THE CONTRIBUTION OF ARCHITECTURE TO SUSTAINABLE DEVELOPMENT

Application of Green Architecture as a Strategy for Realizing Sustainable Architecture (Case Study: Traditional Balinese House in Bangli and Modern Cafe in Ubud)

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ABSTRACT

Currently, environmental problems such as increasing physical environmental damage and global warming are being hotly discussed in the world of architecture. The implication is the importance of implementing sustainable architecture through green architecture. Green architectural practices in the world of architecture continue to be carried out on an ongoing basis as an effort to care for the environment. Green architecture itself is defined as architecture that is environmentally friendly, energy efficient, sustainable, and is a high-performance building. Traditional architecture is recognized as architecture that really cares about the environment, as can be seen in the Balinese Traditional House Architecture in Penglipuran, Bangli. The implementation is based on the concept of local wisdom inspired by Hindu-Balinese beliefs. Apart from that, there is also contemporary (modern) architecture in commercial buildings, namely WYAH Cafe in Ubud which applies green architecture. The design was carried out by maintaining existing elements such as the contour of the land and trees, thereby making this building blend with nature and the surrounding environment. The research method used is qualitative research with a descriptive approach to describe the application of green architecture in building design. Includes the process of verifying green architectural concepts and standards as well as implementing the concept of Traditional Balinese House Architecture in Penglipuran and WYAH Art & Creative Space Cafe in Ubud which are related to green architecture. It is hoped that the results of this verification can explain the relationship between existing theories/concepts and the research object, namely looking at the value of green architecture in traditional houses and modern buildings from the perspective of green architecture theory. The research results obtained show that the mass patterns of the Penglipuran Bangli traditional house and WYAH Ubud Cafe are very in accordance with the values of green architecture.

Keywords: *green architecture, sustainable architecture*

1. INTRODUCTION

In the current era of globalization, environmental problems such as decreasing environmental quality, increasing physical damage to the environment, global warming and the energy crisis are still major issues in the world of architecture. This is caused by the increasing need for physical facilities and infrastructure which triggers excessive exploitation of natural resources, such as large amounts of green open land being converted into buildings and infrastructure, which has implications for reducing the carrying capacity of the environment. Apart from that, the phenomenon of sick building syndrome has also emerged, namely health problems and discomfort due to air quality and air pollution in buildings, poor

ventilation and lack of natural lighting. This makes it important to integrate sustainable architecture through the application of green architecture in depth in building design practice because it understands the current phenomenon of environmental damage.

In the practice of developing designs related to environmental and energy issues in the world of architecture, Jimmy Priatman (2003) stated that green architecture is an architectural concept that is environmentally conscious and based on concern for environmental preservation with an emphasis on energy saving, a sustainable and holistic approach. Apart from that, according to Wajong (2018) green architecture not only integrates green building facades and lots of plants but also sustainable buildings. This means that buildings are environmentally friendly by empowering their potential and trying to minimize negative impacts on the surrounding environment by utilizing energy sources and natural resources efficiently and optimally.

Rapoport (1969) stated that traditional house architecture is known as architecture that really cares about the environment and is believed to be a form of architecture that has experienced trial and error in dealing with natural behavior. Architectural works during this period have basically adapted to natural behavior, including simple procedures for utilizing natural resources efficiently. According to Sari & Wirahadi (2020), Traditional Balinese Architecture is the art of designing the spatial layout of Balinese buildings and refers to achieving harmony and integration, both for humans, the surrounding environment and the universe. The life of the Balinese people brings ecological values to the environment, space and traditional culture which originate from local beliefs, religious teachings, local wisdom and natural characteristics.

Until now, this value is still maintained in several places, one of which is Penglipuran Village, Bali. The application of the Balinese traditional house concept can be seen from the physical form of the residence and other buildings. One form of implementation can be seen in the mass pattern of the building. Apart from that, traditional Balinese architecture buildings have advantages in spatial planning so that air circulation runs smoothly and is cool. The positive impact can reduce the use of AC (Air Conditioner) in daily activities. Traditional Balinese house architecture has a spatial layout that is translucent and close to nature (open). With many gaps and partitions that blend with nature, air circulation in and out runs well. Apart from that, the Balinese traditional house architecture has a courtyard surrounded by a brick fence and contains separate building units.

On the other hand, apart from traditional architecture, current architectural trends with the concept of green architecture are increasingly in demand by modern society. Not only applied to homes, the concept of green architecture is also widely applied to commercial buildings. Like one of the iconic commercial buildings, namely the WYAH Art & Creative Space cafe in Ubud. This building is surrounded by forest and contoured land. This place is challenging to create buildings that blend with nature and a collection of buildings that are more connected to the open air. The aim of this research is to obtain an overview of the application of green architecture in Penglipuran Bangli traditional houses and WYAH Ubud cafes as a form of strategy for achieving sustainable architecture.

2. RESEARCH METODOLOGY

The research method used is qualitative research with a descriptive approach. This approach is used to describe the application of green architecture in the design of the Penglipuran Bangli traditional house and the WYAH Ubud cafe. The location of this research is in two places, namely in Penglipuran Village which is located on Jl. Penglipuran, Kubu, Kab. Bangli, Bangli Regency, Bali. Then at the WYAH Ubud cafe which is located on Jl. RSI Markandya II, Keliki, Ubud District, Gianyar Regency. The research data comes from primary data, namely data on existing conditions in the field related to building elements that apply the green architecture

concept. Meanwhile, secondary data comes from the archdaily website which contains architectural news, architects' opinions regarding the design of WYAH Ubud and comes from previous similar research regarding the application of green architecture in Penglipuran traditional house buildings and WYAH cafes. The data collection technique was carried out by field observation by recording data regarding existing conditions to obtain a detailed picture and information at the research location. Apart from that, interviews were conducted to obtain specific information regarding building elements as well as documentation to collect visual data in the form of photos and drawings. The population in this research is building owners and architects, while the unit of analysis is buildings. The analysis carried out in this research was through a verification process regarding green architectural concepts and standards for the research object, namely building design. From this verification process, it is hoped that a conclusion can be drawn to the extent to which the Penglipuran Bangli traditional house and the WYAH Ubud cafe contain green architectural values.

3. RELAT ED RESEARCH/LITERATURE REVIEW

Definition of Green Architecture

Green architecture is a building planning approach that seeks to minimize various harmful impacts on human health and the environment. The main goals of green architecture are environmentally friendly architecture, natural architecture and sustainable development. Green architecture can be implemented by increasing energy efficiency, water use and using materials that reduce the impact of buildings on health. According to Robert and Brenda (1991), there are 6 principles that can create Green Architecture buildings, including:

A. Conserving energy (energy saving), that is, the building must minimize the use of fuel or electrical energy and maximize natural energy around the building location as much as possible. Examples of applications include minimizing the use of AC cooling equipment and utilizing solar energy for lighting in buildings.
B. Working with climate, namely utilizing natural conditions, climate and the surrounding environment in the form and operation of buildings. Examples of its application include building orientation facing sunlight, using a cross ventilation system to channel clean and cool air into the room. Apart from that, it also uses plants and water as climate control and uses windows that can be opened to get light and ventilation as needed.
C. Minimizing new resources means optimizing existing materials by minimizing the use of new materials.
D. Respect for site (responding to the condition of the building site), namely not damaging the original condition of the building site, both in terms of construction, shape and operation, and not damaging the surrounding environment. Examples of implementation include maintaining the condition of the site by creating a design that follows the shape of the existing site and using local materials and ingredients that do not damage the environment.
E. Respect for users (paying attention to building users), namely considering the needs and comfort of users.
F. Holistic, namely applying the 5 existing principles into one unit.

Application of Green Architecture Concepts to Buildings

Subijono (2012) explains the application of green architecture as a strategy to achieve sustainable architecture and a form of concern for the environment that can be done in ways such as saving energy use, saving water and being environmentally friendly. Furthermore, Prawibawa and Santosa (2015) explained the application of green architecture in buildings consisting of:

A. Earth friendly, namely by utilizing natural lighting and ventilation.
B. Sustainable, namely design that can meet current needs without jeopardizing the ability of future generations to meet their needs.

C. Future healthly, namely by considering the health and sustainability of the surrounding environment.
D. Climate supportly, namely building designs that are responsive to local climate conditions.
E. Aesthetics, namely the application of aesthetics that also has benefits for the environment.
F. High performance buildings are energy utilization by utilizing energy that comes from nature (energy of nature) and combined with high technology (high technology performance).

4. RESULTS AND DISCUSSION

Penerapan Green Architecture pada Arsitektur Rumah Tradisional Penglipuran

If we look at the concept of green architecture, there are several things that can be found in the layout patterns of traditional Penglipuran architectural buildings, such as energy utilization efficiency, water conservation, as well as physical comfort and air quality in buildings. The value of green architecture in the mass pattern or spatial layout of traditional Penglipuran residential buildings can be described as follows:

Figure 1. Site Plan Penglipuran Bangli (2022)

A. Energy efficiency

The layout of the mass of buildings in the Penglipuran traditional house is patterned after the Bali Aga which is often called a row of wayang even though they don't exactly face each other. This pattern is in the form of a cluster, that is, there is a space in the middle as an orientation center which is usually called natah. This mass pattern allows almost all rooms to make maximum use of sunlight. In general, the need for 75% natural light to illuminate the room has been achieved. Thus, it can be said that the cluster mass pattern in the Penglipuran traditional house has a relatively low energy consumption pattern.

B. Physical comfort and air quality in buildings

Each building mass in the Penglipuran traditional house is relatively small. The mass of this building is arranged according to certain rules and creates a balance between massive elements and open space. This layout pattern allows fresh air circulation to flow very well into the building. The concept of cross ventilation, especially in bedrooms in accommodation bales, seems to have also been implemented. Thus, a mass composition like this will have a good influence on temperature comfort and air quality inside the building.

C. Outdoor space design (open space)

Judging from the site arrangement, not the entire yard area is built with building mass. Areas that have not yet been built or areas that are formed between building masses are not entirely hardened with natural hardscape materials, but most of them are maintained as green areas by planting plants. Some rear areas of yards that are being developed tend to be used as additional buildings and garages. However, the arrangement still takes into account the availability

of open space for vegetation areas. The arrangement of the Penglipuran traditional house garden is at least able to minimize the effects of heating and the various types of vegetation planted can lower the air temperature and reduce the amount of carbon dioxide as an air pollutant or in other words the plants will be able to 'clean the air in the residential environment.

Penerapan Green Architecture pada Arsitektur Masa Kini Kafe WYAH Ubud

A. Conserving energy & working with climate (earth friendly, climate supportly)

The absence of walls or open spaces in this building allows many dynamic natural phenomena to be perceived by the human senses, such as changes in temperature, wind, humidity, the smell of rain, natural light and shadows. Surrounded by trees and without walls followed by no air conditioning, but still provides natural light and natural temperature. This means reducing building energy by using lights and air conditioning. Apart from that, this aims to involve the surrounding nature to create a natural atmosphere in the WYAH building such as natural trees.

Figure 2. Building Interior (2023)

B. Respect for site (sustainable)

This building is surrounded by forest and contoured land. This place is challenging to create buildings that blend with nature. The design began by maintaining existing elements, such as the contour of the land and trees. This makes this building initiate users to be more connected with nature. Five polygon-shaped masses are positioned according to the contour of the site. Not only does this design create an interesting play on building heights, it also minimizes cutting and filling. Apart from that, the design of this building also avoids cutting down existing trees, so that more of the building mass is connected to the open air.

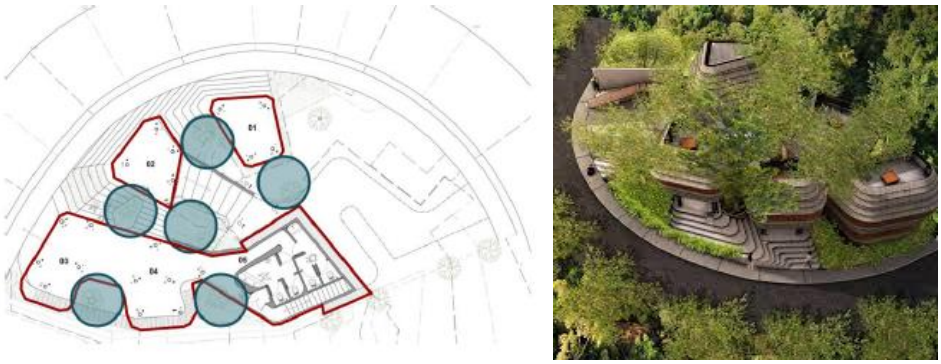

Figure 3. Layout Plan WYAH Ubud (2023)

C. Minimizing new resources (high performance building)

The materials used in WYAH buildings are iron, concrete and shingles. All of these materials come from Bali, follow the context in which the building stands

and have a theme of natural materials, especially shingles. Iron is used as building support pillars, concrete is used in parts of buildings that have walls such as kitchens and other service areas and as floor material, while shingles are used for the appearance of the building, namely the roof. All of these ideas are based on considering the uniqueness or special features of the building as well as the impression of being at one with nature from the use of the natural surroundings of the building.

Figure 4. Building Exterior

D. Respect for users

The WYAH building is a building that provides comfort both in terms of privacy, the desire to linger in the building, a sense of peace, and so on. This is related to the architectural characteristics applied to buildings, such as the appearance of the building, the mass of the building, the natural features around the building, the location of the building, and the spatial arrangement. The appearance of the building referred to by visitors is a building made of materials (wood, concrete and iron) as well as a building without walls or using narrow openings. This feature creates a sense of comfort for visitors, where visitors feel awake, cool, have privacy and tranquility when inside the WYAH building.

Figure 5. Top View WYAH Ubud

5. CONCLUSION

Based on the results and discussion, it can be concluded that the Penglipuran Balinese Traditional House Architecture and the WYAH Ubud cafe building implement aspects of green architecture such as conserving energy, working with climate, minimizing new resources, respect for site, and respect for users.

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