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- Architectural design
- Mosque architecture
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Mosque as a Model of Learning Principles of Sustainable Architecture

Swambodo Murdariatmo Adi, Cynthia Puspitasari

Abstract

The mosque is an integral part of the circuit-worship rituals of Islam. For Muslims in Indonesia, the role of the mosque as a place of worship, examines religion and some other activities occupy a strategic position not only as a religious symbol but more emphasis on the function of the space as a public building. Utilization of space in public buildings as well as space-ritual-social space will have meaning for the people in view of adaptation space used. Awareness of the importance of effective space utilization and management of water resources wisely in support of the ritual apply the principles of sustainable architecture will have a positive impact for the people to give directions as to how the principle of austerity-not wasteful in Islam can be applied. This paper will discuss about the process of continuous learning from the essence of understanding of the mosque as a model in implementing the process of life, taking into account the principles of simplicity, functional and wisdom, especially in the efficiency of utilization of local resources. The method used in this research is qualitative descriptive, which is explained the theory and based on literature and accompanied by case study that have implemented the principles. The output of this application of the principles of sustainable architecture in the planning and use of mosques as a place in the relationship with God and with fellow human relations can be a model for the faithful to deal with wisely challenge natural resource constraints, especially for future generations.

Keywords

Mosque; Sustainable Architecture; Adaptation of space; Water

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MOSQUE AS A MODEL OF LEARNING PRINCIPLES OF SUSTAINABLE ARCHITECTURE

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ABSTRACT

The mosque is an integral part of the circuit-worship rituals of Islam. For Muslims in Indonesia, the role of the mosque as a place of worship, examines religion and some other activities occupy a strategic position not only as a religious symbol but more emphasis on the function of the space as a public building. Utilization of space in public buildings as well as space-ritual-social space will have meaning for the people in view of adaptation space used. Awareness of the importance of effective space utilization and management of water resources wisely in support of the ritual apply the principles of sustainable architecture will have a positive impact for the people to give directions as to how the principle of austerity-not wasteful in Islam can be applied. This paper will discuss about the process of continuous learning from the essence of understanding of the mosque as a model in implementing the process of life, taking into account the principles of simplicity, functional and wisdom, especially in the efficiency of utilization of local resources. The method used in this research is qualitative descriptive, which is explained the theory and based on literature and accompanied by case study that have implemented the principles. The output of this application of the principles of sustainable architecture in the planning and use of mosques as a place in the relationship with God and with fellow human relations can be a model for the faithful to deal with wisely challenge natural resource constraints, especially for future generations.

KEYWORDS

Mosque; Sustainable Architecture; Adaptation of space; Water

INTRODUCTION

Construction of worship place in Indonesia in order to embody man who is faithful to God is an integral part in the life of the state and society. The worship place is a building that has certain characteristics are specifically used for worship for the followers of each religion permanently, not including the family worship place [1].

In a series of these regulations, are also discussed related to the establishment of worship place in terms of needs, technical service and development. In general, the need of worship place in Indonesia was believed to be part of the process of life which is based on the principle of religious tolerance. Worship place is defined as a space (interior-exterior) which is used as a place to carry out religious rituals for the religious community in touch with the God.

Worship place for Muslims is the mosque. Mosque used to accommodate a capacity crowd with a larger amount, while the smaller size of worship place called *mushollah*, *langgar* or *surau* that is widely spread in all regions in Indonesia.

Rituals performed in both categories mentioned above generally includes daily prayers (*sholat*), speeches, chanting and some other supporting activities in addition to activities of Islamic religious

festivities. The effectiveness and efficiency of space utilization is very possible to be studied in more detail, related to time management, the scale of space and activities.

One of the series of daily rituals activities in the mosque building is ablution. Ablution is an activity that is conducted prior to prayer, the wash water in a manner according to the *syariah*, beginning with the intention to purify themselves of dirt / small *hadast* on certain limbs. Use water sparingly and wisely to perform ablutions is the first step in the process of maintaining the availability of natural resources. Reduce the dependence of ground water utilization need to be considered as an alternative consequences in the provision of water for such activities. Rainwater to run water purification technologies can be one of the alternatives do. The existence of resources that have not been optimized will encourage creativity in making space more comfortable and inspiring for the people / worshippers to be learning in everyday life.

MOSQUE AS A CENTER FOR COMMUNITY ACTIVITIES

The definition of worship place for Muslims can be viewed from various perspectives, here is a review of the terms of etymology / language related to

mosque term derived from the Arabic, *sajada-prostrate-masjad* / mosque [2].

1. *Prostration*, means obedient, submissive, and bow respectfully. It refers to the physical ritual prayer movement by putting the forehead, hands, knees, and feet into the earth. Have a meaning that a mosque built specifically for prostration.
2. *Sajada*, meaning submissive and docile and obedient, so that the mosque could be interpreted as a place to observe all human activities that reflect the values of obedience and obedience to Allah.

While the terms of semiotics, the mosque can be understood based on the physical shape of the building, model / style, and symbols that appear from the building. Shape and physical model of the building of mosques in Indonesia cannot be separated from the strong influence of the culture of the Middle East, Turkey and several other countries are developing Islam in Indonesia. The influence of local cultures of all regions in Indonesia, traditions and customs handed down across the generations will continue to affect the physical development of the mosque with the adjustment to the needs of each era.

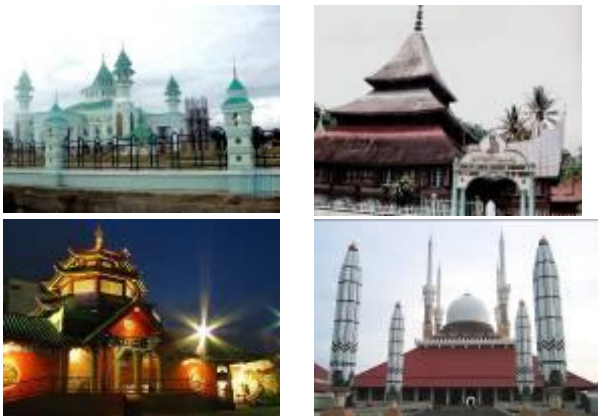


Figure.1. Tradition, culture and customs are passed down across generations affect the physical development of the Mosque [3]

Mosque in addition to functioning as a place of worship place for prayer also is the center of the Muslims. It can be stated that the majority of people activities in ritual such as lectures and study activities / recitation, learning the Qur'an celebration of religious studies and discussions carried out in the mosque, even in certain circumstances at the time of the Prophet Muhammad, the mosque plays an important role for the socio-economic community activities to a place to set the state and military strategy.

SUSTAINABLE ARCHITECTURE PRINCIPLES AS A METHOD OF ANALYSIS

Sustainable Architecture is architecture that would meet the needs now, without compromise the ability future generations, in fulfilling their own needs [4]. The need is different from one society to another,

from an area to the other and most comfortable rather decided by the community related.

Sustainability, in the context of building and habitat design, has multi-dimensional effects, which can summarized as below [5]:

- Environmental sustainability
- Social sustainability
- Economic sustainability

Table 1. Various Dimension of Sustainability [6]

Economic	Environmental	Social
Creation of new markets and opportunities for growth of sales	Reduced waste, effluent generation, emissions to the environment	Worker health and safety
Cost reduction through efficiency improvements and reduced energy, and raw material inputs	Reduced impact on human health	Impact on local communities, quality of life
Creation of additional value	Use of renewable raw materials	Benefits to disadvantaged groups (such as the disabled)
	Elimination of toxic substances	

The basic principles of sustainable development in building design based on the book of Sustainable Building – Design Manual: sustainable building design practices, are outlined below [7]:

- Maximizing the use of renewable and natural resources in the building environment.
- Minimizing energy and water use and the negative environmental effects of buildings.
- Ensuring processes to validate building system functions and capabilities for proper maintenance and operation.

From the text and the table (fig.2) above, adaptation of space and the management of water resources can be chosen as the analysis tools, due to these two reasons: (1) Adaptation of space which is effectively and efficiently implemented will contribute to the social and economic sustainability, while; (2) Good management of water resources which is applied safely and optimally, will contribute to the environmental and economic sustainability.

Adaptation of space and the management of water resources were also chosen because considering that mosque is one type of a house of worship which apply the spaces being commodious and the use of water as one of the important thing.

ADAPTATION SPACE AS PART OF THE PROCESS OF SUSTAINABLE UTILIZATION

Allah says, "And verily, the mosques it belongs to Allah. So do you worship one else can in it, in addition to (worship) of Allah" [8].

Utilization of space inside / interior for some common activities have been considering the efficiency and effectiveness of spatial scales. Adaptation of the operational systems prayer activities, lectures and other standards specific space so that the capacity of space for multiple activities can

be saved with the functioning of space for different activities. In general, time management use of space in the mosque has been done wisely by the people / worshipers, resulting in the utilization of space for the activities of pilgrims adults (men / women) can be adapted to the needs and capacities, as well as to the activities of children in learning read the Koran and special events on the big day Islam. The outdoor space / exterior is also used to adjust the capacity of the living space on several activities festivities, either to pray in the courtyard mosque (prayer-Eid), the event Eid al-Qurban, as well as other social activities such as mass circumcision, wedding receptions, Tabligh Akbar etc. Some of the considerations that can be done in the planning of these spaces are adjusted to the needs and the availability of existing land resources.



Figure.4. The mosque space utilization with adaptability of common activities [9]

Based on the explanation above, the perception of space utilization can occur directly and spontaneously with reference to the possibilities that can be done in the adaptation functions for certain activities.

"An affordance is a relationship between the properties of an object and the capabilities of the agent that Determine just how the object could possibly be used" [10].

With reference to the principles of sustainable design in architecture, space utilization with high adaptability to the mosque building is a model of the design lifecycle stage use and maintenance operations [11].

ABLUTION WATER AND MANAGEMENT

"Do you not see that Allah sends down water from the sky, then the earth was green? Indeed, Allah is Subtle, All-Knowing" [12].

That verse is closely linked to the function of water as a natural resource which is utilized for the benefit of the earth and living creatures that inhabit in

it. Living creatures will require water as part of the biological functions and metabolism. In particular in the way of worship for Muslims, purify themselves (ablution and shower) is an integral part in everyday life. The requirement becomes obligatory in the manner prescribed governance in accordance with the word of Allah:

"O ye who believe, if you want to offer prayers, then wash your faces and your hands up to the elbows, rub your heads and (wash) your feet up to the ankles, and if you junub then wash, and if you are sick or in traveling or returning from the waste water (toilet) or touch the woman, then you do not get water, then do tayamum with good soil (net); rub your face and hands with the land. Allah does not want to complicate you, but Allah wanted to cleanse you and complete His favor to you, that ye may be grateful" [13].

The convenience provided, in accordance with paragraph if the condition is not found water, can be done by using a purification process dust / tayamum. It is an indication of how in certain circumstances cannot find water, dust and soil will be the part that is the function of acting as a substitute for water. Drought in the period of time that can not be predicted in most parts of Indonesia as a result of global warming impact on the depletion of groundwater resources. One of the efforts made to maintain the availability of water is making water tank on the ground or in the ground. Calculation of underground water reserves requires voluminous data aquifer, the aquifer distribution and transmissibility of the aquifer. If data is not available, then the annual ground water reserves comparable to affix ground water comes from rain water, rain water and surface water in part be partially seep into the ground [14].

The existence of space ablution requires storage and distribution system water should be sufficient for the assembly to perform ablutions and other service activities. Based on the assumption that the water needs for each person was 3.5 liters per day, the volume of water needed and grey water resulting from the ablutions process perform substantial enough.

With the geographical condition of Indonesia which has a high rainfall year, consideration of the use of rainwater as an alternative to maintain the availability of water resources can be done. Exploration design of the mosques roof can be done, with the optimization of a wide span structures that functioned as rain water catchments area.

Use of local materials with environmentally friendly technologies can be developed by considering the availability of materials and energy resources exist.

Some architectural design precedent of modern mosque with a flat roof and the roof of the tent can inspire in the water catchment area of the roof at the same time can function as a container storage and purification of rainwater and then distributed through a pipeline into the ablution area. The next stage is to use water purification technology, can be used with a simple precipitation technology uses a combination of

fibers, sand, coral or modern technology.



Salman mosque, Bandung-
architect: Ir. Ahmad Noe'man

Al-Irsyad mosque, Bandung-
architect: M. Ridwan Kamil,
ST, MAUD



Great Mosque of Central Java, Semarang
architect: Ir. H. Ahmad Fanani

Figure 5. Precedent of Mosque flat roof and tent structures can be used as the inspire model of water catcher function in Indonesia [15]

Maintaining the Mosque outdoor space / open space on as rain water catchment area can maintain the availability of ground water reserves as well as being an alternative to the adaptation function space that can be used for people to religious events.

"Do not be excessive (wasteful), verily Allah is not happy to those who love extravagance" [14].

With reference to the principle of sustainable utilization of the water, should be considered also recycle / recycle-dirty water from the ablution activities, a consideration that must be carried out later as part of maintaining the water cycle can be recovered. Utilization of water-dirty / gray water as watering, toilet flush is not a new thing that has been applied in sustainable architecture nowadays. Filtration and purification technology, precipitation with modern methods require further studies from the fields of technology and reference syariah in order to produce pure water and can be reused as clean water for ablution.

CONCLUSION

Based on a fragment of verse and descriptions that have been described, sustainable architecture approach can be applied to building mosques in Indonesia as an early stage to begin the process of learning and meaning for the people in terms of:

1. Utilization of space (interior – exterior) of the mosque as part of a model / example of highly adaptive function for activities that can be developed to support the function of ritual, socio-

cultural and prudence in the utilization of land resources with limited management, so as to become a benchmark for the effectiveness and efficiency of the lack of land availability.

2. Wisdom in water use and management become a learning process to increase the understanding of the importance of preserving the natural resources of water and the use of technology as part for solving the problem of limited natural resources.

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