

EXPRESSIONISM VERSUS ENVIRONMENTAL SUSTAINABILITY IN MODERN AFRICAN ARCHITECTURE

DR. BARNABAS NAWANGWE
MAKERERE UNIVERSITY, UGANDA
nawangwe@tech.mak.ac.ug

ABSTRACT

The debate about the reality of an african architecture appears to have subsided. Many architects and scholars argue, that architecture has become so internationalised, that it is futile to continue agitating for the development of an african architecture.

This paper examines african architecture during the colonial period and immediately after independence. It argues that african architects were overwhelmed by the need to find a new identity for the young states, that they almost wholeheartedly threw out all consideration for sustainability. The paper further argues that even after years of training her own architects, the attitude has not changed. If anything, it has worsened with the modern architect trying to overdo so called internationalism.

The paper cautions, that it is high time african architects awakened to the reality of the region's socio-economic and climatic conditions in order to be able to design sustainably for the african people. Examples from the East African region are discussed.

1.0 INTRODUCTION

Modern African Architecture is generally assumed to cover the period from the 1950s to present time. It is from the 50s that urban populations in Africa started rapid growth. With the coming of independence, the African countries embarked on programmes of industrialization and development of service sectors that inevitably pulled large numbers of rural inhabitants to the urban centres. The rapid increase in urban population required a corresponding response in expansion of housing and other built infrastructure, including institutional, commercial and industrial buildings. The growth rate implies *that a growing number of people will depend on environmental goods and services for their survival thus putting increased pressure on the available natural resources* (NEMA Report, 2002:08). The economies of the newly independent countries were too weak to cope with the new problem. Originally well planned cities deteriorated into largely informalised settlements. A good example is Kampala, where more than 70% of the population lives in unplanned, unhygienic informal settlements (Nnaggenda-Musana, 2006).



Fig 1.1: Part of Kampala showing the sprawling nature of the City. Photo by Vestbro.

On realizing their inability to independently bring development to their countries African governments had to resort to their former colonial powers and other industrialized countries for assistance in achieving their development dreams. As would be expected, this did not only bring money to the countries, but also a host of other influences, including architectural styles. Most of the big development projects undertaken after independence were realized with foreign capital support, and the consultants and contractors were foreign not only to the countries, but also to the local socio-economic and climatologic realities. The result of the foreign influence is buildings that are considered alien to the people's cultural aspirations. Even after most architectural assignments were taken over by locally trained architects, the situation did not improve. Indeed in many cases, the situation moved from bad to worse.

The problem that the author set out to investigate is the apparent lack of knowledge by most architects and planners practicing in Africa of the region's special socio-economic and climatic conditions that must be considered when designing buildings in the region.



Fig. 1.2 A government housing project to the left
Clearly shows the massive differences
With unhygienic dwellings in informal
Settlements to the right

This paper examines some of the architectural tendencies in the East African region, with particular emphasis on large housing estates and institutional buildings and their response to the environmental conditions of the region.

2.0 LITERATURE REVIEW

Figure 2.1 below shows systems model for architecture, as developed by Sanya in his PhD thesis (Sanya 2007). The model clearly shows that environmental issues play a major role in determining the sustainability of the built environment. The natural environment directly affects the durability of buildings. In East Africa, the climates range from hot and humid tropical and marine climates to hot and dry semi arid. But the critical factors that must be considered during the design of buildings are direct sunlight, heat, humidity and heavy torrential rains. According to Sanya's systems model for architecture, these factors can have far reaching consequences not only on the durability of buildings, but also on their micro climatic comfort.

In the climatic conditions of the East African region, the durability of buildings is affected by heavy torrential rains. Subjecting walls to persistent heavy rains alternating with intense heat from the sun leads to weathering of cladding materials and cracking and weakening of the load bearing materials.

High temperatures and humidity in combination make buildings quite uncomfortable to live and work in. To enhance the comfort of buildings in these conditions, maximum ventilation is necessary. In that case buildings should be designed with short cross sectional spans and with windows and other openings located directly opposite each other. Proper orientation is also vital. Buildings should be located on the site in such a manner that windows and long facades face away from direct sunlight. In East Africa, this means maximizing on the north-south orientation as these countries lie astride the equator.

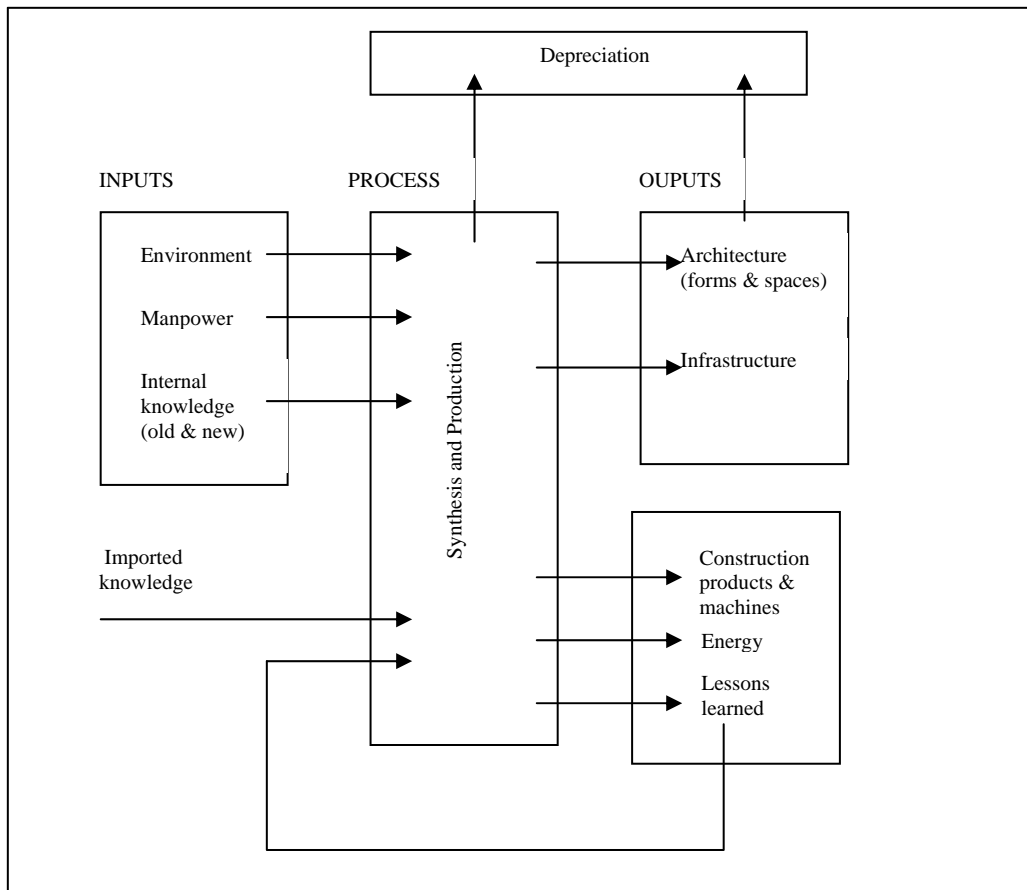


Figure 2.1: Systems Model for Architecture

In a paper presented to the conference of the Nordic Forum for Universities in Achitecture (NOFUA), held in Oslo in 2004, I emphasized that *‘The onslaught of modern technology has robbed our communities of the construction skills and environmentally sensitive design of their dwellings. “Modern Architecture” is becoming more and more environmentally unfriendly not only to people, but also to all the surrounding natural environment.* (Nawangwe, 2004)

Many authors have written about modern African architecture. Many others have extensively written about the vernacular architecture of the different regions of Africa. But no author has discussed in a comprehensive manner the lessons that can be learnt from vernacular architecture for enhancing environmental sustainability in modern African architecture. Again in my paper presented to the NOFUA conference in Oslo in 2004 I suggest as follows: *‘However, the study of vernacular architecture of Uganda is revealing that the use of industrial materials for construction can produce environmentally friendly shelter, responsive to our climate and conserving our dear cultural heritage’.* (Nawangwe, 2004)

In that paper, I argue that architects should take advantage of the positive oractices used in vernacular buildings, including steep roof slopes, large roof overhangs, efficient ventilation of roofs and small window openings.

3.0 METHODOLOGY

The study adopted the case study methodology of conducting research. The study was conducted in four countries in Eastern and Southern Africa, including Kenya, Uganda, Tanzania and Mozambique. Photography and physical observation were the main methods used to collect data. Sketches of building plans and building clusters were made.

4.0 FINDINGS

The findings of the study are discussed under four main headings: building orientation, cross ventilation, roof design and use of the natural environment.

4.1 Building Orientation

In most of the cases studied, it was observed that very little attempt was made to consider building orientation in the design of the site layout. The tendency is to orient buildings facing the street, irrespective of the position of the sun. Many buildings are sited with windows facing the east and west, thus subjecting the buildings to heat build-up during the day.

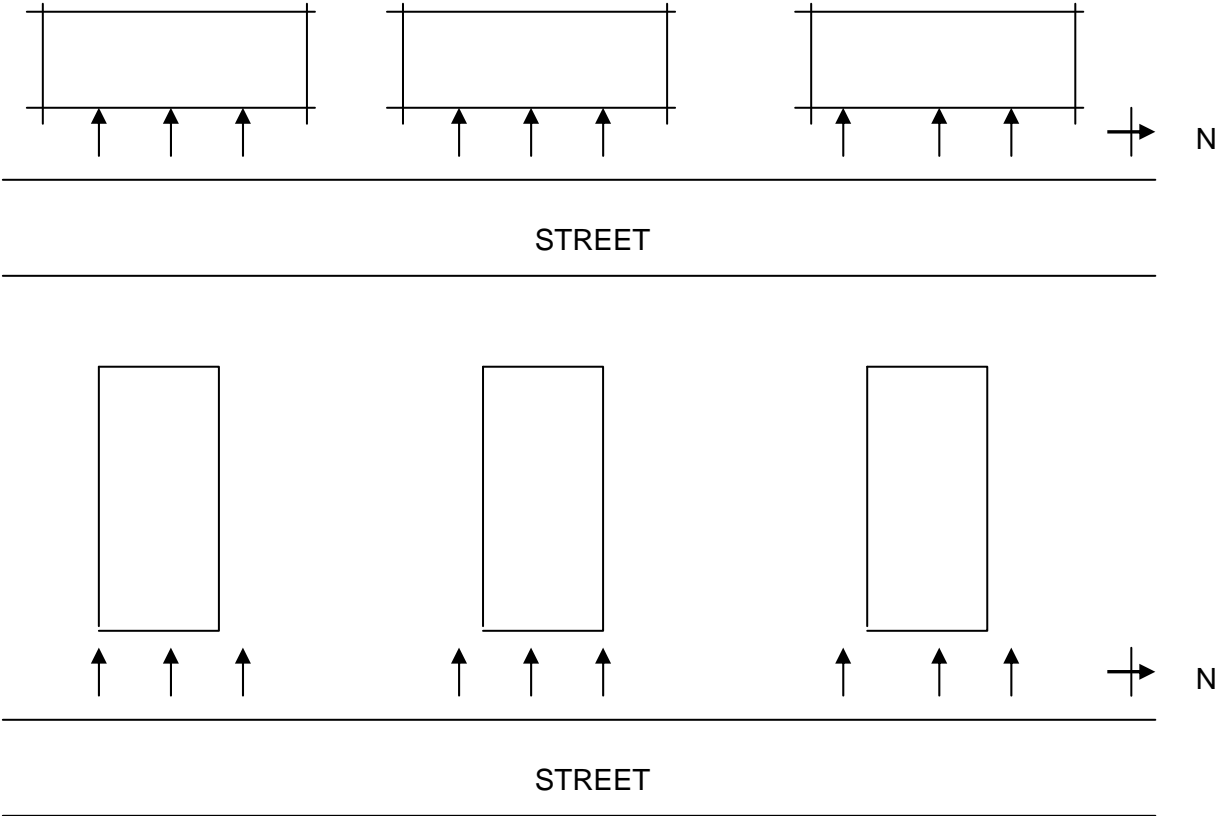


Fig. 4.1 Buildings sited facing east and west are subject to intense heat build-up from direct Sun rays, while buildings with longer facades facing away from direct sun rays are protected.

In many cases, it may be inevitable to have buildings facing the direction of the sun. In that case, the facades facing the sun should be protected with sun-shading devices. This was not apparent in most buildings studied. The figure below shows two examples of buildings, one with the façade protected by sun-shading devices and the other with no sun-shading devices.

Buildings that face east and west accumulate a lot of heat during the day and may require mechanical air conditioning to make them habitable. This is not sustainable given the acute lack of electricity in most African countries.



Fig. 4.2: The building on the left is well protected with sun-shading devices while the glass building on the right is not protected at all from direct sunlight.

4.2 Cross Ventilation

A lot of buildings are designed without taking into account the need for cross ventilation. A large number of buildings studied were of very big cross sectional spans, which inhibits easy flow of air through the building. This leads to unpleasant smells in the buildings.

4.3 Roof Design

The heavy torrential rains in the east African region require that rain water should be drained off the roofs of buildings as efficiently as possible. Lack of efficient drainage of rain water from roofs eventually leads to early rusting of iron sheet roofs and leakage. Many of the buildings studied either had completely flat roofs or pitched roofs with slopes less than 20 degrees. Maintenance of flat roofs is costly and they are therefore unsustainable.

4.4 Use of Natural Environment

The use of trees and other kinds of vegetation can go a long way in enhancing thermal comfort of buildings and building environments. Trees give good shade to buildings and protect them from the intense sun heat. However, in most of the cases studied, the use of trees for enhancing a pleasant micro climate in buildings was not considered. Figure 4.3 below shows examples of two building environments, one where vegetation is positively utilized and another where it is not utilized at all.



Fig. 4.3: The building on the left takes advantage of tree shade, the one to the right doesn't

4.5 Materials of Construction

Selection of materials of construction is probably one of the most important decisions an architect will make as far as environmental sustainability is concerned. The most energy intensive materials are at the same time the materials that produce the buildings with the most unfavourable interior and exterior environmental conditions. The demonstration effect has meant that most buildings are constructed using energy intensive materials, including concrete, glass and steel. Apart from the unfavourable environmental conditions that these materials create within and around buildings, their manufacture leads to environmental degradation. The study established that over 80% of buildings surveyed were constructed out of energy intensive materials.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study covered buildings in four major cities in eastern and southern Africa. In the majority of cases studied, evidence is abundant that the design of buildings did not consider comprehensively the environmental factors that affect the durability and comfort of the buildings. Most designs of buildings appeared to be imports of building styles from without the region.

5.2 Recommendations

The following recommendations are made:

- Architects should always consider the environmental effects on the durability and comfort of buildings they design;
- Use of energy intensive materials should be discouraged as their use leads to environmental degradation and environmentally uncomfortable buildings;
- Curricula of schools of architecture and planning in Africa should be re-designed to put emphasis on the environmental conditions of the region and their effect on the built environment;
- Further research should be conducted in the specific environmental conditions and their effect on the built environment.

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