

RESEARCH METHODS IN ARCHITECTURE

A

RESEARCH PROPOSAL ON THE DESIGN OF PROPOSED LOW COST HOUSING DEVELOPMENT

FOR

OSUN STATE GOVERNMENT

**WITH EMPHASIS ON THE USE OF LOCAL ROOFING
MATERIALS (THATCHED ROOF) AS ALTERNATIVE
ROOFINGMATERIAL IN BUILDING DESIGN**

BY

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1.0 ABSTRACT

Reports gathered over the years showed that there has been a continuous decrease in the use of locally available construction materials in developing countries. This, in no doubt has contributed to the increasing and exorbitant prices of housing in Nigeria. This study however serves as a door opener to the use of indigenous roofing materials as it critically accesses and analyses a wide range of roofing materials used in building construction in Nigeria as well as examining the factors determining the choice of the existing roofing materials in order to pave way for further researches on how to make the local or indigenous roofing materials most especially thatched roof, suitable for modern roofing. This study thereby integrates the use of thatched roofing materials into the design of a low cost housing for Osun state Government. This study would focus on this clause “towards the revival of the dying indigenous architectural practice in terms of materials usage”.

2.0 INTRODUCTION

In the order of priority of man's basic needs, housing has been said to have ranked second after food, with clothing as the third (Aribigbola 2000). The quest for man's shelter has not just began as it was quite evident in the history of the earliest man and woman (Adam and Eve), who out of their need for a covering went ahead to hide themselves in a particular space in the Garden of Eden.

Though, housing is commonly regarded as shelter but in the real sense, housing has gone beyond a mere shelter as it encompasses the totality of human environment. Thus, housing could be regarded as the totality of man's environment, where man lives, grows and where the need of such a man is met.

Over the years, the demand for housing has rapidly increased due to various factors such as population increase, physical factors, economic factors, etc.

Housing has been subdivided into two basic sectors, they are: housing as a product and housing as a process. The sale and purchase of finished buildings has led to the definition of housing as a product while the development of housing from inception (substructure stage) to the completion stage (finishing) has led to the description of housing as a process.

However, since housing is regarded as a covering on man's head, the housing process which involves substructure, superstructure construction is not complete without roofing. Then, roofing becomes an important stage in housing development process.

A roof is the uppermost part of a building which protects the building from various elements of weather such as rain, sun, wind, etc. A roof consists of structural elements which supports the roof coverings. Hence, the roof trusses, roof members and roof coverings are referred to as “the roof”. (Fadamiro 2000)

In recent years, the increasing rise in the demand for modern/ contemporary roofing materials in developing countries such as “Nigeria” is gradually bringing the use of traditional roofing materials to an extinct. This research however proposes the need for re-visitation, examination and exploitation of traditional roofing materials and their adoption in the modern buildings construction.

3.0 LITERATURE REVIEW

3.1 HISTORICAL BACKGROUND OF ROOFING

Researchers have revealed that roofing, as it were, was abstracted from nature, precisely, from an almond tree. As it has been said that roofing happens to be one of the most important stage of a building process, there is a need for a detailed study on the choice of roofing materials, most especially at macro and micro level.

Roofs have been constructed in a wide variety of forms-flat, pitched, vaulted, domed, or in combinations-as dictated by regional, technical, and aesthetic considerations. Thatched roofs, usually sloping, were the earliest type and are still used in rural Africa and elsewhere. Flat roofs have historically been used in Arid climates where quick drainage of water off the roof is not important, as in the Middle East and the southwestern U.S. They came into more widespread use in the 19th century, when new waterproof roofing materials and the use of structural steel and concrete made them more practical. Sloping roofs come in many different

varieties. The simplest is the lean-to (or shed) roof, which has only one slope. A roof with two slopes that form a triangle at each end is called a gable roof. A hipped (or hip) roof has sloping sides and ends meeting at inclined projecting angles called hips. The gambrel roof has two slopes on each of its two sides, the upper being less steep than the lower. The mansard roof has two slopes on all four sides, a shallower upper part and a steeper lower part.

A roof is an overhead covering of a building with its framework support. Various methods of construction, such as are suited to different climates, have diversified exterior and interior architectural effects of a roof. A roof may be flat, as in hot, dry areas where the shedding of rain and snow does not present a problem, e.g., in ancient Mesopotamia, Egypt, and in the SW United States. Modern structural materials and methods have made flat-roof construction practical in nearly any climate, with the development of concrete slabs, efficient drains, and waterproofing materials.

On the other hand, steeply sloping roofs are still commonly found in New England, in the Scandinavian countries, and in other regions where it is necessary to shed snow. Variations of the pitched roof are in gable, gambrel, mansard, or hip (having four sides sloping from a short ridge or center) form. The pitched roof may be of the lean-to type, as in a simple shed, or it may achieve the dignity and aspiration of a dome or spire and embody such features as the dormer window, cupola, or minaret. Pointed-roof construction includes the tie-beam, trussed-rafter, collar-beam, and hammer-

beam types. English churches and halls afford many examples of these various methods, some of which have highly decorative open-timber interiors.

The simplest roof covering is thatch (of straw, palm leaves, or other fibers) used by the peasants of many lands. Other finishing materials include wood (usually shingles), tile, slate, tin, lead, zinc, copper, felt, and tar. A roof's ridge is the point where the rafters meet; its principals, the purlins, resting on center or side posts, support the rafters; a valley or trough is formed by the junction of two slopes (e.g., where an ell joins the main structure (Wright 1998). The eaves, or overhang, carry gutters or themselves drain water beyond the walls, and in the chalet and bungalow they are very wide. The concave curve of East Asian roofs is said to follow the graceful lines of a sagging tent. The classical Greek roof was of marble slabs upon timber framing and sloped gently.

Early Roman roofs also were timber framed (as in the basilicas), but vault and dome construction (as in the Pantheon) were prominent in later buildings. The pointed arch and vaulting gave the slope to the Gothic roofs of Europe, while roofs in Renaissance Italy, except those with domes, were concealed, but France and Germany of this period emphasized the gable. Stepped gables are characteristic of Dutch and German roofs. Cone-topped turrets are common on the steep roofs of French chateaus. Roof ornamentation consisted of finials, crockets, cresting, gable crosses, bosses, and fantastic gargoyles (that also served as waterspouts).

Roof decoration was particularly elaborate in early Asian and Gothic architecture. In contemporary architecture, roofs can span great distances with little material and few supports because of advances in the methods of using concrete and steel. Green roofs, which have used mainly since the late 1980s, lessen the environmental impact of traditional roofs, especially in urban areas. The roof surface of a building is covered with soil or another growing medium that is planted with grasses, flowers, or other plants. Green roofs reduce storm water runoff, reduce roof heating (mitigating urban heat islands and lowering cooling costs) and insulate the building (lowering heating and cooling costs).

3.2 ORIGIN OF ROOFING MATERIALS

There has been a revolution in building efficiency and quality since the development of modern transport facilities. The wider range of roofing materials and products that is available quickly and easily has led to buildings with improved insulation, ventilation and other properties. This in turn yields environmental and cost benefits through lower heating and air conditioning costs. Not all of these widely available roofing materials are new, though. For example, the Myceneans were using pozzolanic cement technology around 3,000 BC, (Smith, 1989) and the first clay bricks probably date back even further to the Sumarians some 6,000 years ago. (Smith, 1989) Terracotta roof tiles were used during the time of the Greek Empire and were introduced to the rest of Europe by the Romans. They have also been found in early East Asian archaeological deposits from the same period in China, Korea and Japan.

3.3 EXPECTED ATTRIBUTES OF A GOOD ROOF COVERING MATERIALS

Physical factors included durability of the materials, fire resistivity, strength and stability of the materials, etc

Strength and Stability:

Owing to the fact that the roof structure should be able to carry super imposed dead, live and wind loads. The wind load becomes a major factor in high-rise building. Hence the materials for roofing are chosen to perform this function.

Weather Resistance:

The primary function of a roof is to effectively protect the covered area against rain, sun, wind loads etc. The roof covering plays an important role to ensure adequate weather resistance. The covering may be of corrugated iron and asbestos sheets, clay tiles, slates, mastic asphalt or build-up felt. However these covering are chosen with a good consideration to this function

Durability:

The roof covering should be able to withstand atmospheric conditions and there should be an effective means of speedy removal of rain water from the roof as this might cause early deterioration of the roof structure. Durability forms the basis

Fire Resistance:

The building regulation stipulates a resistance to fire and smoke spread of one and a half to six hours depending on the use of the building and the materials used. The

degree of fire resistance require also depends on its proximity to other buildings and the structure of the roof. Hence there is an expected fire resistivity required from roofing materials before consideration for use in residential buildings.

Thermal Insulation:

The conventional roof coverings i.e iron sheets and aluminium do not offer adequate thermal insulation and the one that gives adequate insulation (asbestos sheet) may cause asbestosis (asbestos cancer) or are not durable enough (thatch). The only ways of increasing thermal insulation are therefore the use of efficient ceiling materials and building orientations. (Fadamiro 2000)

Sound Insulation:

Most forms of roof construction provide adequate insulation against sound from outside the building. For building such as studio halls, sound insulation is a major factor affecting the choice and design of the roof.

Lighting:

Where large floor areas covered by the roof (especially in factories), the natural light provided by the openings may be inadequate; therefore, roof lights may supplement this.

Ventilation:

This may be required in industrial buildings where the roof can provide an economic means of removing noxious fumes from manufacturing processes.

Appearance:

Roof materials can have an important influence on the appearance of a building, both with regard to the form and shape of the roof. This may be considered significant in religious buildings. In that case, the type of materials to be selected must have a pleasant appearance.

4.0 AIM AND OBJECTIVES

4.1 AIM

The sole aim of the project is towards the realization of modern low cost housing scheme that is close to nature through the use of traditional roofing material.

4.2 OBJECTIVES

The objectives are

- i. ensuring maximum utility of local and available roofing materials so as to promote the economic growth of the country through a drastic reduction in the importation of modern roofing materials.
- ii. reducing the cost of housing development Nigeria.
- iii. ensuring affordability of housing in the nation.
- iv. promoting the use of local and traditional roofing materials as well as the cultural value of the nation.

It should however be noted that this study will focused more on materials for roof coverings

5.0 JUSTIFICATION FOR THE STUDY

Housing, which is one of the three basic needs of man's existence, has of recent grown to become one of the most expensive properties to acquire in most

developing countries, (Agboola 2000) in particular, Nigeria. This occurs owing to the continuous and increasing importation of foreign building construction materials and this has led to a rapid and tremendous decrease in the use of some local materials in the building industry.

However, this study is hereby borne out of the need to minimize the rate of materials importation through the utilization of traditional choice of materials for roofing. This could be achieved by re-examining and improving the quality of local or traditional roofing materials which are readily available within the local environment.

6.0 SCOPE OF THE STUDY

This study is intended to explore a general overview of roofing in terms of its origin, classifications as well as the importance of roofing in residential building development.

The paper also critically analyzed a wide range of roofing materials already in use in the south-western part of Nigeria. The need for alternative roofing materials and such factors determining the roofing materials choices in housing development process were also discussed in this study.

7.0 LIMITATION OF THE STUDY

The issue of time constraint and the unavailability of much existing thatched roof structures in South Western Nigeria pose a major limitation on this research.

The exorbitant cost of transportation to various relevant places and locations for the case studies is also an important factor to note as limitation for this project

8.0 RESEARCH METHODOLOGY

The term methodology describes the specification of procedure for the collection and analysis of data necessary to help solve the problem at hand. In other words, methodology could be described as set of methods or systematic approach towards solving a particular problem through data collection, data analysis and data presentations.

8.1 RESEARCH INSTRUMENTS

Research instruments could be referred to as such methods or ways of collecting information from different sources. The research instruments adopted in this research included the following:

8.1.1 QUESTIONNAIRE

This is a set of well structured questions designed to elude relevant information or data on a particular issue or problem. These questions are later analyzed and used in providing a suitable and appropriate solution to the problems and the issues at hand. The use of questionnaire as a research instrument is of a greater advantages than oral interviews due to the fact that more areas are covered in a shorter time

8.1.2 INTERVIEW

Interview is a simple and straight forward method involving a face to face conversation with the source or respondent. This method involves preparing a list of relevant questions which are to be asked from the respondent. In order to avoid a

loss of information, it is often advisable that the researcher takes a tape recorder along. This is however necessary as there is every tendency to ask some other questions which are outside the listed ones from the respondent. Information is also gathered through telephone conversation.

8.1.3 OCULAR/ VISUAL INSTRUMENTS

Aerial photographs are also taken on the area in question so as to have a first hand and pictorial information on the issue or problem. For example, pictures of illegal dumpsite would give the viewer firsthand information on how unpleasant, an illegal dumping could be.

8.1.4 LITERATURE REVIEW

Consultation of relevant literature, books, journals, seminar papers, newspapers, etc

8.1.5 INTERNET BROWSING

Relevant information was also obtained from the internet.

8.1.6 DATA ANALYSIS AND PRESENTATIONS

Data analysis involved the extraction of data from the data-gathering instruments such as questionnaire, and displaying the data with various illustrative charts, such as bar charts, pie charts, histogram etc. The data collected for the purpose of this research was however analyzed with the use of software such as Microsoft office excel and SPSS.

9.0 EXPECTED BENEFITS OF THE RESEARCH

- This research helps in the production of very economical roofing in Nigeria.
- It also aims at giving the city a new and a very natural look.
- Very importantly, the research will create another type of occupation most especially in the area of supply of raw materials and craftsmanship, thereby providing a reasonable solution to the problem of unemployment.

10.0 CONCLUSION

It is a known fact that among the various challenges of developing nations is their low level of exploration, improvement and exploitation of the locally available materials in their environments. However, attentions should be shifted to this particular subject matter on how to improve and make use of the so called obsolete materials for proper growth and sustenance of the economy.

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What research knowledge do practising architects need? How does research bring value to architects'™ practices and their clients? This study uses interviews to develop a series of case studies and build up a picture of how architects in practice currently view research as a facet of their activities. By speaking to a range of different types and sizes of practice we have attempted to discover the various ways in which architects define, obtain, undertake and use research. We have also asked what benefits and advantages research knowledge brings to their business performance and quality of work, and to find out those areas of research in which they are most interested and engaged. Jeremy Till's paper "Architectural Research: Three Myths and One Model" was originally commissioned by the Royal Institute of British Architects... Architecture is stretched along a line from the arts to the sciences and then sliced into discrete chunks, each of which is subjected to the methods and values of another intellectual area. For example, the highly influential 1960s Oxford Conference on architectural education looked to scientific research as the means of establishing architecture within the academy. More recently architectural theory has immersed itself in the further reaches of critical theory in an effort to legitimize itself on the back of other discourses. Non. DAUWE Simon. MARCH Research Methods in Architecture. Module: ECTS: Description: Architecture I (Semester 1). 2. Students will be introduced to research methods in architecture. This course will introduce students to architectural research and will provide tools and techniques on the master's level. We have already been exposed to landscape architectural thinking in the teaching sessions on landscape architecture lead by Olivier Gaudin in April. Program In the first session, I will make a short introduction to the studio. This will be followed by a presentation of your site analysis and concept development that you have been working on as groups and a short introduction of each of your projects.