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Imo State Museum (Enhancing Natural Lighting in Museums Space)

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ABSTRACT
A museum is a facility primarily dedicated to the presentation of historical and cultural information about a place and its people, including, to some degree, natural features. The goal of a museum is to create an interactive experience for the visitors, as well as preserve the condition of artifacts. Light is an electromagnetic radiation from a natural or artificial source that travels with the speed of 300,000km/s which when perceived by human eye aids vision. Virtual perception in the museum is the ability for tourist to perceive the artifact as well as the surroundings through the light that enters their eyes. In this context, the daylighting design in museum buildings is a critical consideration. The lighting solution implemented in a museum has to assure an excellent visual performance but at the same time has to avoid the deterioration of its exhibits. This study aimed at identifying daylighting design strategies, through extensive literature study that can be incorporated in museum design to enhance exhibition. This research analyzed the design features of typical museum buildings through case studies. Some existing museums were investigated, and deduced that daylighting should be balanced for visual comfort and preservative values. In this research, an attempt was made to identify design solutions with proper consideration of the study area. The variables directly affecting daylighting such as; climate and sun path were studied, considering their importance in daylighting design within the tropics. The data of the study area were collected and analyzed. The analysis became a guide in the selection of shape and building orientation, size and location of fenestrations, type of glass and shading devices. It concluded that when daylight is maximized in exhibition spaces, visual comfort and visitor's experience is maximized.
Keywords: Virtual, lighting, exhibition, museum visitors, tropics

INTRODUCTION

The English word "Museum" comes from the Latin word of Greek origin *Μουσεῖον* (*Mouseion*), and is pluralized as *museums*. The word means a place or temple dedicated to the Muses (the patron divinities in Greek mythology of the arts) and hence a building set apart for study and the arts (Paula, 1989). Museums have a long history going back to the 3rd century B.C., when the first known museum was opened in Alexandria, Egypt. Over the years, however, the museum philosophy has spread to nearly every part of the world and today it has become uncommon to find any country that does not have a museum, no matter how small it may be. This implies that the concept of the museum has become a global idea that has survived through the centuries. The traditional role of museums is to collect objects and materials of cultural, religious and historical importance, preserve them, research into them and present them to the public for the purpose of education or enjoyment (Arinze, 1999)

Museums serve various goals, extending from educating the people about their history and cultural heritage, promoting unity, aiding researchers, to serving the public. Museums can be seen as a place where 'the past is brought back to life' and are imaginal illustrations of the different generations of our

cultural history. They allow visitors to see, feel, and experience the past. Culture can only continue if the indigenous holders, learn and transfer it to following generations. Heritage museums, have come to an awareness to be institutions that provide an organized main street for the learning and transmission of these cultural knowledge to succeeding generations.

A **museum** is a public facility primarily dedicated to the presentation of historical and cultural information about a place and its people, including to some degree, natural history. In the Nigerian context, in the face of the impending loss of cultural identity, social disorientation, loss of faith in the continued existence of the nation and patriotism at its lowest decline, the need for efforts towards the preservation of our cultural heritage. A museum encourages the unification, understanding and study of history, traditions and culture for the purpose of posterity. The Imo State Museum will aid in conserving historical findings and discoveries, promoting the culture of the Igbo tribe, their past, their art, their architecture, their religion and other elements that constituted their lifestyle will all be preserved within the museum. Another goal is targeted at promoting tourism in the South-Eastern geopolitical zone, and Nigeria at large, generating attention and attracting interest from far and wide to see and have a taste of how rich the Igbo culture is.

A concise definition of natural/ daylight is the illumination of indoor spaces by natural light. Research has proven that natural lighting gives the best of views for displayed objects (Mardaljevic, 2002). Daylight is carbon free and expense free and can, if properly harnessed, can play an important role in enhancing the viewing of displayed artifacts. Lighting for museums and art galleries has a unique set of priorities, those of conservation and for effective display. In many ways, these two requirements conflict as there is a necessity to restrain lighting levels to promote the former while the latter requires sufficient light of high quality to provide optimum viewing conditions. The process of lighting design becomes some sort of a balancing act to provide an effective compromise between these conflicting requirements. To attain this balance, the need to look to the entire spectrum of the lighting design; considering all aspects of lighting within the display area. A complete understanding of the reasons for and requirements of conservation level lighting is essential.

Statement of the Architectural Problem

Museums in recent times have been designed with much focus on the use of artificial lighting as supporting in the areas of display. This is as a result of the difficulty in achieving maximum daylight in the display areas as a result of their hazardous effects on artifacts and viewing of displayed objects. However, no artificial light source can exactly simulate the color composition of daylight (Neeman, 1999), In this research, the paramount problem is to adopt functional daylighting design strategy to illuminate the display areas, while eliminating the effects it has on the artifacts and visual comfort.

Aim and Objectives

The aim of this study is to address the intricacies of daylighting design and outline a general design methodology for daylighting in the design of an Imo State Museum. Pursuant to the above aim, the following objectives were pursued.

1. To identify key issues in daylighting designs for museums
2. To establish the basic techniques of daylighting
3. To examine the elements of Imo (Igbo) Architecture for application in the museum.

Research Questions

The researcher developed the following research questions to guide the study

1. How to identify key issues in daylighting design for museum?
2. How to establish the basic techniques of daylight?
3. How to examine the elements of Imo (Igbo) Architecture for application in museum?

LITERATURE REVIEW

The Museum as a Social Phenomenon, Linking the Past with the Present

It has been observed that when the present becomes unbearable, man tries to find escape by appealing to the past. Therefore, museums are like temples, because of the atmosphere they engender, inspire and

fortify the confused individual. The attempt to seek such a reunion with the past, via the museum itself, a diverting tendency has almost become.

In order words, the past has now become an object of worship. As much the museum which is depository of the tangible evidence of the past has thus become a temple dedicated to the glory of the past. Perhaps the best example of these temples of the past are the Scandinavian open air museums especially Skansen in Sweden, colonial Williamsburg in the United states of America and the museum of traditional Nigerian architecture (MOTNA) in Jos all of which are definite attempts to recreate the past in tangible forms. The glorification of the past has also been shown both in the design of museums and the attitude that it is supposed to prevail in them.

Museum as a monumental building

According to Nietzsche (1973), the museum is the church of the aesthetics which implies that museum buildings should be imposing in appearance, solemn and monumental.

Museum as a historical record

The museum educates its devotees not only in aesthetic appreciation and emotional enjoyment of the works of the ancient people, but also in the intellectual understanding of the circumstances and periods from which the art pieces came and the message they carry. The result is that today, most museums would admit the importance of their roles as custodians of vital historical records.

The national museum of Denmark sees itself *as "An institution for assembling material evidence of the past"* while the authorities of the Vatican museum believe that a museum is *"A place intended for the preservation and display of unwritten testimonies of the past"* (Routh, 2019). In some countries, India for instance, the commitment of museums to the advancement of history has been such that the feeling is being generated that museums are paying too much attention to the past and little attention to more recent periods which people regard as more relevant to the education interest of recent times (Ki-Zerbo, 2020). Dr Ekpo Eyo, the former director of Federal Department of Antiquities and former Director general of the National Commission of Museums and Monuments, wrote in his monumental "Two hundred years of Nigerian art" emphatically stated that "the *museum's main use is to store information and to illustrate with concrete examples the stages of development through which mankind has passed* (Margaret and John, 2022)

Museum as an educational institute

The Museum as a social and educational institution has proved to be an exceptionally important instrument of engendering peace and tolerance among children, youth, as well as adults of different ethnic groups in Nigeria. The National Museum Lagos (one of the over 33 museums in the country) organized an art competition for handicapped children titled "*What Peace Means to Me.*" Under the auspices of the Commonwealth Association of Museums, some of these works were shown in an international exhibition of children's' art, "*What Peace Means to Me,*" in 2006 in the Faculty of Education, University of Victoria, Canada. These programs made a tremendous impact on the psyche of the children and adults alike.

Types of Museum

Museums around the world is categorized by the nature of artifacts it preserves, and some of these types of museums includes;

Art Museums: These are those museums that chronicle both historic and contemporary artistic accomplishments. They enrich the visitor's understanding, appreciation and enjoyment of art through their exhibitions and educational programmes. They house many different kinds of artworks, such as paintings, textiles, sculptures, photographs, drawings, ceramics, metalwork, wood carvings and furniture, which reflect diverse cultural traditions of different parts of the world. Some examples of Art museums in Nigeria is the Igbo-ukwu museum in Anambra state, the Owo museum in Ondo state, the Centre for black and African Art and civilization Lagos.

Museums providing lasting solutions in Nigeria

According the (Emmanuel, 2013), amongst all the programs and means adopted by the Federal Government of Nigeria as a means to unify its ethnic groups, the museum as an educational institution has proved to be the most effective with the use of tangible and intangible cultural heritages sheltered in the museums. First, through historical records, it was appreciated that before the amalgamation of the northern and southern protectorates to form the political entity known as Nigeria in 1914, the various ethnic groups lived and worked in their present geographical locations, interacted with one another and shared some beliefs, attitudes and life styles. They lived in kingdoms and empires with well-defined systems of governance.

These include the great kingdom of Benin, the Kingdom of Kanem Bornu, the kingdom of Ife, the caliphate of Sokoto, the Oyo Empire, the politically decentralized Igbo speaking people, and the city states of the Niger-Delta. Strong trade relationships existed among them and between them and Europe prior to the amalgamation. Recent archaeological discoveries show that some of these kingdoms have been in existence for over 8,000 years. The various objects of antiquity attest to this fact and they are of great value to the Federal Government.

In order to exploit the opportunity offered by the above historical antecedents in forging national unity, the Federal Government decided to use the objects of antiquity to propagate the message of tolerance and peaceful co-existence. In line with this, four Museums of National Unity one for each geographical quarter of the country, North-East, North-West, South-East and South-West were earmarked for development. As their name implies, "*National Unity*" these museums were specifically designed to engender peace and tolerance among the people and are different in content and programs from the other thirty museums in Nigeria. By their contents and their programs, these museums fit into the notations of Martin Segger (Bulletin, 2007) that "exhibited coins, collections and educational programs in Museums must be examined and critiqued for their role in fostering intercultural tolerance and understanding." Objects of exhibition in these special museums are carefully selected from diverse ethnic groups to underscore their similarities in use, language and application. Programs in the museums are designed to achieve similar goals.

The Federal Government of Nigeria, in appreciating the widening differences amongst the tribes and their implications on the future of the nation, evolved several strategies to create a sense of nationalism in all Nigerians. This process involves a whole array of methods from which to choose in the education of the public, for example, sensory experience; multimedia and audio-visual production; personable guides; demonstrations and remodeling; self-guided tours; labeling and introductory panels with maps, artists' impressions in photographs; lectures and the publication of guide books and printing of postcards and handouts.

Roles of Museum in Nation Building

Museums play a very vital role in the country's developmental program. Apart from the four major functions of a museum (collection, education, research and exhibition) it helps also in national unity, generates economic resources and in preservation of culture. Collection of artifacts is the first function of museums to appear historically and remains the predominant reason for a museum's existence. Collection is an age-long characteristics of man, wherever he lives or finds himself.

It is necessary to distinguish between museum collection and collection by men motivated by security needs, curiosity and pride. The latter are individuals who enjoy these collections and hold them for themselves. Modern museums, however define first their areas of collection and they hold their collections in the public interest. Collections can be made for the purposes of different requirements and the desires of men.

The Concept of a Museum

A museum is a facility primarily dedicated to the presentation of historical and cultural information about a place and its people, including, to some degree, natural features. Heritage museums typically differ from most traditional museums in usually featuring a high proportion of "hands-on" exhibits and live or lifelike specimens and practical artifacts.

Museums in Igboland

The earliest found settlements in Igboland date back to 6000 BC in the central area, from where the majority of the Igbo-speaking population is believed to have migrated. This is based on early pottery works found in what is known today as Awka. There is, however, evidence of Paleolithic man settling in southern Nigeria from at least 10,000 years ago. Much of the pottery excavated by a team led by Thurstan Shaw of the University of Nigeria, Nsukka in 1978 uncovered a rock quarry which was a mine for tool and pottery making for a 'stone civilization' nearby at Ibagwa. Anthropologists at the University of Benin discovered fossils and use of monoliths dating back to 6000 BC at Ugwelle-Uturu in the Okigwe area. Further evidence of ancient settlements was uncovered at a hypothesized Nsukka metal cultural area from 3000 BC and later settlements attributed to Ngwa culture dated back to 8-18 AD (Emmanuel 2013).

Isaiah Anozie was digging in his compound to install a cistern in 1939 when he stumbled onto the first finds of the Igbo Ukwu metal and precious artifacts that led to the discovery of a larger network of linked metal works from the 9th century. The works were based in Igbo Ukwu and further finds were found by archaeology teams led by Thurstan Shaw in 1959-60 and in 1964 in the compound of Isaiah Anozie.

Initially, throughout the 1960s and 1970s it was thought that the Igbo Ukwu bronze and copper items were of an external origin or were influenced by outside technology due to their technical sophistication. The opposite was revealed to be true since local copper deposits had been exploited by the 9th century and anthropological evidence, such as the Ichi-like scarifications on the human figures, show local origin.

Artificial Lighting in Architecture

As according to (Anthony 2008), all forms of energy use in buildings should be analyzed, related to the different needs of individual architectural programs, to see where savings can be made; for example, in homes, the use of natural source has always been paramount during the day, so few savings can be made. At night however, developments in lamp technology have produced significantly more efficient artificial light sources and this is an area where, due to the large number of residential property, significant savings are yet to be made, moreover major energy savings in the home are to be found in the means of heating and insulation.

The different factors identified are those of efficacy, lamp life and colour, but other factors that must be considered are those of cost and control. It can be seen from the column under “lamp efficiency” that the favorite domestic lamp – incandescent tungsten – has an efficiency of only 7-14Lm/watt.At present the CFC lamps cannot be dimmed economically, but there are many areas in homes, where dimming is not a requirement, and with satisfactory colour. (2700 K) there is no reason not to take advantage of their long life and lower wattage.

The newer generations of lower-energy lamps such as the compact and T-5 linear fluorescent lamps can in many cases replace less efficient incandescent sources, which can be four to eight times more efficient, they can also have more eight times longer lamp life. Used in conjunction with high frequency electronic control gear further reductions of 20 per cent in power consumption or energy savings can be made.

To realize these gains, they must relate not only to the lamp, but also to matching this with the correct luminaire or light fitting. It is no use simply fitting energy-efficient lamps into inappropriate luminaries, resulting in unsatisfactory installations, furthermore an energy efficient scheme demands regular, consistent and informed maintenance. It may also be cost effective in large installations to operate a system of ‘bulk replacement’ of lamps after a specific period irrespective of how many lamps may have failed.

Windows as Daylighting Elements

As per Dalilah (2007) the design of windows is in constant development, both in the form of the aperture through which the daylight comes and in the nature of glass or transparent material permitting the light to enter. Windows do more than let in light and are often associated with solar shielding and ventilation. Forgetting about the early architecture, such as the pantheon or the roman patio house, where holes were left in the roof admitting rain as well as light, it was left to the 18th century and the introduction of the glazed skylight, to introduce daylight deep into the interior of a building.

This development had the important effect of increasing the "daylight effective depth" and has its modern equivalent in the atriums we see today, the word atrium being devised from the original roman patio house. There are many window forms which have been developed over the centuries, some for military reasons, and others designed to introduce light into the interior in such a manner as to reduce the difference in brightness between the window brightness, and its surroundings to reduce glare, to the point where the wall became the window and some form of control is required to protect the occupant for excessive brightness (Dalilah, 2007).

The control of sunlight is sometimes necessary and many ingenious devices have been designed to cope with this. Some of which are at odds with the less tangible benefits of daylighting enumerated above and pay attention more to architectural fashion than functional design.

Method of Combining Artificial Light, Daylight and Architecture

Light is brought into the space from artificial sources and the window system. Windows are easily understood to be both a lighting device and an architectural motive. Basically the same applies to electric light, the light cove is an architectural element. The placement of windows and light coves depends on the architectural design. On the other hand, these elements and the resulting light become a part of architectonic expression. Hence, there is a mutual relationship between lighting and architecture. Together, they provide the basics for a good lighting result. Artificial light and daylight are complementary. The former is easily controllable and extremely versatile, the latter is "natural" in appearance and colour but also very dynamic and potentially hazardous. The window system (glazing, shades etc) is essential in daylighting. The combination of artificial light and daylight (light mix) is another issue. Some kind of a control system is usually needed. However, well-designed architecture may greatly reduce the complexity of such system (Teo, 2020)

Daylighting in Museums

In most museums buildings, bioclimatic, environmental-friendly and energy-conscious designs have been completely ignored. These are good reasons to support the opinion that museums are lit, heated and ventilated by artificial means. This leads to full dependence on mechanical equipment's. The sensitivity of the artifacts exhibited is the main argument to justify this position. The exhibits are considered to be better preserved when light, temperature, humidity etc are fully controllable and adjustable according to the special requirements of the exhibits (Tombazis & Preuss, 2001). In terms of the lighting issue, the use of daylight in museums is a somewhat controversial issue for two reasons, the ultraviolet component of natural light has a deteriorating effect on museum artifacts, and daylight is difficult to control because of variability of sky conditions through a day and season. These concerns have tended to curtail the use of daylight in museum buildings (Royal Ontario Museum, 1976)

Benefits of daylight in museums

The most important criterion for museum lighting is spectral distribution. In this respect, daylight is considered as the best choice. Some museum curators even consider that daylight, because of its superior color properties, has no substitute in museums during the day. No artificial light source can exactly simulate the color composition of daylight (Neeman, 1999). Daylight, whether bright or dim, always offers continuous spectral curves, meaning that it can reveal all colors in works of art (Darragh & Snyder, 1993). In addition, daylight also gives natural feeling to the museum visitors. By using daylight in museums, artificial lighting loads will be decreased during the daytime.

Artificial lighting accounts got 35-50% of the total electrical energy consumption in public buildings. By generating waste heat, lighting also adds to the loads imposed on a buildings mechanical cooling equipment. The energy savings from reduced electric lighting through the use of daylighting strategies can directly reduce building cooling energy usage to an additional 10-20%. Consequently, for many institutional and commercial buildings, total energy can be reduced by as much as one third through the optimal integration of daylighting strategies.

Design considerations for museums

As with all energy-efficient design strategies, there are some costs associated with the use of daylighting. Designers must be sure to avoid glare and overheating when placing windows. More windows do not automatically result in more daylighting. That is, natural light has to be controlled and distributed properly throughout the workspace. Also, for cost savings to be realized, controls have to be in proper functioning order. Poor installation, commissioning or operations and maintenance (O&M) practices can all lead to sub-optimum performance.

Effective exhibit lighting must balance exhibition and conservation needs to enrich the museum experience (IESNA, 2000). To increase the ambient lighting level, top lights will be installed on the roof of the building. Top lights can increase the indoor lighting level without changing the original architectural design context. For the side openings, shading devices will be installed to block the direct sunlight entering through the side openings. In designing daylighting systems, the following should be considered to protect material deterioration.

Daylighting concepts for museum design

It is important to appreciate that the daylighting design process involves the integration of many disciplines including architectural, mechanical, electrical, and lighting. These design team members need to be brought into the process early to ensure that daylighting and ideas are carried throughout the project.

a) An awareness of basic visual acuity and performance issues is essential to an effective daylighting design.

- Veiling reflections: veiling reflections of high brightness light sources of specular (shiny) surfaces obscure details by reducing contrast. They should be avoided; particularly where critical visual tasks occur.
- Distribution: Introduce as much controlled daylight as deep as possible into a building interior. The human eye can adjust to high levels of luminance as long as it is evenly distributed. In general, light which reaches a task indirectly (such as having bounced from a white wall) will provide better lighting quality than light which arrives directly from a natural or artificial source.
- Glare: The aim of an efficient daylighting design is not only to provide illuminance levels sufficient for good visual performance, but also to maintain a comfortable and pleasing atmosphere. Glare, or excessive brightness contrast within the field of view, is an aspect of lighting that can cause discomfort to occupants. The human eye can function quite well over a wide range of luminous environments, but does not function well if extreme levels of brightness are present in the field of view.
- Variety: Some contrast in brightness levels may be desirable in a space for visual effectiveness. Dull uniformity in lighting can lead to tiredness and lack of attention, neither of which is compatible with a productive environment.

Often times a good daylighting solution will integrate a “blast” of beam daylight in a circulation area for visual interest and to help lead occupants through a building. The human eye is naturally attracted to this bright area and can be useful in guiding people down an otherwise burial corridor.

b) Good daylighting requires attention to both qualitative and quantitative aspects of design. Make sure the combination of natural and artificial sources provides adequate light levels for the required task.

- The illuminating Engineering society of North America publishes an industry standard method of determining recommended illuminance levels (expressed in units of foot-candles or fc) for various tasks.
- For office spaces, the U.S general services administration has interpreted the IES method to recommend a minimum of 50 footcandles on an imaginary desk height horizontal “work surface”. Nevertheless, when used in conjunction with indirect ambient lighting system and direct task lighting, a high-quality daylighting design can be achieved with ambient lighting levels for 30 footcandles or less.

c) To be effective, daylighting must be integrated with artificial lighting design. In a particular, daylighting must be coupled with efficient electric lighting controls of not energy savings are to be realized.

- As part of a daylighting design, consider the use of continuously dimming fixtures controlled by luminous sensors (Chrysavgi, 2017).

The Concept of Art in Igboland

Visual art: There is such variety among Igbo groups that it is not possible to define a general Igbo art style.Igbo art is known for various types of masquerade, masks and outfits symbolizing people, animals, or abstract conceptions.

Mbari Art: Mbari is a visual art form practiced by the Igbo people in southeast Nigeria consisting of a sacred house constructed as a propitiatory rite. Mbari houses of the Owerri-Igbo, which are large opened-sided square planned shelters contain many life-sized, painted figures (sculpted in mud to appease the Alusi (deity) and Ala, the earth goddess, with other deities of thunder and water) (Oliver, 2008).

Mbari House

Source: (Google Images - www.google.com)

Other sculptures are of officials, craftsmen, foreigners (mainly Europeans), animals, legendary creatures and ancestors. Mbari houses take years to build and building them is regarded as sacred. A ceremony is performed within the structure for a gathering of town leaders. After the ritual is complete, going in or even looking at the Mbari house is considered taboo.

Igbo Ukwu (Bronze Casting) Art: Bronze castings found in the town of Igbo Ukwu from the 9th century, constitute the earliest sculptures discovered in Igbo land.

Vessel from Igbo Ukwu

Bronze bowel

Source:(Google Images - www.google.com)

Here, the grave of a well-established man of distinction and a ritual store, dating from the 9th century AD, contained both chased copper objects and elaborate castings of leaded bronze. Along with these bronzes were 165,000 glass beads said to have originated in Egypt, Venice and India. Some popular Igbo art styles include Uli designs.

Masks: Masking is one of the most common art styles in Igbo land and is linked strongly with Igbo traditional music. A mask can be made of wood or fabric, along with other materials including iron and vegetation (Anthony, 2008). Masks have a variety of uses, mainly in social satires, religious rituals, secret society initiations (such as the *Ekpe* society) and public festivals, which now include Christmas time celebrations. Some of the best known include the *AgboghoMmuo* (Igbo: Maiden spirit) masks of the Northern Igbo which represent the spirits of deceased maidens and their mothers with masks symbolizing beauty.

Igbo Facial Masks

Igbo Ceremonial Masks

Source: (Google Images - www.google.com)

Other impressive masks include Northern Igbo *Ijele* masks. At 3.7m high, *Ijele* masks consist of platforms 1.8m in diameter,supporting figures made of coloured cloth and representing everyday scenes with objects such as leopards. *Ijele* masks are used for honoring the dead to ensure the continuity and well-being of the community and are only seen on rare occasions such as the death of a prominent figure in the community.

- ***Eze Nwanyi:*** Otherwise known as the Queen of Women, this mask represents a wealthy, senior wife and grandmother who commands enormous respect in the village. She embodies the ultimate feminine ideals of strength, wisdom, beauty, stature and dignity, and is a leader among women. This mask is worn in performances that occur at funerals and ceremonies that purify the village and other communal places.
- ***Agbogho mmuo:*** Otherwise known as theMaiden Spirit masquerades perform annually during the dry season in the Nri-Awka area of northern Igbo land. At these performances men dance as adolescent girls, miming and exaggerating the girls' beauty and comportment. The performance is also accompanied by musicians who sing tributes to both real and spirit maidens. These masks showcase an ideal image of an Igbo maiden. This ideal is made up by the smallness of a young girl's features and the whiteness of her complexion, which is an indication that the mask is a spirit. This whiteness is created using a chalk substance used for ritually marking the body in West Africa. The chalky substance is also used in *uli* design, created and exhibited on the skin of Igbo women. Some

maiden spirit masks have elaborate coiffeurs, embellished with representations of hair combs, and other objects, modeled after late 19th century ceremonial hairstyles.

Uli: In lgboland, *Uli*, was a feminine art form and a form of graphic communication. *Uli, uri,* and *urie* are dialect variations in the lgbo language that describe either body or wall painting in a local village setting. However, in Igboland the art of applying *uli* to the body is not referred to as painting, since brushes are not used. Instead the phrase *ide uli* (to write uli) or *ise uli* (to draw uli) is more appropriate. For the purpose of this thesis and for consistency, I will refer to the art form as simply "*Uli*" or "*Uii* painting".

The Nri Uli Classicals, Painting the Walls of Iyi Azi
Source: (Google Images - www.google.com)

With *uli* paintings, women used their skin as portable canvases where different designs were painted that defined a woman's body as well as her social standing within the society. *Uli* symbols and patterns were also painted on the walls of dwellings, compounds, and communal shrines. In Sarah Margaret Adams's PhD dissertation for Yale, Hand to Hand: *Uli Body and Wall Painting and Artistic Identity in Southeastern Nigeria* she states "*uli* body painting may predate wall painting, the hypothesis being that since the Igbo were nomadic before they became settled and agrarian, women must have originally painted on their bodies and then transferred the art to walls when they ultimately settled" (Adams, 2002). While the designs and compositional forms varied from village to village, the script of *uli* held the same importance throughout the Igbo culture. The symbols used by Igbo women artists represented things of physical importance and were intended to beautify the female body as beauty was equated with morality in Igbo culture.

Uli art work on skin and cloth
Source: Cole, (1982)

Despite the beauty of *uli*, many African women including Igbo women may be completely oblivious to the existence of this art form. The imposition of Western and European values on Igbo cultural practices suppressed the art form. Missionaries and Western religious groups insisted that women not cover their bodies with black designs, but rather with cloth. They viewed *uli* as primitive and inappropriate. Sadly, this led to a period of decline in *uli* practice, and the art form soon became obsolete.

Carved Doors: The Igbo use carved wooden panels as entrance to doorways into the compounds of titled members of the prestigious men`s association *Ozo*. Members of sufficiently high rank are entitled to commission sculptors to carve the panels. Carved doors and panels were also apparently adopted or used in the houses of wealthy families as a means of displaying wealth. Igbo doors are delicately carved with deeply cut abstract designs in striated and hatched patterns that catch the sunlight to produce high contrasts of light and shadow. (Campbell 2006).

Carved Wooden Doors in Igboland
Source: Google Images, (2019)

Akwete (Cloth Weaving): According to Obi-Young (2020) before the introduction of coinage currency in Igbo land, cloth was used as trade good and currency item. It is worn for body beautification and decoration, and for ceremonies. Cloth is also a material of great economic, cultural, political and social importance. Cloth weaving is an ancient craft of our people dating to the early new Stone Age when the Igbos learnt to make a rough kind of clothing from the fibers of flax plants. However, these days, raffia and cotton are most-widely used for cloth-weaving in Igbo land.

In times past, Igbos, were famous for Akwete traditional fabric weaving. Akwete is just a local homespun cotton cloth worn by men as narrow-strip cloth, usually woven with vertical stripes in different colours on background colour. Akwete cloth weaving in Igboland is basically done by the women in Akwete area near Aba in Abia State. It was originally referred to as "*Akwa Mmiri*" (Cloth of the water) meaning towel. Akwete cloth weaving is said to be as old as the Igbo nation.

Akwete Weaving and Patterns ***Akwete Weaved cloth***

Source: (Google Images - www.google.com)

Because of the skill of the weavers who demonstrated evincing great mastery of technique and beauty of design, the art of Akwete cloth weaving was erroneously believed to have been introduced from Okene in Kogi state where a similar but highly developed style earlier existed.

However, Akwete cloth comes in different colors and designs. Some are in the patterns of red and black designs, interwoven in geometric patterns on the white ground which is favored by Igbo men. It is mainly used as a towel for bathing. The Akwete cloths, woven from sisal-hemp fibers are of coarse type, used by masqueraders, and by warriors as headgears, while those made from raffia fibers are used on religious occasions like the Ozo titles, and for mourning by women. But the most popular Akwete cloth is the type of cotton fabric woven from cotton fibers in colorful patterns, the weavers have much preference for bright and strong colour like red and yellow (Teo, 2020).

Weaving is done on a loom. There are two types of loom namely: horizontal loom which is used by men weavers; vertical loom, used by women weavers. Both types of loom operate on the same principle. An Akwete woman weaves on a wide vertical loom which produces cloth about 115cm wide x 1609cm long; the length of the finished product is normally twice the height of the loom. Thus, after processing the cotton to desired thread form, the weaver fixes a set of threads on the loom to form the warp and then the weft thread (net-work of thread) is passed over and under the warped thread.

Akwete cloth is usually made of cotton thread, and the decorative motifs are produced with cotton threads of a heavier texture or rayon silk. The decorative motifs appear mostly on one side of the cloth, though they can appear on both sides. The decorative motifs are given names which are suggestive of their

appearance. A few among them are animals' heart; children's fingers; comb; earring; snake-back; stool and tortoise.

Performing Arts: The Igbo people have a musical style into which they incorporate various percussion instruments: the *udu*, which is essentially designed from a clay jug; an *ekwe*, which is formed from a hollowed log; and the *ogene*, a hand bell designed from forged iron. Other instruments include opi, a wind instrument similar to the flute, *igba*, and *ichaka*. Another popular musical form among the Igbo is *Highlife*. A widely popular musical genre in West Africa, Highlife is a fusion of jazz and traditional music. The modern Igbo highlife is seen in the works of Dr Sir Warrior, Oliver De Coque, Bright Chimezie and Chief Osita.

Osadebe, who were among the most popular Igbo highlife musicians of the 20th century (Falola, 2003) There are many Igbo dance styles, but perhaps, Igbo dance is best known for its *Atilogwu* dance troops. These performances include acrobatic stunts such as high kicks and cartwheels, with each rhythm from the indigenous instruments indicating a movement to the dancer (Harper & Peggy, 2008).

Architecture of the Igbo People

Neeman (1999) stated that most Igbo houses were private houses built alongside other buildings in a family compound enclosed by a large wall. The main entrance was usually a gate. The main materials used in building Igbo houses include mud, timber and raffia/palm stems which are used for the wall support and the roof. Though shrines exist in the compound, they are centered on the individual and take on less intense spatial and architectural manifestations for the community as a whole. The traditional thatch house is usually made of wooden frame, bamboos, thatch of bamboo or palm frond or straw depending on the locality and finished with red mud (*uhie*), *odo* yellow clay and white chalk (*nzu*). The population of those who still live in this kind of house has diminished.

Contents of the house includes wooden door, veranda, family pallor or family room, bedroom, pantry, kitchen, which is often an extension of the main house, a backyard which usually has the family home barn for preserving yam tubers, staple crops etc. both for feeding and next seasons crops for planting. The bed is made of hardened mud while bed spread is made of mat (*ute)*. Fireplace of burn fire is a usual feature of the family room for roasting corn, yam, games and fish. A bank is usually located in a sacred spot, for cowries, money and other valuables

House Type: The tradition of Igbo round house still survived into the colonial period. At the same time the Igbo rectangular wall house design was in practice also. This architectural design was patterned after colonial buildings built with cement blocks or with burnt bricks. There were two broad types of this rectangular house. One type was entirely constructed with mud while the walls of the other were formed with cut poles used to form the partitions of the building. The sharpened ends of the wooden poles were driven into the earth. The next stage was the watling process.

Watling involved the use of slim-size wooden poles of about 2cm diameter and lengths of about 6m for the exercise. In the process the wattles were used to crisscross lengths of the wooden poles right from the base to the uppermost level of the walling skeletal framework, providing about 2.5cm spacing between one horizontal level and the other. The vertical wooden poles and the slim horizontal wooden poles (wattle) were knotted or tied together at various points to produce a solid and compact building skeletal framework. The gaps between one vertical pole and the other as well as the gaps between one horizontal wattle and the other were to accommodate balls of puddled mud that would normally be placed there to fill the gap, and flesh up the skeletal framework of the building wall partitions (Onwuakpa, 2016).

Roofing Type/style: As in the case of wall construction, the traditional conical roofing design was still in practice in the colonial period. Despite this, a modern roofing model came on board. This was the gable roofing style. This design was commonly applied by the colonial officials in building their office complexes and residential quarters. Rafters and purlins were used to design the skeletal framework of the roof of those buildings, while aluminum roofing sheets or asbestos sheets were used for the roofing. The commonest architectural roofing style at the time was gable roofing. It was probably adopted by the colonial officials due to its relative economic advantage when compared to other roofing designs (Oluwaseyi, 2015).

This colonial model of roofing (gable roof design) advertently and inadvertently influenced the Igbo roofing plan. Thatches or raffia mats were used by Igbo people for the roofs of their buildings.

Traditional Igbo roof thatching in progress by members of a household Source: (Google images, 2019)

While the colonial gable roofing made use of wooden rafters 2" x 4" x 12' and purlins (wooden poles) measuring 2" x 2" x 12' each, to form the vertical and horizontal framework of the roofing, using nails to fasten them, the traditional Igbo gable roofing made use of Indian bamboos as rafters and raffia fronds, palm fronds or slices of bamboo lengths as purlins for horizontal crossing of the bamboo rafters. The difference between rectangular wall and round wall houses was not much. The only outstanding difference was that rectangular wall houses contained more rooms than round ones.

Wall-Plastering/Decorations: The culture of plastering the walls of Igbo traditional buildings would appear to be another influence of the western culture under colonial rule in Igboland. Reasons why pre-colonial buildings in Igboland were not plastered: The walls were very rough; no one had the trowel and other plastering tools to embark on such assignments. Besides, the people were most often engaged in their farming activities either within the homestead or in their farmsteads.

But colonial offices and residential quarters were beautifully plastered and sometimes painted. The same was true of church buildings and parish houses where priests lived. It is likely that close contacts between Igbo traders, early Igbo Christian converts, teachers, civil servants, colonial officials and their agents exposed them to those and other influences of the white man. The Igbo thus embraced the culture of plastering the walls of their houses, and of even painting and decorating them.

The traditional tool for plastering walls of buildings among the Igbo in the colonial period was clay soil. Clay has gloomy and compatible qualities and was therefore preferred to other soil types for the purpose of wall plastering. Clay had the capacity of providing the needed adhesion to the loose soil particles on the walls of a building. Besides, plastering the wall with clay soil gave a special beautification to building. Plastering was undertaken also to fill up cracks on the walls of the building, ultimately, smoothening the entire wall surface of a building.

CONCLUSION

Most museums in the tropics drift away from natural lighting in display areas as a result of the hazards it imposes on artifacts, hence this research was aimed at investigating and adopting a general design methodology for daylighting exhibition areas, in the design of a heritage museum in Owerri. Findings from research show that these daylighting strategies and methodologies like Light shelves, clerestory

windows, atriums, shading systems and anti-solar glass/windows will be considered the most appropriate daylighting strategy sufficient for daylighting design in a museum. The water and life museum, in California materializes almost all these strategies under consideration.

Finally, the application of the typical plan layout of the Igbo traditional building – from the forecourt to the obi down to the courtyard and the huts that replicates the movement progression pattern in a traditional Igbo compound, seamlessly fused together and employed to invoke a sense of emotional connection between the proposed museum and the Igbo people. The project will serve as an educational center for posterity, consequently serving as a timeless landmark for the Igbo nation.

RECOMMENDATIONS

Museums are meant to provide a safe and comfortable internal environment for the artifacts and visitors, despite variations in external conditions. Therefore, with the potentials observed, from the use of daylight strategies for museums, the following recommendations are suggested

1. Architects should be encouraged to design museums with much considerations on daylight design concept.
2. Other areas of research outside the scope of this study, which are vital to its accomplishment should be carefully studied.
3. Government through relevant bodies (National commission for museums and monuments) should ensure museums are purpose built not a make shift building or a converted building

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