AFFORDABLE HOUSING OF EARTHERN STRUCTURAL BUILDING

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Abstract

One definition of architecture is the design of building and the definition of building is durable enclosures in control environment and the creation appropriate for human function is durable in human function. Environment and architecture has to be blended together like a coin with two side faces. Climate and architecture are two subject of binary opposition that need to be solved by an architect. If we divide the world in the main climate areas analyze their traditional architecture, it is astonishing to discover how distant areas produced similar architecture solutions. Generally speaking vernacular architectural forms are product of climate on building for example the proportion between and area of wall change from case to case according to the climate, and the most important purpose of materials used is to change the microclimate inside the house. Today it becomes more and more difficult to find a reflection of vernacular architectural principles in modern buildings. For example, in tropical countries the traditional skills have been abandoned in favor of concrete architecture with wide screen of glass walls to produce solar radiation. This kind of structure will let in big amount heat to the surrounding area. Any architect who to change the microclimate of the building with cooling machines should think that it is time for him to find other solution. Earthen architecture is one solution for the wall construction in the dry arid in the tropical area such as Indonesia.

Keywords: architecture, environment, earthen material

I. INTRODUCTION

Most population in the developing are living in rural areas. Most of rural houses are built with earth, for example houses in rural areas of North Africa, Middle – East India, China and South American countries. A shelter made from earth indicate poverty. Cement and fired bricks are and will be luxury building materials for the majority in rural areas. The production of cement which is not ecologically right will increase and it shortage also higher. On the other case the production of cement and bricks can not fulfill the demand of millions low – cost houses and is therefore out of the question for the poor. New Industrial building materials and complicated building methods have not their way into the village yet, they are still too expensive.

In this sense Ken Yeang comments in Tropical Urban Regionalism that: “The modern buildings especially in the tropical climate, when they reach in a certain scale become a high technology item. They use up a significant amount of
material and energy resource for their production and require sizeable and elaborate systems to power and maintain (them)” (Yeang 1987, 15). On the other hand architects face the limitations of an urban site. They can not avoid erecting high-rise buildings with multiple use designs, because the land on which they are building is so expensive. The consequence is that in big cities, it is difficult to achieve adequate quality of environment for the human beings that live there.

The new era of industrialization was spread out across the world by western countries, who introduced new formations of life style which later became known as modernity. As third world countries took over the idea of modernity, there was a danger that the most important points about the nature of regional cultures could be gradually disappear. With the development of education, recently Third World countries have become more aware of their own culture, or at least of the put that it is changing. In development educational implication of architectural design, architects and scholars in Indonesia have begun to think about the revitalization of their culture in terms of searching for the architectural identity of Indonesia.

The idea of a return to cultural philosophy became the basis for propaganda since the 1970s, especially in relation to architectural identity, with a series of solutions offered to the confrontation of binary contradiction between traditional and modernity. Ismail Serageldin has identified the inherent contradictions of this current architectural debate as being to do with the modern versus traditional, technology versus craft and international versus regional (Serageldin 1989). As Chris Abel argues: “Sometimes called the green movement, or in the developing world context, eco-development, these experiments have their architectural counterparts in a renewed interest in regional architecture and history, which usefully serves to focus attention upon previously neglected concepts of cultural and place identities” (Abel 1997, 166). Possibly Earthen Architecture will become one solution of unique and better architecture and environment in modern time.

II. CLIMATE AND ARCHITECTURE

Climate and architecture are two subject of binary opposition that need to be solved by an architect. If we divide the world in the main climate areas analyze their traditional architecture, it is astonishing to discover how distant areas produced similar architecture solutions. Generally speaking vernacular architectural forms are product of climate on building’ for example the proportion between and area of wall change from case to case according to the climate, and the most important purpose of materials used is to change the microclimate inside the house.

Today it becomes more and more difficult to find a reflection of vernacular architectural principles in modern buildings. For example, in tropical countries the traditional skills have been abandoned in favor of concrete architecture with wide screen of glass walls to produce solar radiation. This kind of structure will let in big amount heat to the surrounding area. Any architect who to change the microclimate of the building with cooling machines should think that it is time for him to find other solution. Also when modern materials are introduced on buildings some other visible problem can appear:

- Waste of energy used in the production of materials
- Waste of energy used for transportation, stocking and preservation
- Waste of energy used for construction
When Le Corbusier designed the Ronchamp Chapel in East of France he learned vernacular architecture of Santorini (island in South of Greece), M’zab valley (South of Algeria) and from the mosques on the island of Djerba (Tunisia). He also drew sketches for the massions Murondins in Saint Die (1945) to built with rammed earth techniques (earthen architecture). Possibly Earthen architecture is one solution for the wall construction in the dry arid in the tropical area such as countries in Middle East and North African countries.

III. THE SIGNIFICANCE OF VERNACULAR ARCHITECTURE

“Vernacular architecture - a field of study which deals with built environment of those people whose cultures are often characterized by rich mythological systems - has developed a rich mythological system of its own” (Stea 1990, 20). Vernacular buildings as an expression of culture, record the visual shape of history and are treasured as representative features of the past. The form and space of the vernacular concept direct an idealized version of life through the relationship between local climate and the life style of the people. The environment reflects many socio-cultural forces including beliefs, religion, family structure, and social relationships between individuals. Lessons can be drawn from vernacular wisdom.

The form of vernacular buildings is not simply the result of physical forces or any single ordinary factor, but is the consequence of a whole range of socio-cultural factors seen in their broadest terms. Form is in turn modified by climatic conditions and by methods of construction, materials available, and the technology (Rapoport 1969). “Regionalism is more easily illustrated through vernacular building, religious institutions, and through building types that have existed in a particular society for a period of time long enough to have established a tradition in terms of image, style function and technology or in the way of construction” (More 1989, 53)

From the West to the East of Indonesia, the richness of the architectural idioms of the past represents a great cultural tradition. On one hand, we are aware of these cultural traditions, and on the other hand, we are also forced to respond to the new challenges of life so that independence from colonial rule and foreign domination with its new architectural styles, gradually changes the architectural features of urban areas. With the passing of time, the cultural context of society must change as well. The people have to adapt to new physical arrangements which replace traditional living patterns as existing cultural symbols of the society (Budihardjo 1992, 27). Parallel developments also cause human roles to change and therefore threaten cultural identity.

The cultural meaning of vernacular ‘form’ is derived from the nature of the belief systems and religion. In the past, society was ordered and determined according to belief and religious values. Therefore transferring belief systems and religion transmits the relationship with tradition, social customs and nature. The understanding of the past from vernacular concepts as expressed through symbols, can be read on several levels and transferred into modern design to embody certain meanings that have relevance to modern life. This understanding of the past can help in providing lessons for aesthetic inspiration for the use of past values in future design. Contemporary design that provides for the present and future attempts to reflect these aspirations by developing a continuity with reference to the past, in providing a better environment for today, and the future,
by care and concern for the splendid legacy of past eras. Therefore it can be
concluded that the visualization of the concept of the future is not possible
without fully appreciating the fundamental experience of the past. In the integrity
of this approach, it is understandable that the history of human kind is nothing
without its own past, so the past has a substantial role in the human sense of
identity.

In terms of the human life span, history records the chronology of the past,
present and future. We are now in the position of the present. Understanding
history, the present tense is always in association with the past and in continuation
is drawn toward the future. It is clear that it is impossible to ignore any of these
tenses in the linking concept of history. It is necessary to fully understand
experiences of the past in connection with the present and future, because the past
is reality of humankind.

Therefore it can be concluded that visualising the future is not possible
without fully appreciating the fundamental experience of the past. It is
understandable that the history of the human lifetime is nothing without its own
past, so the past has a substantial role in human sense of identity. The historical
approach is that one can learn from the past. That study of the past is of value
philosophically as well as for making us aware of its complexity and resonance
things. For the national scale appreciating the past may lead to the pride of
nationalism and better understanding to our sense of identity, in role our guiding
towards the future. Linking to the concept of the past, present, and future, history
is the repository of permanent values transmitted from one generation to the next
in the form of myths, and is also a process of evolution in which systems of
cultural value only possess a relative truth.

In general terms, we are dealing with an aspect of history which is
concerned with the evidence and physical work of the past. Every place has a
history, culture and architectural heritage. Architecture is a product of culture and
history, and so is an important means for approving the past. According to
Rapoport: “Human geography has always been linked with history, and even
prehistory, and in the past history has also played an important role in
architectural studies“ (Rapoport,1969:11). Vernacular architecture as an
expression of the culture, way of life and aesthetic values of the local people,
records the visual shape of their history over time. We can see the evidence of this
from examining buildings and the way they are used both today and in the past.

There may be a great lesson in vernacular building for our own day in the
value of constraints to establish generalized, “loose” frameworks, where the
interplay of the constant and changeable aspects of man can find expression
(Rapoport 1969, 135). Studying vernacular architecture may be relevant to other
aspects of developing countries, and may throw light on the whole problem of
understanding the relation of the built form to the cultures concerned, in turn
making clear the value of cross cultural analysis in relation to housing and the
built environment in general (Rapoport 1969,129). The value of this kind of study
is that it provides a great ranges of variables in different cultures, as well as
greater extremes, and hence a greater sense of the range of alternatives that is
possible (Rapoport 1969,12).

IV. EARTHEN ARCHITECTURE CONSTRUCTION TECHNIQUE

Earthen architecture is part of vernacular building and also definitely part
of history. Also earthen architecture is ecologically suitable to surrounding area.
“Eko arsitektur adalah dimensi ekologis dalam arsitektur yang penuh berkaitan kepada lingkungan alam yang terbatas” (Frick 1998). In sustainable development architecture have to be viewed from many different angels; ecological planning in terms of balance of environment, healthy for human and environment and building materials donot give negative impact for the people surrounding. Therefore the building materials have to be provided in this area, simple technology and costly available.

Earthen architecture is the product of relatively simple and highly effective technology. Clay is took approximately 50 cm from the ground, clean up from root and other organic stuff, mixed with sand, chopped straw and water. The clay provides cohesion, the straw function as to help the mass to dry evenly and minimizing cracking. The sand is inner filler. The water is to mix up all material together. Local recipes vary widely depending on the soil available, like in Lombok cow dung was used instead of straw, whether in Bali they used small stands instead. There are general methods of earthen architecture

IV.1. Pise or Rammed Earth Construction

In some areas the mixture is tamped in place using a large wooden square form and bake or dry under the sun. This method is similar to brick but without any fire burned. To construct the wall just like brick wall construction but using clay mixture between each bricks.

IV.2. Adobe or Coursing or Paddling

This method is commonly using in Northern Sudan. Thin layer of mixture is tamped in the wooden form (most commonly the size of form is wall size). The second, third and the next put on top of the first layer and the same method with the first one. After the form is full another wooden form is added in order the wall rises.

V. CONCLUSION

One of earthen construction great advantage is thermal. Usually mud walls have a high heat retaining capacity. During the day acting as a passive solar collectors, they insulate well against high temperatures and at night the heat they have absorb is slowly released. While outside temperatures may soar or fall dramatically, indoor ones stay remarkable constant.

In Vernacular Architecture as a Paradigm, Guvenc (1990) provides an insight into the most current interests underlying vernacular values in ‘building in harmony with environment’, citing a period in which people believed that it was possible for humankind to live in a certain place, adapting to the prevailing conditions by designing their built environment to be viable within its natural surroundings. Nowadays we have what might be termed the era of ‘building against the environment’s forces’ which has been brought about by the process of universal industrialisation and commercialisation, where the economy is controlled by capitalists, modern architecture is controlled by technology; the aim of design is to control the environment in order to reach maximum comfort and convenience. Architects in the modern era, for all their impressive knowledge and technological know - how often build comparably less well than did their predecessors. This era of destruction has to be brought to a turning point, that of the reawakening of our ‘collective wisdom’ to return to a ‘modern vernacular’
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practice. We have the idea of tracing back to the ‘past’ to study for the ‘future’
contemporary design sources. We must connect the ‘continuity past - present -
future’ by the following objectives. Earthen Architecture will become slowly
possible to answer the demand of unique architecture and better environment in
the era of sustainable development to reach advantage of ‘building in harmony
with environment’.

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