What kind of Architecture for Mali? A Dilemma of continuity of tradition and the influence of modernity

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Introduction

The architecture is developing in Mali in an environment characterized by natural climatic contrasts, the weakness of the national economy, the limited resources of people and the preponderance of empirical methods of construction.

I. FACTORS WHICH MAY AFFECT THE DESIGN

In Mali, the designer not having sufficient systematic information and experimental data in the field of building science is obliged to make decisions more or less subjective. However, any plan should take into account a variety of factors: geo-climatic conditions, social, traditions, economical opportunities, cultural exchanges, etc.

1.1. Geo-climatic factors

Mali is a country of natural contrasts affecting the way of life. Increasing humidity climate or rainfall from North to South led to a corresponding change in the character of the green and the type of soil.

Zoning in latitude of geo-climatic conditions influence on the character of empirical architecture at typological and structural level as well as the use of available buildings materials (plants, stones, earth, etc.)

These materials have the advantage of having simplicity in production technology and to be economic. But, they have the disadvantage of being little lasting and relatively less adapted to the morphology of modern architecture and have a more or less harmful to the ecosystem. It is therefore necessary to stimulate new technologies and materials of construction.

In desert regions, semi-desert and dry savannah (less than 900 mm of rain per year), i.e. regions of KIDAL, GAO, TIMBUKTU, MOPTI, SEGOU, northern regions KAYES and KOULIKORO are dominated by the tents and houses' flat roofs or terraces relatively thick walls. In the South of the isohyets 900 (SIKASSO region, the southern regions of Kayes and KOULIKORO) the traditional sloping roof are more frequent. We will refer to these two areas respectively as 1st and 2nd construction zone (2,3)

In the first area, must be taken measures against the great drought of wind, solar radiation, the reflection from the surface, the heat transmitted in neighbouring buildings, sandstorms, dust, insects and parasites. That is why the plano-Volumetric composition in this area must be closed to the outside environment with the use of small courtyards well appointed and shaded (greens, pools, etc.) as well as passages covered. If possible, the spaces not covered should be protectors with greenery.

The plano-volumetry and structures used must take into account of local zoning in relation to time of operation to better control the thermal factors.

In the second area, the problems encountered require natural combating heat (with a relative humidity of at least 50%), solar radiation, precipitation, insects and parasites. The buildings must be prepared or oriented so as to facilitate the breakdown of the premises based on the rational use of the wind rose.

The morphology of the building must take into account the need for rapid evacuation of rainwater. The structures of openings and roofs must ensure protection against sunlight, parasites, dust and allow good air circulation.

In Mali, where the desert is advancing and where dangerously building specialists do not have a developed infrastructure network, they must seriously consider the possibility of an ecological approach when designing the infrastructure for construction projects.

The harmonious interaction between the various elements of the buildings on the one hand and between the building and the surrounding environment on the other hand, may be an alternative in solving the problem of improving the living of the vast majority of Malians.

To that end, it is necessary to step up applied research in the field of renewable energies (biological treatment of waste, solar and wind power, etc.), And the design of types of solar homes by the laboratory of solar energy in collaboration with specialists in architecture, having an efficient planning of buildings near mandatory green space and control the use and abuse of uncontrolled amount of land to build.

1.2. Historical factors

From the historical point, the architecture can be seen as a common thread connecting the past of a people with its future. The more this thread is brilliant, solid and long, the more life is rich and constant for the culture of this people. The continuity of the architecture is the memory of the people expressed through its originarity. In Mali, we have an original architecture and "faceless" architecture which has nothing in common with national traditions. This is due to:

- The originality in the historical process that led to preserve unique architecture (Dogon architecture) (2,4);
- The mix of external and internal elements for the creation of a historically unique architecture and resistant (Sudanese style) (1, 2)
- The creation of a regional architecture due to the mutual influence of neighbouring settlements (African style) (2,6)
- The preponderance of the influence of external factors on the development of architecture (colonial style, monotheistic architecture, etc.) (2)

The rational analysis of the architectural heritage imposes to us flexible use of the principles of traditional architecture which must be over the conservatism. We must link the tradition with acquired knowledge in science and technology in order to create a positive and varied architecture to a larger number of people.

1.3. Socio-economic factors

The influence of very low levels of the Malian economy (along with a sub chronic equipment in terms of infrastructure) and social relations on architecture expressed by the differences between city and countryside, between districts within the same town and between houses in different families, as well as the organization of the family home.

The design of mass habitat in the context of Mali must take into account the large size of families containing various generations. We must be creative in organizing the social core of the area and the types of dwellings, which should allow the isolation of the individual and his contact with other people.

Due to the lack of technological and financial resources, the designer must considered the study and the development of cultural heritage, aesthetic and architectural aspects of Mali by discovering and drawing on national traditions most progressive based on the use of available resources.

2. MORPHOLOGY OF URBAN HABITAT

The under-development of the construction industry and infrastructure as well as the high cost of materials and construction techniques mostly imported must be taken into account when designing mass habitat in Mali. Due to the limited number of qualified workers, projects for buildings must have a technology simple. However, economic considerations must not make us forgetting the largest consumer of architecture (the man), for whom the specialists of the building must create normal conditions of housing and work. Projects must therefore exceed empirical construction and having long life both physical and moral aspects after their completion.

Contrary to current practice, the design and implementation of multi family housing building is needed in typological research and the implementation of a habitat convenient for urban masses. This has many advantages compared to orthogonal frame organized on the basis of family housing: compactness of buildings, reduction in the cost of urban transport linked to the reduction of distance intra-urban, plano-volumetric varieties and structures, possibility of an optimum centralisation of sanitation and other elements related to urban engineering.

The architecture of mass housing must be achieved on the basis of the following principles:

- Plano-volumetry and structures in relation to the construction in the area;
- Rational use of architectural heritage;
- Control of the international practice of architecture and construction.

2.1. Plano-volumetry and structures in relation to the construction zone

The creation of mass housing should be based on analysis and consideration of local factors as well as on the control of means architectural and urban planning for the welfare of human being (2, 3, 5). That is why in the first construction zone, the principle of the layout of houses should be based on the volumetric compositions plano-house residential Sudanese style (TIMBUKTU) where the patio plays the role

of ventilation channel for all rooms. The interior of the courtyard built with the greenery acts as a functional centre of the habitat and spends the closure of the volumes environment characterized by a hostile climate. Bedrooms should not be surrounded by structures accumulating heat.

For the second zone, a certain openness of the buildings in the surrounding environment is recommended to ensure better natural ventilation to different premises. That is why the houses should be designed along the lines of the plano-volumetric "houses with verandas" prevalent in the southern part of the country. The morphology of buildings with different types of galleries and loggias characterised by the role of shadow and light well enough to meet that requirement.

2.2. Rational use of architectural heritage

The conservation of the particularities of local architecture and consideration of the f life style are very important for of housing design for the majority of population. Therefore, the morphology of the buildings for normal residential use must be plastic, human and warm. This will develop the aesthetic principles of construction of African, Dogon and Sudanese styles, which reflect the profound aspirations of the Malian people and the beauty of the surroundings.

We must build by considering the existence of traditional public places in the village by constructing greenery with different shapes playing positively on human emotion.

The projects of construction several flats must take into account the complexity of human relationships in Malian families, its size as well as the low level of technology in the production of goods. Some must study the organization of communal life for at least three generations. In all cases, the demands of modern comforts and the rationality of functional processes in the flats must be taken into account in order to integrate hygiene and comfort to the notion of "economic habitat."

2.3. The control of international practice of architecture and construction.

The use of engineering equipment in the construction of mass housing, the creation of appropriate types of houses with floors and the design of complex inhabited with services will improve the living conditions and save land building. To do this, we must not forget the weakness of technology in the country. That is why, in order to save energy mass housing, elevators and conduits garbage may be missed. The constructions of 2 to 5 levels better meet these requirements.

The architectural expression of these buildings in respect with human being can be improved by different types of sun barrier, through a combination of building at different levels and different configurations, as well as the contrasts of surfaces and volumes.

3. ARCHITECTURE OF PUBLIC BUILDINGS

The contribution of foreign designs is significant in the realisation for the most representative public buildings. These works are characterized by their large operating expenses.

In the architecture of the buildings we see on the one hand, the influence of a regional architecture or architecture from countries of designers and on the other

hand, a superficial reading of the national architectural heritage symbolized by the use of pilasters Sudanese style as decorative elements.

The architecture of public buildings must have a systemic approach integrating the organic unity between the plano-volumetry, structures and artistic composition and emotional. This requires the use of the principle of continuity in the organization of volumes, the implementation of local materials and the synthesis of the arts.

Public buildings must also be made from the following principles:

- Plano-volumetric and structure in relation to the construction zone;
- Rational use of architectural heritage;
- Control of the international practice of architecture and construction.

3.1. Plano-volumetry and structures in relation to the construction zone

As for the construction of housing for use in the first zone, we must take into account the dry air, sandstorms and the scarcity of rainfall (2, 5). That is why; the of plano-volumetric composition of buildings must be closed with minimal external openings. The distribution of the rooms will be around inner shaded courtyard.

These patios serve as channels or ventilation shafts. The design of the structures will be done taking into account the time of exploitation. Thus, the external walls of buildings operated during the day will be carried out in materials which could delay the movement of heat from the outside inwards. The most exploited buildings during the night will of the outer walls which do not accumulate heat.

In the second construction zone, designer needs to incorporate the following factors: relative abundance of rainfall, humidity, solar radiation, heat. In this case, the composition plano-volumetric must be the housing type. The buildings will be grouped around open spaces and rooms will be broken on both sides. The rooms will most be often arranged on one side of the corridor and balconies gallery will be used. In some cases, the hallways will be cut with pockets of ventilation.
The use of sunscreens should not impede air circulation. The structures are usually mild and should not accumulate heat.

3.2. Rational use of cultural heritage

The originality of contemporary architecture of Mali can be achieved by maintaining a degree of national expression in the architecture of public buildings. This requires the use of the wealth of built heritage: flexibility and simplicity of the African style, originality and synthesis of the arts Dogon style, plastic and artistic emotional of Sudanese style.

Today, as yesterday architecture of public buildings should incorporate elements of other artistic expressions (masks, sculpture, painting, etc.). Traditionally, people of Mali have skills, in the field of sculpture.

In general, the traditional art of Mali has great aesthetic value. It is simultaneously simple and original, visible and mysterious, static and dynamic. In addition, we can found a logic compositional and symbolic relationship with life. These qualities are necessary for the design of public buildings. The architecture of these buildings must

be expressed in Mali through the use of blind walls of large area, significant size and simplicity of architectural details. The entrances, terraces, “claustras”, forged grids and other functional elements used taking into account the deep shades can highlight the national character of public buildings.

Given the weakness of the construction industry in Mali, public buildings are essentially monolithic constructions. However, to reduce the costs of implementation, the use of local materials should be encouraged with the contribution of new technologies for buildings (land stabilized waste of agricultural products, natural stone, small blocks, etc.).

3.3. The control of the international practice

In Mali, regarding public buildings, it is necessary to recommend the implementation of complex urban planning, the use of landscape architecture, the concentration of services in health institutions and prophylaxis, the synthesis between architecture, landscape and art for tourism institutions, the link between compact forms and multifunctionality in cultural institutions.

Conclusion

It is difficult to predict all the details of Malian architecture. It is necessary to define the criteria for scoring the quality of architecture in terms of the satisfaction of physiological and spiritual needs of man under the conditions of Mali. In addition, family composition by age groups and genders, the best variants of adaptable for the physical and moral deterioration must also be considered. The specificity of each city and each locality, the natural conditions, topography and climate, as well as the works of architects will create different designs of type of buildings including flats. The economic progress of the country, the quantitative and qualitative increase of specialists in the area of construction will link to the design of individual buildings to industrial methods of construction.

References

1. Domian, S. (1989). Architecture Soudanaise. Vitalité d’une tradition urbaine et monumentale : Mali, Côte d’Ivoire, Burkina Faso, Ghana. *L’Harmattan,* Paris
2. Doumbia, M. (1988). Architecture Traditionnelle et Contemporaine (dans les conditions du Mali) .*Thèse de doctorat (PhD)* / Institut d’Architecture de MOSCOU.
3. Doumbia, M. (1996). Méthodologie de conception de l’habitat urbain au Mali : approche théorique. *Etudes Maliennes*, N°50, p:18 – 26
4. Lauber, W. (1998). Architecture Dogon. Construction en terre au Mali. ADAM BIRO.
5. Lippsmeier, G. (1980). Building in the tropics. München.
6. Habitat traditionnel au Mali/ C.T.A – Bamako 1983.