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DESIGN SOCIAL DEVELOPMENT CENTER BASED ON BIOPHILIC ARCHITECTURE IN SURABAYA

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ABSTRACT

As a metropolitan city, Surabaya faces a range of social challenges resulting from rapid urbanization and unequal access to education, employment, and basic services. To respond to these challenges, there is a need for facilities capable of empowering communities through skills training and non-formal education. A Social Development Center based on Biophilic Architecture in Surabaya serves not only as a response to these social issues but also as a center for community capacity building. The design integrates natural elements such as vegetation, water features, natural lighting, ventilation, and sustainable materials to create comfortable and healthy spaces. This study was conducted through literature review, site analysis, and a design approach rooted in biophilic principles. The result is a conceptual design of a social center that supports education, training, and the strengthening of urban communities. Its implementation is expected to offer an innovative solution toward the development of a more sustainable and environmentally friendly city.

Keywords: *Biophilic Architecture, Social Development Center, Green Open Space, Surabaya*

INTRODUCTION

Indonesia has been experiencing rapid urbanization, marked by a continuous migration of people from rural to urban areas in pursuit of better economic opportunities and improved quality of life. This demographic shift has significantly impacted metropolitan cities such as Surabaya, the second-largest city in the country. According to data from Statistics Indonesia (BPS), the proportion of Indonesia's urban population rose from 49.8% in 2010 to 56.7% in 2020 and is projected to reach 66.6% by 2035. Surabaya, with a growing population exceeding 2.8 million, continues to attract internal migrants. However, not all migrants can access formal employment, often ending up in informal sectors without adequate social protection or access to education and skills development, leading to the formation of urban poverty pockets.

Despite a declining poverty rate in recent years—falling from 4.65% in March 2023 to 3.96% in March 2024—Surabaya still faces considerable social and economic disparities. The city's increasing urban population demands a proactive and sustainable response to mitigate future social challenges. The government's Regional Medium-Term Development Plan (RPJMD) 2021–2026 outlines the goal of inclusive economic growth through local economic empowerment and poverty reduction. Within this framework, preventive development strategies are essential to not

only address existing poverty but also prevent the emergence of new vulnerable groups by enhancing the capacity of migrants and low-income communities.

To respond to these challenges, this study proposes the development of a Social Development Center in Surabaya, guided by the principles of biophilic architecture. This design approach emphasizes the integration of natural elements—such as daylight, greenery, ventilation, and local materials—into the built environment, promoting psychological well-being, social cohesion, and ecological sustainability. The center would serve as a community hub offering non-formal education, skills training, and social empowerment programs. Managed through a non-profit foundation model and supported by CSR funds and international grants, the center is envisioned not only as a physical facility but also as a catalyst for inclusive urban development. It reflects the urgent need for architecture that transcends conventional functionality by addressing emotional, social, and environmental needs within an increasingly complex urban landscape.

LOCATION DESCRIPTION

Surabaya, the capital city of East Java Province, is the second-largest metropolitan area in Indonesia after Jakarta. Administratively, the city is divided into five zones: Central, North, East, West, and South. In total, Surabaya comprises 31 districts (kecamatan), which are further subdivided into 154 sub-districts (kelurahan). The location at Jl. Boulevard Familia Selatan, Babatam, Wiyung District, Surabaya, East Java, falls within the South Surabaya zone, characterized by a predominantly middle-class population with a socially heterogeneous composition, including local residents, professionals, and students. Consequently, the area exhibits a mixed-use character, encompassing residential neighborhoods, educational institutions, commercial zones, and open spaces.

The selection of the site is based on several considerations, as outlined below:

1. According to Surabaya City Regional Regulation No. 12 of 2014 concerning the Regional Spatial Plan (RTRW) for 2014–2034, the project is situated within Wonokromo District, specifically in Development Unit VII, which is designated as a trade and services area. This designation aligns with the intended design objectives.
2. The site is located in an area surrounded by residential neighborhoods, educational facilities, and public transportation access, allowing convenient accessibility for the surrounding community.
3. The land parcel offers a substantial area, enabling the comprehensive development of the proposed building.
4. The site provides potential for attractive views from multiple vantage points.

Based on the Regional Spatial Plan (RTRW) for Wiyung District, Surabaya, the selected site is designated for trade and services land use. According to local land-use regulations for trade and services areas in Wiyung, the development parameters are as follows:

- Building Coverage Ratio (BCR / Koefisien Dasar Bangunan, KDB): Maximum 50%
- Floor Area Ratio (FAR / Koefisien Lantai Bangunan, KLB): Maximum 5
- Green Coverage Ratio (Koefisien Dasar Hijau, KDH): Minimum 10%
- Building Setback Line (Garis Sempadan Bangunan, GSB): Minimum 10 meters

- Maximum Building Height: 50 meters

Maximum Number of Basement Floors: 3 levels

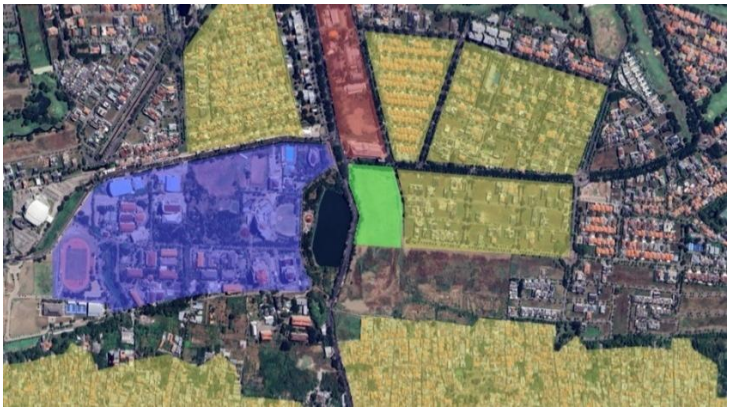

Figure 1. Area Around The Site

THE SITE ANALYSIS

The overall site analysis is integrated and selectively adapted to suit the specific needs of the location and the architectural design concept, namely the biophilic approach. The selected site analysis process aims to understand the physical, environmental, social, cultural, and regulatory conditions of the site prior to the design process. This phase serves as a foundation for making contextual, functional, and sustainable design decisions.(Francis D. K. Ching, 2019)

In addition to physical factors, a comprehensive site analysis also requires an understanding of urban spatial elements such as paths, edges, districts, nodes, and landmarks, which are essential in interpreting the site's character. This understanding facilitates the creation of architectural forms that are not only technically functional but also visually and emotionally meaningful to users.(Lynch, 1984)

In the design of the Social Development Center, the analysis is primarily focused on ensuring user comfort and addressing the core concept of Biophilic Architecture. The key aspects emphasized in the site analysis include physical conditions such as solar orientation, prevailing wind direction and intensity, circulation patterns, drainage systems, existing vegetation, and site accessibility. The collected and synthesized data play a crucial role in determining the building's position, orientation, massing, and material selection. This understanding enables the designer to create a building that is both efficient and environmentally responsive.(Chiara & Callender, 2019)

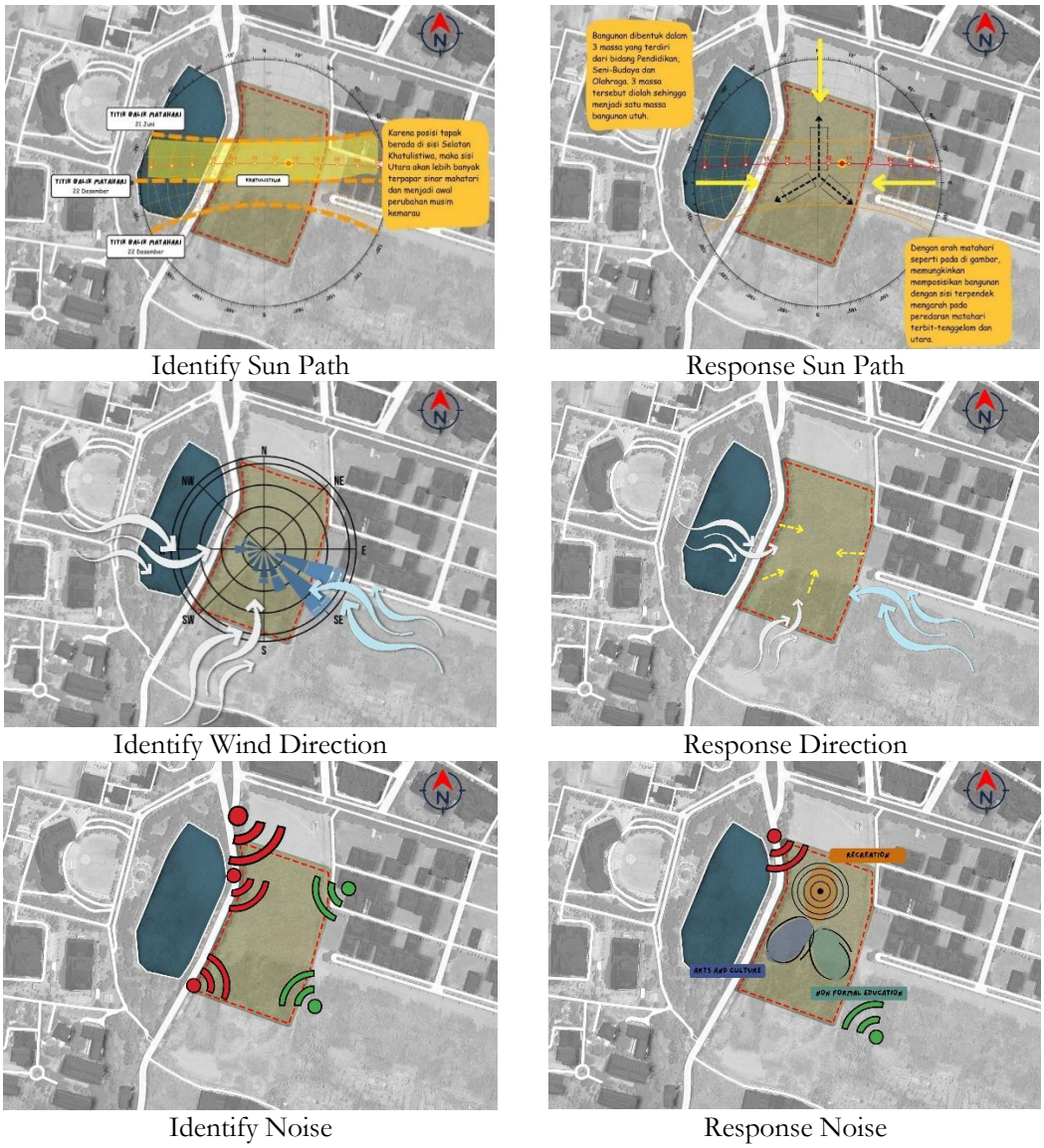

Figure 2. Site Analysis Image

CONCEPTUAL APPROACH AND WARFARE THEME

The design approach employed in the development of the *Social Development Center* adopts the principles of biophilic architecture as the primary strategy for fostering a harmonious relationship between humans and their environment. As outlined by Browning et al. (2014), biophilic architecture is grounded in the *biophilia hypothesis*, which posits that humans possess an innate tendency to connect with nature and other living organisms.(Browning et al., 2014) This principle is particularly relevant in the context of social facility design, as the integration of natural elements has been shown to correlate positively with improvements in physical health, psychological well-being, and the quality of social interactions among users. Consequently, the adoption of biophilic

design is regarded not merely as an aesthetic choice, but as an evidence-based intervention that supports environmental sustainability while reinforcing community inclusivity.

According to Almused (2011), biophilic design can create restorative spaces that promote a healthy circulatory system and provide an aesthetic environment. This includes physiological needs such as human tranquility through a bioclimatic approach, while psychological needs such as human health are addressed through biophilic design. This biophilic design can be implemented artificially or naturally and can be applied through interior or exterior elements. Biophilic design has principles that serve as guidelines for design. According to Browning, quoted by Soderlund (2019), biophilic design has 14 design patterns divided into three categories, namely Nature in the Space, Natural Analogues, and Nature of the Space, to accommodate urban design.

Tabel 1. 14 Patterns of Biophilic Design

Nature in The Space	Natural Analogues	Nature of The Space
P1. Visual Connection with Nature – Views on natural elements, life systems, and natural processes.	**P8. Biomorphic forms and patterns** – A reference that has contours, patterns, textures, or structures similar to those found in nature.	**P11. Prospect** – The wide view, the balcony, and the open space
P2. Non-visual connection with nature – Stimulation of hearing, touch, and smell	**P9. Material connection with nature** – Natural materials in harmony with the local environment	**P12. Refuge** – The presence of a shelter, a canopy or high ceiling, and a private zone
P3. Non-ryhtmic sensory stimuli – A vague connection with nature	**P10. Complexity and order** – Complexity and rules	**P13. Mystery** – The existence of mysterious patterns makes people curious.
P4. Thermal and air flow – Surface temperature that mimics the natural environment		**P14. Risk/peril** – The connection between the floor and the ceiling, flowing water, and bridges
P5. Presence of water – Experience space by seeing, hearing, or touching water.		
P6. Dynamic and diffuce light – The intensity of light and shadows can change over time, as happens in nature.		
P7. Connection with natural systems – Seasonal changes that are characteristic of a healthy ecosystem		

Within the context of the *Social Development Center*, the implementation of biophilic architecture carries strategic implications. First, nature-based design has the potential to enhance user performance and innovative capacity, which are essential to fulfilling the function of a social development hub. Second, fostering human-nature connectivity can cultivate a stronger *sense of place* and reinforce community bonds. Third, the integration of sustainability principles through the responsible utilization of natural resources aligns with long-term objectives in creating a resilient environment. Therefore, biophilic architecture serves not only as a medium that bridges the human–nature relationship but also as an instrument for sustainable social transformation.

DESIGN THEME

Nature in Space is one of the patterns in *biophilic design* that focuses on the direct integration of natural elements into the built environment, thereby fostering multisensory interactions between users and their surroundings. According to Browning, Ryan, and Clancy (2014) in *14 Patterns of Biophilic Design*, *Nature in Space* refers to the visual, auditory, olfactory, and tactile presence of natural elements such as natural light, vegetation, water, fresh air, and landscape views. The presence of these elements has been shown to enhance psychological comfort, reduce stress, and improve the health and productivity of space occupants.

The implementation of this theme in design emphasizes creating spatial experiences that maximize direct connections with nature. This can be achieved through strategies such as orienting the building to optimize natural lighting, positioning openings toward natural landscapes or gardens, employing natural materials such as wood and stone, and integrating water features that enrich both the acoustic and visual quality of the space. Furthermore, the incorporation of vegetation, both indoors and outdoors, serves not only an aesthetic function but also plays a role in regulating the microclimate and improving air quality.

By adopting *Nature in Space* as the central design theme, the project aims to establish a harmonious relationship between humans and their environment, in alignment with the principles of *biophilic design*, which emphasize human well-being through positive interaction with nature. This approach is relevant not only in terms of aesthetics but also in supporting sustainability and the overall health of the built environment.

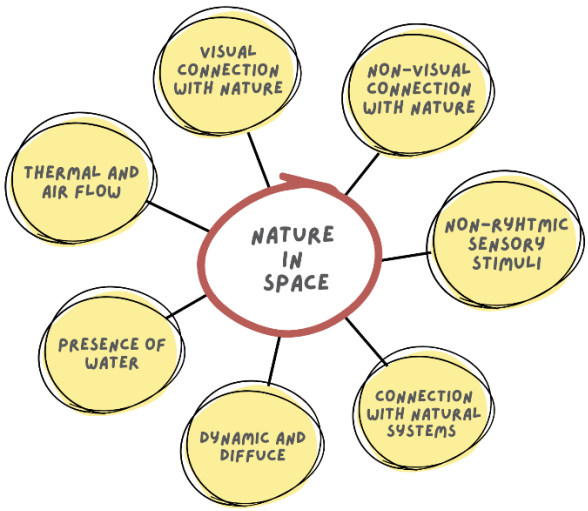

Figure 3. Nature in The Patterns

Based on the selected design theme, the Social Development Center is conceived as a human-centered facility that fosters the holistic development of individuals through three primary dimensions: the mind, the soul, and the body. The mind represents the cognitive and intellectual aspects, encompassing the processes of acquiring knowledge, engaging in critical thinking, and solving problems creatively. The soul pertains to emotional and spiritual well-being, cultivating values, empathy, and inner balance. The body encompasses the physical dimension, emphasizing health, vitality, and the ability to actively participate in daily activities.

These three dimensions are unified within a single design framework grounded in the Nature in Space concept. As described by Browning, Ryan, and Clancy (2014) in *14 Patterns of Biophilic Design*, this concept emphasizes the direct integration of natural elements—such as natural lighting, vegetation, water features, natural ventilation, and landscape views—into the built environment. Through the application of these elements, spaces can create multisensory experiences that enhance mental clarity, emotional balance, and physical health. Thus, **the Social Development Center** is envisioned not only as a functional space for learning and activities but also as a restorative environment that harmonizes human needs with nature, in alignment with the principles of *biophilic design*.

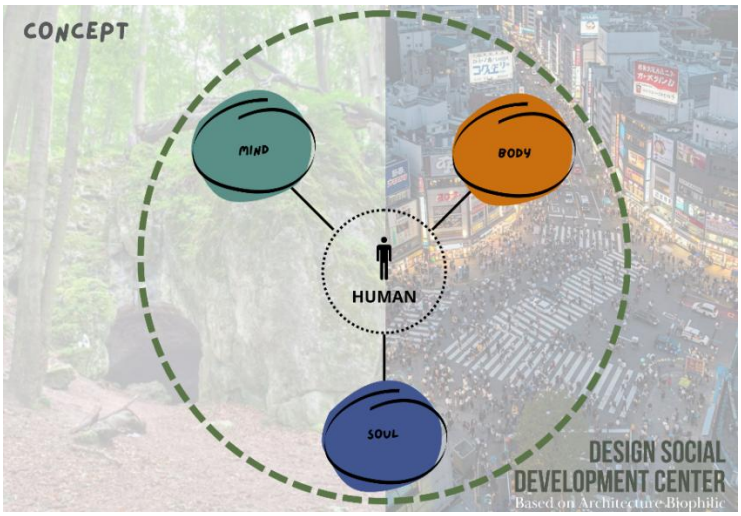

Figure 4. Design Concept Conclusion

IMPLEMENTATION OF CONCEPT IN DESIGN

The design implementation applied to the site plan refers to site analysis related to the environment, such as solar orientation analysis, wind direction analysis, noise, and so on. Environmental analysis is the primary analysis in the design process because it aligns with the concept being applied, namely the "nature in space" concept. Environmental analysis plays a crucial role in the implementation of the "nature in space" concept. Based on the analysis conducted, the building has a massing consisting of the main building, educational buildings, and sports buildings, all of which have been arranged in accordance with the site analysis.

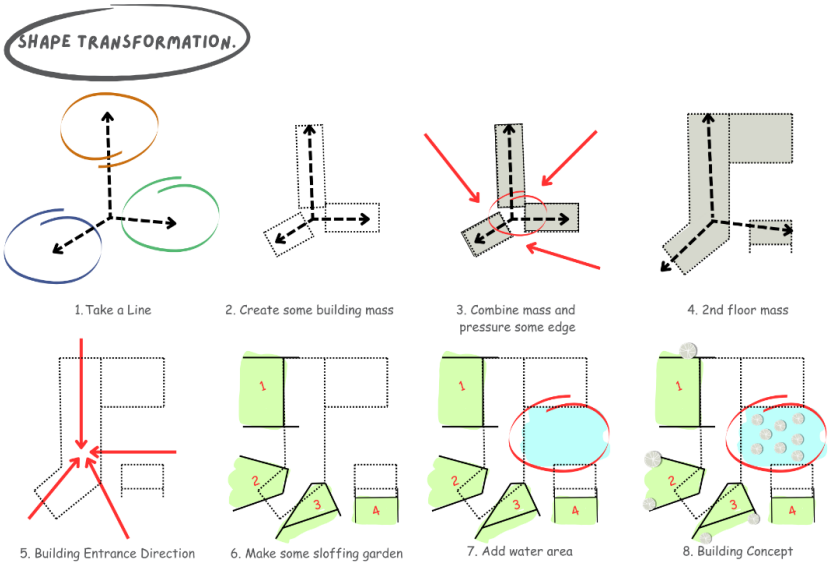

Figure 5. Shape Transformation

Figure 6. Shape Transformation

The building's shape, which combines squares and rectangles, is a response to an analysis of the surrounding environment, which found that surrounding buildings share similar shapes and grids, such as those at Surabaya State University and Surabaya National Hospital. This shape is also integrated with the proposed concept, Nature in the Space.

CONCLUSION AND SUGGESTIONS

The proposed Social Development Center in Surabaya demonstrates how biophilic architectural principles can be effectively integrated into community-oriented design to address urban social challenges. By combining natural elements with functional spaces for education and skills training, the design promotes physical comfort, psychological well-being, and environmental sustainability. This concept not only enhances community empowerment and inclusivity but also contributes to Surabaya's vision of becoming a healthier, more resilient, and sustainable metropolitan city.

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