms and their relevance in modern design. The findings advocate for inclusive curricular reforms and multilevel policy support that bridge historical practices with current and future applications. In doing so, heritage geometries can be safeguarded not only as cultural artifacts but also as dynamic elements in contemporary architectural and creative expression. The study advocates the preservation and revitalization of indigenous Nigerian geometries as vibrant cultural assets and sources of innovation via curricular integration, inclusion of indigenous geometrical knowledge, patterns, and design principles in national curricula at primary, secondary, and tertiary levels, especially within subjects such as mathematics, art, architecture, and technology, create interdisciplinary units that connect traditional geometry to other education sectors. Partnering with cultural custodians, historians, and artisans to co-develop training content and encourage collaborations between creative professionals (e.g., architects, fashion designers, digital artists) and indigenous knowledge curators to deploy traditional geometries in contemporary design and product development.

References

Abimbola, W. (1976). *Ifa: An exposition of Ifa literary corpus*. Ibadan: Oxford University Press.

Abiodun, R. (2001). African aesthetics. *Journal of Aesthetic Education, 35*(4), 15–22.

Adejumo, T. (2012). Dynamic space agenda and the conceptualization of public place in Yoruba urbanism. In *Landscape in Transition Conference Proceedings, 49th International Federation of Landscape Architects Congress* (pp. 518–529). Cape Town, South Africa. https://www.ifla2012.com

Aliyu, K. (2018). The influence of Islam on Hausa architectural styles. *International Journal of Islamic Architecture, 10*(2), 255–272.

Aliyu, K. (2021). Cultural significance of Hausa decorative arts. *Journal of African Cultural Heritage, 18*(3), 205–220.

Aliyu, M., & Haruna, H. (2021). Architectural revivalism: The progressive design approach in Hausa communities. *International Journal of Architecture, Arts and Applications, 7*(4), 143–149.
Bello, A. (2022). Symbolism in Hausa decorative motifs. *Journal of Cultural Studies, 18*(2), 190–205.
Babade, T. (2008). *Akojopo ijinle owe Yoruba pelu itumo ati iloo won ni ede Geesi* (Vol. 1, pp. 249–251).
Bargery, G. P. (1934). *A Hausa-English dictionary and English-Hausa vocabulary*. London: Oxford University Press.
Bascom, W. (1969). *Ifa divination: Communication between gods and men in West Africa*. Bloomington: Indiana University Press.
Davis, M. (1974). Akwete cloth and its motifs. *African Arts, 7*(3), 22–25.
Dasylva, A. O. (2011). Yoruba Omoluwabi and the concept of the persona. Public lecture delivered at the University of Georgia, Atlanta, USA.
Dawud, S. (2020). Traditional tools and construction techniques in Hausa architecture. *Construction History Review, 12*(1), 45–62.
Diyaolu, I. J. (2010). Role of dress in socio-cultural events among the Ijebu-Yoruba, Ogun State, Nigeria. *Journal of Home Economics Research, 13*, 35–41.
Dmochowski, Z. R. (1990). *An introduction to Nigerian traditional architecture* (Vol. 3: Northern Nigeria). London: Ethnographica.
Etefa, S. (2024). Preservation of indigenous knowledge and appropriate technologies. Retrieved from https://www.researchgate.net/publication/385301074
Hales, K. (2015). The moving finger: A rhetorical, grammatological and Afrinographic explanation of Nsibidi in Nigeria and Cameroon. Ohio University. http://rave.ohiolink.edu/etdc/view?acc_num=ohiou1431071905
Hassan, M. (2021). Decorative motifs in Hausa traditional architecture: A cultural study. *Journal of African Cultural Heritage, 16*(1), 85–100.
Hillier, B. (1999). The hidden geometry of deformed grids: It works when it looks as though it shouldn't. *Environment and Planning B: Planning and Design, 26*(2), 169–191.
Isiboge, O. E., & Diapkaromre, A. M. (2015). Sculptural formalisation of social stratification in Urhobo, Delta State, Nigeria. *International Journal of Science and Research, 4*(6).
Isola, A. (2009). Yoruba culture in education. In P. A. Ogundeji & A. Akangbe (Eds.), *Omoluabi: Its concept and education in Yorubaland* (pp. 89–112). Ibadan: Ibadan Cultural Studies Group.
Jibunoh, T. (2020). The role of decorative elements in Hausa traditional buildings. *Architectural Heritage Quarterly, 11*(2), 123–140.
Kurfi, M. H. (2017). Hausa calligraphic and decorative traditions of Northern Nigeria: From the sacred to the social. *Islamic Africa, 8*(1–2), 13–42.
Li, Y., Du, Y., & Law, A. (2023). A review of the tools and techniques used in the digital preservation of architectural heritage within disaster cycles. *Heritage Science, 11*, 199.
Majasan, J. A. (2009). *Yoruba education: Its principles and practice and relevance to current educational development* (Unpublished PhD thesis). University of Ibadan.
Mohammed, B. (2019). Floral designs in Hausa architectural decoration. *Botanical Studies Journal, 6*(2), 78–90.
Moughtin, J. C. (1985). *Hausa architecture*. London: Ethnographica.
Neaher, N. (1981). Igbo carved doors. *African Arts, 15*(1), 49–55. https://www.jstor.org/stable/3336006
Nsude, G. C. (1987). *The traditional architecture of the Igbo of Nigeria* (PhD dissertation). Thames Polytechnic.
Nwanna, C. (2004). *Life and works of Uche Okeke as a contemporary Nigerian artist* (Unpublished M.Phil thesis). University of Ibadan.
Offoboche, A. (2008). *Tinapa Resort Apartment Hotel Calabar: Application of Nsibidi expression* (Thesis). Ahmadu Bello University, Zaria.
Ofomata, G. (Ed.). (2002). *A survey of the Igbo nation* (pp. 99–116). Onitsha: Africana First Publishers.
Okoye, C. B., & Ukanwa, O. E. (2019). Igbo traditional architecture: A symbol of Igbo cultural identity. *International Journal of Scientific & Engineering Research, 10*(11), 84–88.
Okonkwo, I. E., & Akhogba, A. E. (2013). Uche Okeke as a precursor of contemporary Nigerian art education. *International Journal of Arts and Humanities, 2*(3), 53–67.
Okpu, O. (2015). Nsibidi: An artistic expression and communicative system in South Eastern Nigeria. *Arts and Design Studies, 29*, 88–94.
Oloyede, A. (2021). Cultural and symbolic meanings in Hausa architecture. *Journal of Architectural Symbolism, 9*(4), 303–319.
Omekwu, C. O. (2003). Information technology revolution, libraries and cultural values: Issues, impacts and inevitable challenges for Africa. In *Proceedings of the 69th IFLA General Conference and Council*, Berlin.
Onwuakpa, S. (2016). Visuality and representation in traditional Igbo Uli body and mud wall paintings. *African Research Review, 10*(2), 345–357.
Osasona, C. (2007). From traditional residential architecture to the vernacular: The Nigerian experience.

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Roberts, E. (2007). W. G. Hoskins's "Great Rebuilding" and dendrochronology in Hampshire. *Vernacular Architecture, 38*(1), 15–18.

Sa'ad, H. T. (1981a). Decorative motifs in Hausa architecture. *Savanna, 10*(2), 45–58.

Sa'ad, H. T. (1981b). *Between myth and reality: The aesthetics of traditional architecture in Hausaland* (PhD dissertation). University of Michigan.

Sa'ad, H. T. (1986). The impact of modernization and westernization on traditional Hausa architecture. *Kano Studies, 2*, 1–20.

Sani, K. (2020). Hausa decorative motifs: An artistic expression. *Journal of African Arts, 19*(1), 22–39.

Starkweather, F. (1966). *Traditional Igbo arts*. University of Michigan Printing Office.

Tonianni, A. (2015). Nigerian design patterns. Retrieved June 2022, from https://tonianni.wordpress.com/2015/05/12/nigerian-design-patterns-akwete/

Uka, G. O. (2022). The making of meaning in Nsibidi visual method of communication in Nigeria: Innovation and development. *Journal of Contemporary Research, 19*(4), 54–71.

Yusuf, M. (2019). Color and symbolism in Hausa decorative arts. *Journal of Visual and Cultural Studies, 14*(2), 180–189.

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