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THE WISDOM OF TRADITIONAL ARCHITECTURE IN INDONESIA TO ANTICIPATE THE PROBLEM OF THE THERMAL COMFORT INSIDE THE BUILDING

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ABSTRACT

Traditional building in some places in Indonesia such as Batak, Toraja, Timor, Papua, had already adapted with the nature and environment through trial and error process in the long period. Due to the various cultural factors, the performance of the building Architecture are different.

Even though the performance of building architecture are different, every traditional building has similarity to create the thermal comfort of the building. For example the way of using material, natural ventilation, solar radiation protection, etc.

In the design process of vernacular or modern Architecture. The wisdom traditional architecture to create the thermal comfort of the building can be used as a referency. That's mean we are not only depend on the mechanical air condition, but we have to pay more attention to the use of natural system, due to energy saving.

Therefore, we can hope that the use of traditional architecture in this decade does not only implement in the use of architectural performance or the ornament. But also in the application of the wisdom traditional architecture it self to create the thermal comfort inside of the building.

Key words: thermal comfort, traditional architecture

INTRODUCTION

Indonesia is a large nation with the area from Sabang until Merauke, it has many kind of traditional architecture which are very interesting and worthy. There are many Indonesian and foreign expert are interested to carried out researches to this cultural matter. This paper tries to discuss about the traditional architecture from the thermal comfort point of view.

There are many aspects related to this issue, which affected the thermal comfort in the traditional building. To limit the problem, this paper discuss only the important aspects, namely: cross ventilation, humidity and protection toward the solar radiation.

The case study are taken from several representative traditional architecture in Indonesia.

According to several representative examples, will describe the general conclusion. From the general output can be followed by the next research related to traditional architecture. With the target to find out the wisdom of traditional architecture especially about the thermal comfort concept. So we can transfer or combine this wisdom concept of traditional architecture in vernacular or modern building

TRIAL AND ERROR PROCESS IN INDONESIAN TRADITIONAL ARCHITECTURE.

From the various kinds' of traditional architecture, which are exist in Indonesia, only few of kinds are chosen as discussion material, namely . Batak Karo, Toraja, , Kupang, and Papua.

According to the opinion of Santosa (2000) Socio-cultural aspect play the important role in the traditional houses: : “Socio- cultural aspect in the spatial formation of traditional houses under hot condition of tropics has a specific role”.

Even tough, the morphology and performance of traditional architecture is influenced by not only philosophy, socio- cultural, esthetical, function aspect but also thermal comfort trough trial and error process. There were no quantitative calculation such as room temperature, wind velocity, air movement, and humidity to create the thermal comfort. However, they can feel instinctive, weather the building comfort or not trough trial and error. Of course, this process would take along time, this so-called evolution.

The above phenomenon could be found in Aceh Besar (fig.01). The concept applied in Aceh traditional architecture building is reflected such as cross ventilation, protection again solar radiation in order to get the thermal comfort, principals to avoid the disaster like earthquake, flood . This design compare competitively by the guidance book developed by the famous universities in Indonesia particularly for reconstructing Aceh post tsunami.

There are so much aspects could be learned and explained from the traditional architecture. This paper discuss the thermal aspect only to get the wisdom principal from traditional architecture to minimize the uncomforted thermal building which use the natural air circulation, this will automatically support energy conservations activity in this decade.

SEVERAL EXAMPLE OF THE WISDOM OF IN TRADITIONAL ARCHITECTURE TO ANTICIPATE THE THERMAL COMFORT PROBLEM

According the qualitative diagram from the several traditional building (fig.02 A-D), can be formulated by the following items:

Protection again solar radiation

In the several researches, which already carried out by some experts, scientists, architects or students post graduated, traditional architecture building in Indonesia has been

described as: “Roof Architecture”. This terminology came from the way to give the name of traditional architecture. Especially in Java, the art of traditional house are named by the shape of the roof, such as: Joglo, Limasan, panggang pe, bekuk lulang. In the reality, the different between the Batak, Minangkabau, Jawa, and Toraja is very easy to find out from the shape of the roof.

Priotomo (2000) also wrote about the role of the roof: “we must say that roof has enjoyed transformation form one as a provision of shade into one of ethnic identity”.

shape of the roof firstly is a product from the mitoses, socio-cultural background or semiotics approach. However, unconsciously the climate consideration plays the important role to the creation thermal comfort of the building.

The room space, from the floor until the roof ceiling is not separated, the height from the floor until the roof ceiling is proper. (fig.02). Some time its look over, because the space of functional room is very small compare with the roof space. For example by batak, toraja, papua traditional houses.

The height from roof ceiling to the floor avoids heat transfer through radiation. So the contribution of solar radiation to accumulation of air temperature can be minimized.

The natural material of roof in traditional building like; bamboos, wood tile (sirap), straw, etc. Absorb the solar radiation slowly. This becomes the advantage.

Wall Ventilation:

Ventilation used especially for the wall, like window and door in traditional building is minimum. The reason is the most activity is often done out side the house. The other reasoning is to avoid the unwanted infiltrators, such as a beast, thief etc.

Nevertheless In the reality the cross ventilation run properly. Because the wall is made from natural material like timber, bamboos etc. The air can flow trough this 'breathing material'. Therefore this wall can be called 'wall ventilation' and can guarantee the properly cross ventilation in the building.

The interior plan of traditional house is mostly semi open plan. If there are divider to get the private room for special function. Design of the divider is not totally closed until the roof. However, the air from one room with another room is not separated and can flow through upside the divider. Therefore, the divider does not avoid the process of cross ventilation.

Roof ventilation:

The roof of the traditional building commonly are equipped with the porous material or porous part, which can act as roof ventilation to flow out the air from inside to the out side. Due to the thermo dynamic process, the hot air will raise to the roof area and cause

the thermal accumulation.

The roof ventilation is sometime not easily identified. This quasi roof ventilation is very useful to avoid the thermal accumulation in the roof. However, the porous material like: bamboo, straw etc make the airflow from inside to out side possible (fig.02).

Elimination of air humidity

Previously most of tradition building was built as a ,rumah panggung' (house with raised floor supported by poles. See fig. 02). However, the shake of economy, recently the floor of traditional building mostly placed direct on the earth. Therefore the humidity is higher compare with the ,rumah panggung.

The raised floor is made from timber, the air flow from below through the timber floor in the room like the additional cross ventilation. This can eliminate the air humidity in the room (fig.02).

PROSPECT OF THE USE OF THE TRADITIONAL CONCEPT TO THE RECENTLY BUILDING.

The design of new building used the traditional architecture concept, mostly applied for tourist consumption for example: motel in Bunaken Manado northern Sulawesi, Bali, eco tourism complex in the forest near Palangkaraya central Kalimantan and buildings in the other tourist resort complex.

The use of the image or style of traditional architecture for the modern functional building is already exist such as Batak-Karo church in Kabanjahe northern Sumatra, the government building such as several office building in Kupang, Banda Aceh, and Sentani- Jayapura (Fig:03). The transfer of the traditional in those building is just focused on the performance only, but from the traditional principal of the use of natural ventilation or traditional system of heat transfer to get the thermal comfort in building is not optimum yet.

Because of the different consideration of psychologies, activities, behavior demand and condition between tradition building and new building, the transfer of traditional concept about thermal comfort is very complicated. Hence, it is needed the proper research and consideration to analyze more about application of natural ventilation, solar protection etc from traditional building to new building.

The transfer of the traditional architecture style in new building in order to get the region character and region trademark is the positive efford from the architects and government in the globalization era. Otherwisdom, Indonesia will lose the traditional character due to international style of architecture

There are many aspects, which can give any contribution especially to the influence thermal comfort, namely the cloth, physic, psychology, activity etc. The demand of thermal comfort by several modern people is increasing, due to the modern cloth such as suit and tie. There are many electrical appliances in the room, that can produce internal heat gain. Therefore, to transfer the traditional wisdom related to thermal comfort for modern architecture has to be continually studied in order to get the energy conservation. According to the matter, we are not only totally depend on mechanical and electrical air condition but we should also consider about natural ventilation.

CONCLUSION

The traditional architecture in Indonesia has a mystery, which has to be researched in order to explore the thermal comfort concept. This concept could be seen as wisdom of traditional architecture, which has been developed through trial and error process. Therefore traditional architecture can act as a wisdom teacher for the today's architecture. Hence, we as an architect have to pay more attention to traditional architecture.

This wisdom traditional concept of thermal comfort can be transferred and combined with the vernacular, contemporary or even modern architecture. By this way, the use of wisdom principal by traditional architecture not only esthetic performance but also the wisdom principal, that consist in the traditional architecture in Indonesian for example: (1) Optimize of the natural ventilation, in order to avoid heat and humidity accumulation in the building. (2) Use of the roof space and roof ventilation to eliminate external heat gain caused by the solar radiation and to support the thermo dynamic process to flow out the heat from the inside to outside of the building. (3) Wall ventilation and raise floor to avoid the heat accumulation, because of external or internal heat gain.

The transfer of systems of traditional architecture above to the new building has to suit and adapt to the new development of the technologies, socio-cultural and economical aspect.

The continuities of architecture in Indonesia in the past time, now and in the future could be developed to support the efforts to maintenance, to preserve, and to sustain the value of the Indonesian culture.

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