Reviewing sustainability, preservation and semiotics of potsherd pavements in southwest Nigerian cultural spaces and built-forms

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Abstract. Potsherd as used in southwest Nigeria Yoruba ancient civilization to pave walkways are continuously discovered along major migratory route from Ile-Ife to Notche in Togo. Its durability was compared to early terracotta pioneer road materials of the Roman and pre-modern Europe. Popularly called Potsherd pavement; the differently beautifully patterned ceramic materials were original to Queen Luuwo; a past and only female Ooni of, the Yoruba historical capital Ile-Ife. Despite not being preserved they remain sustainable indigenous material art and technology used around cultural spaces and built-forms since the 9th-12th century. Reviewed by visitations were some sites of the waste-to-wealth sustainable ceramic paving materials on which much work had not been done by built environment experts. Apart from its original denotative function as a walkway material, it also had ritual, storage, community and presently historic semiotic implications adducible to it. The research used theories of pioneer semioticians; Saussure and Pierce’s as well as denotation and connotation by Eco. “Archaeological” method to compare the cultural material use of spaces, the general semiotic and Elleh’s African triple heritage concept. The study discovered that the cultural and tourism imperative of pavements are not appreciated and so they are not preserved. The use of physical observation, interview and systematic review of past low traffic-making and contemporary engineering applications for the qualitative research helped the discovery. The study concluded that proper preservation of potsherd pavements, drawing out their symbolic meanings and continued application would contribute to build environment sustainability in the study area.

Keywords: Paving, Potsherd Pavement, Material, Southwest, sustainable, Global Semantic, Semiotics.

1. Introduction

The greatly extolled Ife-Yoruba artistic golden age culture was alluded, to the Greek civilizations for over a century by explorers but is now being continuously debunked according to [1]. Closely related to this is description of the early 18th century London-Norfolk, four days’ journey through a sparsely lit, poorly maintained roads that dissolve into mud in wet weather [2]. Interestingly, oral tradition also spoke of splattering of mud on Ife’s queen Luuwo, which made her order the construction of potsherd pavements, around the all public and religious spaces (obviously her path). Queen Luuwo, was the only female monarch ever in Ife, all because she turned the pavement art into a sort of compulsory enlistment issue, even women while the males were at war. Potsherd pavements were alloy road materials or early ingenious efforts highway engineering about the time of Roman terracotta road developments. Potsherd pavement was regarded by an archeologist as a regional architectural phenomenon, but may be at best seen as a landscape architectural element in modern architectural interpretation. However, the resilience of the indigenous floor (walkway) paving art for over ten
centuries in some cases is such that its sustainability quality cannot be downplayed. It also has various implicit historic values ranging from its use to classify the history of Ile-Ife into pre and post pavement respectively and for migrations borders and identities, [3;4;5;6].

Architecture is variously represented in the form of building, interior and landscape designs, in this context are man-made material ordering of our environment. This include material and constructed spaces, like curbs and skate ramps to high-rise hotels, retail parks and urban landscapes [7;8]. Architecture and urbanism are related disciplines of built-forms and cities design respectively with the city being a socio-physical network of subjects and objects [9]. Built-forms of the study area are within indigenous, Islamic and western classifications of the African architecture triple heritage [10]. This was used earlier for better understanding African history by [11], to relatively fit in as a 3-era balanced holistic sequential dateline approach. Indigenous heritage consists of things before or without Islamic or western culture influences such as; the Potsherd pavement, moats cum city walls like the Ijebu-Ode’s Sugbon Eredo and the Olumo rock war time refuge rooms.

![Figure 1: Nigeria’s southwest geopolitical](image)

For this study, the strictly utopian indigenous time can modestly be dated to be about the 7th century and the 12th century with some faint traces till date, as the traditional built-forms typology [12]. The Islamic heritage post 12th century had built-forms with separated harems for women and mosques. The western heritage period includes the Brazilian built-form styles that led to tropical modern buildings (international ‘style’) and the post-modern style, from the 17th century of the colonial, missionaries, to about the time of Nigeria’s independence.

2. Sustainable Environment and Architecture

There is a necessity for ingenuity to be able to ensure a development that can match the rate of urban growth and the ever increasing population of the study area without compromising quality of life [14]. Environmental sustainability came from response to the industrial revolution and the subsequent global challenges of the eco system, resource depletion and pollution. Modern sustainable development concept became clear, as a new development paradigm through the World Commission on Environment and Development (WCED). From the 1970 first earth day by the U.S.A and the Stockholm, 1972 first UN conference on human environment, also the 1980 world conservation meeting where the word ‘sustainable development’ appeared first used.
Therefore, sustainable development was defined as what is done to meet present generation needs, without compromising the ability of the future meeting of needs and aspirations (1987 WCED). Important to sustainability discourses, was ensuring appropriate relationship between two complementary but sometimes conflicting concepts of environment and development, while maintaining equitable balance between them for the present and the future. As human-induced development is largely responsible for environmental problems, sustaining the environment must ensure developments with minimum negative impact on the environment. A sustainable environment is one, where resource utilization and associated emissions, do not impair the self-regenerating and self-regulating capacity of the natural environment. The construction sector of the built environment plays a major role in the pursuit of a sustainable environment in terms of energy, resource consumption and GHG emissions [15]. The built environment performs a positive role through the provision of shelter, infrastructure and employment; however, its negative role is of particular importance to sustainability. Therefore, making the entire building stock sustainable to protect occupants’ health and well-being is a goal to be pursued by all stakeholders in the built environment. Buildings are Sustainable, if designed, built, renovated, operated or reused resources efficiently, (including water, energy and other resources) to reduce negative environmental impacts. The observed reduction in use of local materials; a key to energy efficiency of buildings and high imported materials in Nigeria, must stop. Sustainable architecture produces healthy comfortable, energy efficient, flexible and long lasting built-forms to show the wide implication of sustainable development on the built environment. Sustainable or green architecture entail environmental conscious, earth friendly design that encourages recycling existing resources and reducing harmful substances, emission to the environment [13, 14]. This will entail built-forms using the six logic and methods of eco-technic, eco-centric, eco-aesthetic, eco-medical, eco-social and eco-cultural as well and the six basic sustainable activity principles which implies procuring built-form that is environmentally responsive, energy efficient, socially inclusive and economically affordable [14].
Table 1: Basic principles of sustainable activities

| Sustainability Principle       | Remark                                                                 |
|-------------------------------|-------------------------------------------------------------------------|
| Conserving energy             | A building should be constructed so as to minimise the need for fossil fuel to run it |
| Working with climate          | A building should be designed to work with climate and natural energy sources |
| Minimise new resources        | A building should be designed to minimise the use of new resources and at the end of its useful life to form the resources for other architecture |
| Respect for users             | A sustainable architecture recognises the importance of all the people |
| Respect for site              | A building design for sustainability will touch the earth lightly |
| Holism                        | Principles of green architecture need to be embodied in a holistic approach to the built environment |

Source: [16]

2.1 Sustainability, Preservation, Semiotics, Meaning and Architecture

The basis of Sustainable development is triple, thus; environmental protection, social equity and economic growth, with culture as a fourth or self-standing additional bottom-line, as a tree on which the identity people is rooted. Economic and social system entails enhancing peoples’ living standards by balanced preservation, conservation and maintenance oriented resources exploitation methods [17]. The cultural aspect is where semiotics, having been used to variously interpret meaning in architecture and meaningful urban development come relevant. There are elements of sustainability in [18] overview of visual arts meanings in the semiotic analysis of the art and architecture of ancient Greece and Rome where, five different levels of meanings were given. They are; factual meaning, conceptual meaning, explicit historical meaning of images, implicit historical meaning of images, and actualized meaning of images. Modern methods for meaning in ancient arts and interpretive architecture were further discussed to be Hermeneutics, phenomenology, grounded theory and visual agency.

Semiotic was a visual language tool in Egyptian Mamluk architecture by [19], for analysis using architectural linguistic properties, elements and tools such as, signs, codes, denotations, connotations and symbols. These were described as primary cum secondary, metaphors cum metonymy, articulations cum semiotic reading of texts in the interior and exterior of the funerary. Symbolic variable attributes were differentiated from the usually fixed sign attribute that sees the minaret as a sign to imply function of call for prayer, and symbolic to remind someone of Islam. Others could be structures like the spiral minaret of Samarra placed on postage stamps identify some countries. Objects as signs have (literal) functional denotative physical interpretation; and figurative connotative or deeper symbolic meanings at the spiritual, conceptual or idea level.

Figure 3: Eco’s theory of the Denotation and Connotation

Source: Adopted from [20]
A socio-semiotic investigation on meaning in the change of urban heritage of historic areas in Yogyakarta, Indonesia was carried out by [21]. Relevant here also is the examination by [22] of the semiotics of social memory and cultural values in the urban space of Volgograd (Stalingrad) [23]. Semiotic case study of Tashkent pre and post-soviet city centre emphasized the use of the built environment for the assertion of cultural values. The connection of collective memory with the strategies of perpetuating memory of important events was explained, making the city to be seen as a commemorative space that is viewable as a sign and a text. This was the case in the study of the street layout of an Omani walled city.

Semiotics in urban studies can be viewed in two ways; the structural analysis of sign systems which focuses on the interrelationships in the semiosphere of the city and the phenomenological analysis of emphasized sign processes. A sign (for example, the word “ship”) may be recognized by the presence of its constituent parts. This in semiotic theories is based on Saussure’s concept, at least, here the signifier (the container, or the sign’s perceptible form: the word; ship) and the signified (the meaning or content). All life form engages in the use of signs, however only humans are aware of their existence. Only humans inquire into semiotics, or sign activity which without an exception has its core in the realization that, every human experience is an interpretive structure mediated and sustained by signs. There was a Zimbabwean study on heritage, semiotics and innovations: architectural space, object-designs, meanings and implications in sustainable development on the post-colonial changes in land use policies, slum improvements and urgent built-form development. The development was such that tilted more towards global forms that down played the rich indigenous heritage. It is such that areas that are disregarded are intentionally visually articulated [24].

3. Methodology

The paper, reviewed the sustainability and preservation status of potsherd pavement as a cultural urban landscape architecture material found in course of studying the cultural spaces and built-form of some selected cities of southwest Nigeria adopting a qualitative research method. The historical research was out to prove architecture as part of a past transcending Yoruba civilization seeing potsherd as a cultural generative concept that came from within the architect’s (Akole-Inu). For a comprehensive appreciation of the case studies beyond visual quality, the archaeological method [24] was adopted. An interpretive research method was used in natural settings with the goal of making sense and interpreting the phenomena with emphasis on meanings attached to cultural built-forms and materials by people [25]. Data generated from observations and interview of people, individually and collectively was analysed using Eco’s semiotic theory of denotation and connotation as a tool. Semiotics was used for the analysis of potsherd pavement art and architecture is applied to bring out, whichever is applicable of the five levels of meaning by [18]. Insights from the ‘African triple heritage classifications of built-forms selected historical cities in the six states of southwest Nigeria geopolitical zone’s cultural built-form, spaces and practises especially the indigenous are used.

4. Findings and Discussion

4.1. Ile-Ife potsherd pavements sites

4.1.1. Ita Yemoo (potsherd square)

The renowned National Commission for Museums and Monuments (NCMM) archaeological site under the Federal Ministry of Culture and Tourism is located on Moore Street in Ife East LGA, Ile-Ife. It used to be an originally fenced-off and guarded 3-acre piece, with a pottery, bronze sculpture and artefacts museum and mass herringbone potsherd pavements. Despite being so known, a 2018 visit, showed a multi-purpose hall built on most of the pavement, without due recourse to the potsherd pavements’ continued preservation. This shows the careless stance of stakeholders even when potsherd retain its naturally transcendental cultural sustainable quality.
Figure 4: potsherd pavement in Ita Yemoo and virtually all over Ife vicinity
Source: Author’s field survey in 2018.

4.1.2. Yemoo Grove
It is one among the few cultural spaces found preserved in the Aafin (palace), Ile-Ife whose past legendary queen Yemoo became a well and is deified. There is the well, green landscape element on the site such as, an old tree, shrubs, with the potsherd pavement on the walk way in figure 5a and b, as this research’s focus. The grove remains a great symbol of indigenous built-form and space, though when it was built is not known. The potsherd is primarily a paved walkway from the fenced grove entrance to the well at its centre, near the other end of the fence. Figure 5 (b) shows a beautiful sight, rhythmically tightly laid in straight short rows piece interspersed with green growths by design. It is well maintained and remains one of the few purpose designed potsherd pavement site still preserved. It is fenced off and gated with, beautiful cobble stone finished arched entrance with metal frontage part of which is the entrance door.

Figure 5a. The entrance Yemoo grove entrance view
Figure 5b. Inside view of the Yemoo Grove in Ile-Ife
Source: Author’s field survey in 2018.
4.2 Oshogbo potsherd pavements sites
The Osun Osogbo grove curating team, led as guides to a Potsherd Pavement site in the town, found years back, yet to be studied or recognised, it was met being used as a mechanic yard. Movement of cars daily remove the heritage architectural element. The site users hinted readiness to vacate if compensated. However without a drastic action, the site’s intricately laid near herringbone patterned potsherd pavement, might be gone within a year. The slightly steep, uneven site; exposed to the typical cut and fills activities, of the road facing site, from which there is no designed manner of approach for vehicles.

Figures 6a and b: Potsherd Pavements in Osogbo
Source: Author’s field survey in 2018.

Continuous driving friction caused “dry erosion”, (questioning potsherds’ pressure resistance ability) shown in Figure 4: the little left of the continued destruction of the large paved surface of this great past work of art to learn from.

4.3. Ibadan potsherd pavements site
This site was studied with information from [26]. Ope-Odu was found to be part of a high spate of non-strictly controlled urban development given the expansion and movement from the city core as such all cultural built-forms were gone. The potsherd pavement site was located at the centre of the Elewuwo earth road construction in Ope-Odu, which from hindsight, in Ile-Ife and Oshogbo was still recognisable even though sadly the potsherd were gone. Figures 7 below shows the details of the earthen road without a sign of potsherd pavement having ever been there before.

A nearby resident gave the opinion that the group of archaeologists from the University of Ibadan went away with samples found in their earlier study. Potsherds in the Ibadan Ope-odu sub-urban area were gone with the earth road construction apart from locating the spot where they were found. This trend of potsherd removal seemed normal to archaeologists in literature, who including Dr. Orijeme, one of the earlier researchers, when interviewed supplied some pictures, taken previously as the only evidence of potsherd being ever on the site. The pictures shown in figure 8a-e, reveal the design of the potsherd pavement to be of herringbone pattern. This is a sad pointer to increasing spate of losing our built environment heritages, because of the way stakeholders handle them with impunity. Figure 7 and 8 show sites of the potsherd pavement when exhumed and as it was with associated pots during Ope-Odu earthen road construction

Figure 7: site with potsherd gone
Figure 8a potsherd pavements with two buried pots
4.4 Discussion

Potsherd pavements were found as part of other cultural spaces and built-form being studied in the southwest geo-political zone in Nigeria. They were only found in five sites three of which were in Ile-Ife and the others in Osogbo and Ope-Odu Ibadan respectively. Out of these sites it was only the ones in the less traversed grove and shrine that were met preserved and have the opportunity semiotic interpretations for meaning. Where found the pavements functioned historically in denotation as walkways, for water collection in impluvium courtyards and to keep medicinal or ritual pots as evidenced in Figures 8d-e. Potsherd pavements sites now serve to symbolise old Yoruba civilization and as such as connotation for tourism. Potsherd pavement in line with literature belongs to the indigenous class of the three heritages of African architecture because in the few places where they were still found they remained intact without Islamic or western influences. It is now more like a relic and it can only be regarded as a regional phenomenon as far as it is being found more in literature widely across the west-African region in archaeological literature. An architect and landscape architect in the focus group in authenticating data saw potsherd pavement rather as a landscape element and not as a major architectural phenomenon. It was the original documentation and subsequent telephone interview with the archaeologists that remained as the only authentic proof there ever having been potsherd pavement at Ope-Odu in Ibadan. This lends further credence to the importance of at least documentary records where the built-form has to give way. Comparatively archaeologists rather see the good in planned or accidental exhumation of pavements since that the easiest way of knowing it exists in a place before plans can be made for preservation. Despite the historical importance of potsherd pavement having been listed for preservation as a museum artefact, there has not been holistic implementation of preservation plans. It is only archaeologists who have in their best possible ways, which in grossly inadequate as Osogbo case of non-response over a long time has shown. It is however evident from this review that the best approach to harness the natural sustainable and symbolic characteristics to ensure adequate preservation is a multi-disciplinary all stake holder to handling potsherd pavement issues.

5. Conclusions

The paper reviewed poor state of preservation of the historic and cultural west-African potsherd pavements revealing their great semiotic and sustainability characteristics. The use of “archaeological”
method, in course of the study brought a new vista of appreciating the cultural built-forms and spaces of the study area and thus a multi-disciplinary approach. From the review it can be concluded that: Potsherd pavements if preserved has sustainable qualities of conservation, minimal maintenance, waste to wealth material and art practise that allowed minimal use of new resources found to have remained for over one thousand years where used around sacred places.

The process of rhythmical laying in straight short pieces of rows or herringbone pattern and either on hedge or flat surface, baked in waste palm oil water, presented a strong decorative yet durable surface despite the fact of being broken pots wastes. The tight fixing together of the shards in a way that growth of green intermingling with hard landscape elements as ideally allowed by design did not destroy a holism and green architecture sustainability trait but has transcended globally into city greening.

Traditional potsherd remain stronger showing the better quality of pottery in the past as seen in strength of materials continues to survive effects of dry and wet erosion; their being washed away is rather taken as the advantage of having it exposed. It is however sad that upon exposure their multi-disciplinary cultural symbolic significance is never appreciated especially complimentarily in architecture, semiotics and sustainable development areas. It therefore seems that they only remained naturally preserved and not necessarily appreciated except in traditional religious and historic places like the Ogun Laadin shrine (picture taking was disallowed) and Yemoo grove, in Figures 5a and b at Ife palace. Potsherd pavement is versatile as it also serves religious and health storage symbolic purpose, fulfilling the respect for people sustainability principle, Ife palace sites and the Ope-oda sites as well as earlier mentions in literature of use of the central pots for ero traditional first aid storage. It still possesses historic tourist attraction quality with original meaning and use by devotees for rites, as was observed during field observation (white basins in Figure 5b). The local traditional material like earth, the potsherd pavement and other methods local content and technology are appropriate in fulfilling this sustainability indexes and are not far-fetched to mitigate negative effects of importation.

6. Recommendations

All stakeholders especially the government must come to the realization of the importance of existing potsherd pavements sites as great historic relics to be properly preserved. Lessons from the traditional method of construction should be adapted and improved upon to resuscitate the art, for its benefits such as; cultural, tourism, religious, health, storage, economic and environmental sustainability.

References

[1] Osasona CO and Ewemade FO (2011). Ile timi: the interface between traditional and vernacular architecture in Ile-Ife. WIT transactions on the built environment, 118, 99-114.

[2] Hil J (2012). A Helish Cloud and a Very Clear Air: Industry, Nature and Weather in Early Eighteenth- Century England. In A. Sharr, Reading Architecture and Culture: Researching Buildings Spaces and Documents (pp. 74-91). New Year: Routledge; Taylor & Francis Group.

[3] Aregbesola RA (2020). Infrastructural deficit and technologicaldevelopment in Nigeria: The role of technical education. Convocation lecture, Lagos State Polytechnic Ikorodu, Lagos, Nigeria.

[4] Adeyemo A (2014). Historical Architectural Maintainable Materials: The Transcending Art and Technology of African Potsherd Pavement. Int J. of Nov. Res. in Eng and App. Scs (IJNREAS), 32-53.

[5] Adewumi I (2001). Indigenous 16th century wearing course for low-traffic walkways in ile-ife: contemporary engineering application. Obafemi Awolowo University Institute of Cultural Studies Weekly Seminar Series.

[6] Usman A and Falola T (2019) The Growth of Complex Societies. In The Yoruba from Prehistory to the Present. (Pp 58-86) Cambridge: Cambridge University Press. (Online DOI:https://doi.org/10.1017/97811075).
[7] Hendrix J (2012) Part Three: A Time of Aspirations: Cultural Understanding of the Roles of Architecture. In P. Emmons, P. Emmons, J. Hendrix, J. Lomholt, J. Hendrix, & J. Lomholt (Eds.), The Cultural Role of Architecture Contemporary and Historical Perspectives (pp. 151-154). New York, London: Routledge; Taylor and Francis Group London.

[8] Karrholm M (2012). Retailing Space: Architecture, Retail Territorialization of Public Space. New York, USA: Routledge; Taylor and Francis Group London USA.

[9] Muntañola J and Mantanyola D (2012). Universidade Da Coruña (España / Spain). World: Distributive Cognitive Paradigm. the 10th World Congress of the International Association for Semiotic Studies (Inass/Ais) (pp. 905-914). Barcelona, (España /Spain): Technical University of Catalonia / Autonomous University of Barcelona (Spain).

[10] Elleh N (1996). African Architecture Evolution and Transformation. New York USA: Mcgraw-Hill USA.

[11] Munro C (1987). Semiotics, Aesthetics and Architecture. British Journal of Aesthetics, 27(2), 115-128.

[12] Majekodunmi O (2017). The Cradle of Civilisation. Nigerian Institute of Architects, 3rd Distinguished Architect's Lecture.

[13] Ogunsote P (2001). Classification of Nigerian Architecture. Ile-Ife, Osun State: Association of Architectural Educators in Nigeria.

[14] Adebamowo M (2017). Sustainable Architecture: A Return To Nature through Biomimicry, Inaugural Lecture Series 2017. Akoka: University of Lagos, Nigeria: Press and Bookshop Limited.

[15] Ezema I (2015). Profiling The Environmental Sustainability of Residential Buildings in Lagos Nigeria using Life Cycle Assessment. Ota, Ogun State, Nigeria: Un-published thesis Submitted for the degree of doctor of philosophy in the department of Architecture, school of postgraduate studies, Covenant University.

[16] Adeyemo A (2014). Historical Architectural Maintainable Materials: The Transcending Art and Technology of African Potsherd Pavement. International Journal of Novel Research in Engineering and Applied Sciences, 1(3).

[17] Dare-Abels OA, Obaleye S, and Adeyemo A (2019). Art, Culture, Architecture, and urbanization convergence:Case of two centres. Caleb International Journal of Development Studies, 2(1).

[18] Holscher T (2014). Semiotics to Agency. In C. Marconi, The oxford Hohandbook of greeks and Roman arts and Architecture. Oxford: Oxford University Press England.

[19] Ramzy NS (2013). Visual language in Mamluk architecture: A semiotic analysis of the Funerary Complex of Sultan Qubait in Cairo. Frontiers of Architectural Research, 2(1), 338–353.

[20] Sinha KK (2010) Semiotics in Architecture: Architectural Representation and Meaning in Legislative Buildings: https://viewer.pdfrock.com/view.php?hash=72ece7d474a8cb07f5c6f9d99048be0d&title=%5BPDF%5D+Kapil+Sinha+REPORT&source=dl

[21] Siregar (2018) The meaning change of urban heritage: a socio-semiotic investigation of historic areas in Yogyakarta, Indonesia. Ph.D thesis QUT.

[22] Yanushkevich I (2014). Semiotics of Semiotics of Semiotics of Social Memory in Urban Space: The Case of Volgograd. Int. J. Cognitive Res. in Sc., Eng and Edu., 2, 2-10.

[23] Demytrie D (2000). A semilogical analysis of urban space in transitional cultures: A case study of Tashkent's city centre (Master's Thesis, University of Manitoba, Winnipeg, Manitoba, Canada). Retrieved from http://hdl.handle.net/1993/2415

[24] Saidi U (2019): Heritage, semiotics and innovations: architectural space, object-designs, meanings and implications in sustainable development, Social Semiotics, 29(4), 448-462

[25] Adejumo T (2002). Place Making: A Study of ‘Oja – Oba’ Open Space Design in Yoruba Urbanism. Akoka, Lagos, Nigeria: Unpublished Ph.D Thesis Submitted to Department of Architecture, University of Lagos, Akoka.

[26] Orijieme E and Ogiogwa J (2016). Potsherd Pavements in ope-odu, ibadan: autochthonous or migrant phenomenon. Nyame Akuma (85), 104-113.