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Seeing the Conservation of Old Semarang City Building from a Biophilic Architecture Perspective

Christian Moniaga[1]

[1] Department of Architecture, Soegijapranata Catholic University, Semarang 50234, Indonesia

E-mail: christianmoniaga@unika.ac.id

Abstract

The Old Semarang City area is currently undergoing many renovation processes, both physical buildings and street furniture, whose existence supports each other. Conservation and renovation activities carried out on historic buildings and several cultural heritage buildings in Old Semarang City often use the concept of adaptive reuse, where there is a concept of physically adapting the building for reuse with the function of the building adapted to several more significant contexts. Renovation, conservation and revitalization are activities carried out to improve the function and image of buildings and the environment which is the attraction of Old Semarang City. All of these activities must of course also pay attention to sustainability aspects. Based on the 13 points in the Sustainable Development Goals agreed upon by the UN, one of the sustainability aspects to consider is health and welfare. This point is the main basis for this research. By using Biophilic Architecture theory, this research will look at how conservation activities taking place in one of the building objects in Old Semarang City, namely the Marabunta Building, have paid attention to the comfort and welfare of building users. Biophilic Architecture Theory is used because in this theory there are benchmarks that can be used to see to what extent building designs pay attention to the welfare of building users when they are active in the building.

Keywords: conservation, biophilic, Semarang Old City, sustainable, architecture

1. Introduction

Conservation, renovation, and revitalization activities in historic buildings, especially in the Old Semarang City area, are currently being carried out. The main trigger for this business is the desire of stakeholders to be able to utilize historical value to become a tourism attraction. Various parties involved in this conservation effort try to restore the existence of buildings and the environment to their original form and appearance. This is mandatory because the majority of these buildings fall into the category of cultural heritage buildings. On the other hand, conservation activities in cultural heritage buildings often conflict with the concept of sustainability. The conflict between sustainable development and cultural heritage conservation is a balancing act between preserving the importance of cultural heritage and enabling sustainable development [3]; Adams et al. 2014; Arumägi and Kalamees 2014; Broström et al. 2014; Eriksson et al. 2014; Fabbri 2013). This is the background to UNESCO adopting the Recommendation on the Historic Urban Landscape to regulate the negative impacts of urban development on cultural heritage building conservation sites. History and development should be able to proceed in a mutually beneficial manner [12].

The sustainable development perspective in this research focuses on aspects of good health and welfare. This aspect is used as a basis due to the mindset that cultural heritage buildings that are or have undergone a conservation process should not only prioritize their original value but must also be able to provide a good, healthy, and prosperous use experience for their users. This aspect of health and welfare is a point of view that cultural heritage buildings should also be able to respond to contemporary contextual challenges and issues.

Biophilic architecture is used as a theory to see the extent to which sustainability considerations are applied to conservation activities for cultural heritage buildings in the Old Semarang City area. This consideration is because biophilic architecture has design pattern guidelines that regulate how designs can maintain the health and well-being of building users. Biophilic is a deliberate effort to meet the need for contact with natural systems and processes in the contemporary built environment and to improve the physical and mental health, productivity, and well-being of society [11].

1.1 Definition of Biophilia

In terms of terminology, biophilia consists of two words, namely bio and philia. Bio means life and philia means love [15]. Humans have lived and evolved over a long period of time. In this time dimension, human life is always in contact with nature. As we move to the modern artificial environment, our dependence on nature for survival in primitive times is maintained and evolved and it becomes a process of seeking a relationship with nature for 'personal identity' [9]. Therefore, the evolutionary process depends on nature for survival and satisfaction needs, this is the basis of the theory of biophilia.

1.2 Biophilic Architecture

Biophilic architecture has certain patterns that can help architects in implementing them in building design. According to Browning et al. (2014) [1], biophilic design has 14 patterns which are grouped into 3 categories. 1) Nature In Space, this category contains patterns that combine natural elements into space including physical plants, natural sounds, aromas, and direct views of nature. 2) Natural Analogy, this category regulates design studies that give rise to an indirect awakening of nature in a space through the use of natural patterns, colors, shapes, and materials. 3) The nature of spatial patterns, or the arrangement of indoor spaces that imitate natural views through the layout of furniture and design elements that often trigger feelings of safety and comfort is referred to as prospect or protection theory.

These three categories are then summarized in more detail into 14 points of biophilic architectural patterns including, the category of nature in space: visual connection with nature, non-visual connection with nature, non-rhythmic sensory stimulus, varying air flow and temperature, presence of water, lighting indirect and dynamic, relationships with natural systems. Categories of natural analogies: biomorphic forms and patterns, material relationships with nature, complexity and order. Meanwhile, for the categories of spatial pattern properties: prospect, protection, mystery, risk [1].

The application of biophilic design in contemporary architectural design currently focuses a lot on the first category, namely the application of nature in space, especially visual connections with nature [4]. This application applies to new buildings and redesigns or renovations. Several previous studies have explained the relationship between the application of biophilic design and reduced stress levels of building users. Participants in a study on the visual assessment of biophilic design have shown results with lower levels of feelings of worry, anxiety, and nervousness as well as lower levels of heart rate when they were in spaces that had a visual view of nature and indoor plants [2]; [8]. Other research that has been conducted examines the impact of considering the implementation of natural elements in space on visual performance. Shibata and Suzuki (2004) demonstrated how students can show increased performance in work and learning in the classroom when there are plants in the room.

1.3 Biophilic Architecture and Sustainability

This section will discuss the relationship between biophilic architectural design and its challenges in sustainable architecture. Sustainable architecture challenges are identified to reflect different design goals, and the advantage of biophilic design is to review effective design elements [14]. In the last few decades, the concept and views of sustainability in architecture have continued to be widely discussed and studied. Dealing with various environmental issues and crises such as resource scarcity, climate change, and sick building syndrome [5]. Approaches to sustainability continue to be explored, for example starting from energy-efficient lifestyle habits, applying high technology and low technology, vernacular strategies, analogizing nature and natural systems as design inspiration, or implementing smart, renewable, recyclable, and biodegradable materials. These various views and approaches defy a simple classification of sustainable architecture [6].

Currently, the definition of sustainability in architecture is still debated and has an ambiguous concept [14]. Schröder (2018) says that heterogeneity, complexity, conflict of goals, and controversy are normal. He advocates for better exploration of what architects, engineers, and clients need from the concept of sustainability in practice through frameworks and perspectives on sustainability challenges.

Several previous studies have discussed the relationship between the 17 SDGs and the implications of biophilic design. To address the unclear notion of sustainable architecture and develop a more analytical approach and understand how biophilic architecture can contribute to the goals of sustainable architecture, we investigate the benefits of biophilic design in addressing specific challenges [14]. In the article [14] has also analyzed how the 17 SDGs have challenges from a sustainable architecture perspective as well as the benefits of implementing biophilic design and the most relevant elements of biophilic design.

TABLE I. BENEFITS OF BIOPHILIC DESIGN IN ADDRESSING CHALLENGES OF SUSTAINABLE ARCHITECTURE

No	17 SDGs	Challenges in Sustainable Architecture	Benefits Biophilic Design	Biophilic Design Elements
3.	Good Health and Well-Being	Healthy and comfortable Indoor environment	Reduce air pollution and optimise air quality	air
		Non-toxic substances and environment	Optimise thermal comfort	daylight
		Obstruct disease transmission and bacterial contact	Provide psychological restoration	plants
		Physical exercise spaces	Reduce stress	landscape
			Increase healing rates	images
			Enhance positive emotions	material, texture, colour
			Encourage physical activity	prospect and refuge, peril and mystery

Reference: Weijie Zhong, Torsten Schröder, Juliette Bekkering, Biophilic design in architecture and its contributions to health, well-being, and sustainability: A critical review, Frontiers of Architectural Research, Volume 11, Issue 1, 2022

In this article, some limitations are the focus of the research. Researchers focus on the third point of the 17 SDGs, namely Good Health and Well-Being. This point is referred to see how the process of conserving cultural heritage buildings can have a good health impact on building users, especially in buildings that are being conserved with the basic concept of adaptive reuse.

1.4 Marabunta at Kota Lama Semarang

One of the famous buildings in the Old Semarang City area which has been successfully renovated using good conservation principles is the Marabunta which is famous as the StadSchouwburg comedy building. In its golden era, there was a performance by a famous dancer named Mata Hari. This dancer is famous for his dance creations which are the result of a combination of classical ballet dance with traditional Javanese dance. After the independence of Indonesia, the StadSchouwburg comedy hall was abandoned because European society had left Indonesia. On August 29th, 1956 this building was inaugurated and used as headquarters. However, in 1994, this building collapsed due to age and environmental factors. Building management is then handled by the Rumpun Diponegoro Foundation.

The area of the StadSchouwburg building was then divided into two parts and a reconstruction process was carried out which replicated the interior of the StadSchouwburg building. Some of the original interior elements from the old building were reused in the hall area of the new building. This building was later given the name "Marabunta Building". The front of the building is a new design that is different from the original shape, but this design is adapted to the style of the surrounding buildings which is strong in colonial style. The Marabunta building is currently used as a restaurant named Marabunta Cafe and Resto. The restaurant area as the focal point of the building has its uniqueness which invites many people to come to visit. One of them is a ceiling design that resembles the shape of a ship's hull which has been turned over from the original wooden material of the StadSchouwburg building.

2. Methods and Discussion

2.1 Research methods

The research was carried out using qualitative methods with a Biophilic Architecture theory approach by previously conducting a study on its correlation with sustainable architecture in conservation building process. Understanding sustainable architecture refers to the 17 points of Sustainable Development Goals (SDG). Furthermore, this research focuses more on the third point of the SDGs, namely Good Health and Well-being. The aim and purpose of focusing on the third point is to look at how cultural heritage buildings that have been conserved can have a positive impact on the user experience.

Referring to previous research, there is an article that discusses the correlation of sustainable architecture with biophilic design points, hereinafter referred to as Biophilic Design Elements (BDEs). These design elements are then

used as a tool to see how the existing design is implemented on the research object.

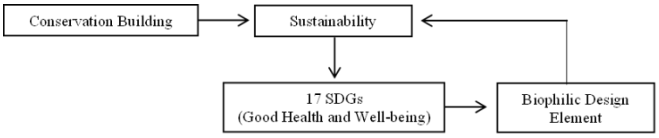
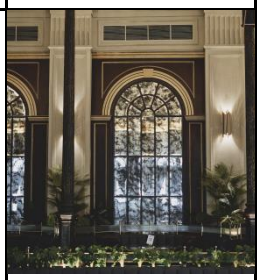


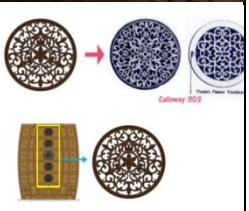
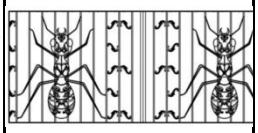
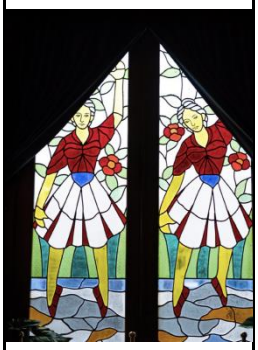
Figure 1. Research Mind Map

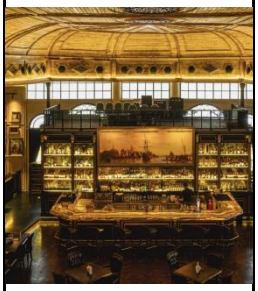
The reference for design implementation in this research is to look at building elements that have undergone conservation, especially the interior and exterior of the building. Building interiors refer to the floors, walls and ceilings of buildings that have undergone a renovation process in accordance with the principles of conservation of cultural heritage buildings.

2.2 Data Discussion

TABLE II. IMPLEMENTATION OF BIOPHILIC DESIGN ELEMENTS IN CONSERVATION BUILDING

BDEs	Design Strategies	Implementation in Conservation Building	Figures
Plants	Indoor vegetation by plants and green walls, incorporate plants in buildings by using green roof, green wall, facade, and park-like set. [1]; [10]	Plan native plant placement zones right in the main areas of the building.	 Marabunta Interior, personal documentation 2023
Animals	Spaces to accommodate animals such as ponds, etc. Animal-friendly living areas. Animal figures. [10]	Animal figure as an icon of Marabunta building are still maintained from the original design.	
Landscape	Landscapes in site such as constructed wetlands, grasslands. Interior landscapes in courtyards, entry area, hallways, etc. Windows views of natural landscapes. [10]	There is a garden at the front of the building which also serves as a welcoming space. The window openings intended to provide visual access to the outside of the building are still maintained in their original form.	 
Weather	Exposure to weather through operable windows, porches, balconies etc. Transparent roofs for enhancing awareness of weather. Simulate experience of weather by sunlight, airflow, humidity, temperature, and barometric pressure. [10]		
Time and Seasonal Changes	Present the changing in building facade appearance because of long-term exposure to nature.	There are groups of plants to support the facade which will change shape and color according to the season.	

	Provide views of seasonal changes in plants [10]		
Forms and Shapes	Imitate the contours and motifs of organisms (biomorphic design) in building forms, structural systems, components, and interior spaces. Biomorphic elements could be botanical/animal motifs, shells, spirals, egg, oval, tubular forms, arches, vaults, domes, etc. [1]	Biomorphic patterns can be seen from the original wood texture retained in the building's structural beams. Several figures of plants, animals and natural elements are still maintained in their authenticity. The dome-shaped ceiling is also still maintained.	    Tekstur Alam, [13] 
Patterns and Geometries	Adopt fractals, hierarchically organised ratios, and scales in designs [1]	There is a natural fractal pattern located in the ceiling carving.	  Fractal Pattern, [13]
Mechanism	Learn from other species to meet the functional needs (Bio mimetic or Biomimicry), such as termites and spiders inspired the the efficiency of climatic controls and the structural strength of building materials. [10]		
Images	Present natural scenes, plants, animals, water, landscapes, or geological features in paintings, photographs, videos, and fabrics. Natural images should include a rich variety of species, land scapes, or human survival experiences in nature. [1]	There are several images that illustrate the presence of natural elements such as plants, landscapes, ants. This image can be seen in paintings, window textures, and detailed carvings on walls and frames.	    

Material, Texture, Colour	Adopt natural materials like wood, bamboo, rock, stone, clay, etc. Consider textures beyond mate rials, such as light, colour, and sound Use natural colours such as blue, green, and other earth colours [10]	Natural materials such as wood and natural stone are still maintained from the initial design on the ceiling, tables as furniture, and floor covering materials.	  
Prospect and Refuge	Conceive spaces with two complementary characteristics: open views/vistas (prospect), and under shelters/safe environments (refuge) Achieved inside and outside experiences through window views, and balconies, court yards, colonnades, etc. Use controllable lighting to design spaces with refuge effects [10]	The choice of warm white light color supports the protective effect.	

Complexity and Order	Arrange rich details and diversity in an orderly manner Consider natural forms, patterns, and geometries, especially in exposed building structures, facades, and details Choose materials with specific textures and colours or carefully arrange the variety and placement of plants [1]	Natural materials as elements of exposed building structures.	
Peril and Mystery	Generate peril using cantilevers, infinity edges, transparent facades, pathways under/over water, scenes defying gravity, etc. Creating mystery through wind ing paths, translucent materials, imperceptible sound sources, obscuring/curvi ng the edges, etc.	Maintaining the construction of old building structures using wooden materials is an attraction that creates the aesthetics of the structure as well as experiencing a feeling of danger in the building.	

	[1]		
Connection to Place	Provide views of prominent landmarks, landscapes, water scapes, geological forms, etc. Use indigenous materials and native plant varieties Apply landscape features to define building forms or dedicated landscape design such as Savanna-like environments [10]		
Connection of Spaces	Conceive interior-exterior connections in transitional spaces, such as porches, patios, balconies, courtyards, pavilions, gardens, entry areas, foyers, atria, etc. Consider mobility in spaces like entrances, exits, corridors, stairs, high glass elevators, etc [10]	There is a transition space in the form of a terrace for the entrance exit, along with a foyer as a receptionist area.	

3. Conclusion

The discussion above describes the biophilic design points detailed in the BDEs implemented in cultural heritage buildings after the renovation and conservation process. This research describes the comparison between the BDE points according to Zhong, 2022 and the realization of design implementation in the research object. Almost all elements of BDEs can be answered in the final implementation of the building. How are these design elements implemented, in what parts where are the design implementations, and their contribution to sustainable architecture? This proves that the consideration of biophilic architectural design to create sustainable designs for the health and welfare of building users can be seen in the research objects.

Some BDEs that have not been realized in research objects include the availability of water elements and open spaces with native plants that resemble the savanna, design elements inspired by the biomimicry process of other living creatures, for example, spider webs, as well as design elements that pay attention to the weather by applying roofs. transparent. On the other hand, the application of design elements of shapes, images, and textures that adapt natural elements is often found in research objects. These shapes, images, and textures are original elements that are retained from the original form of the building. This gives rise to another hypothesis about the role of BDEs in the Dutch colonial architectural style that existed several centuries ago in the Old Semarang City area. This hypothesis can be a trigger for further research

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