BIOS : Jurnal Informatika dan Sains

SEAN INSTITUTE
VOL : 1 No: 2 TAHUN 2023
E-ISSN: 2988-6910

READING MEANINGS AND SIGNS FROM NATURE THROUGH SUSTAINABLE ARCHITECTURAL DESIGN

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Abstract

This research focuses on the interpretation and use of meanings and signs contained in nature through sustainable architectural design principles. In the context of sustainability, this research explores how architects use visual language and natural concepts in building design to create environments that are environmentally friendly and in line with ecological sustainability. This research uses a qualitative approach with descriptive methods. Research results in sustainable architectural design show that the application of principles that include the holistic use of natural meanings and signs can produce buildings that are more environmentally friendly and sustainable. This research confirms that a deep understanding of the natural context, adaptation to the environment, and inspiration from natural forms form the basis for efficient design that suits local site needs. The choice of sustainable materials, which is reflected in these principles, has also been proven to have a positive impact in reducing the environmental footprint and creating more durable buildings. Overall, the results of this research make a significant contribution to the development of a sustainable architectural paradigm, confirming that the integration of natural meanings and signs not only enriches the aesthetics of buildings, but also underlies sustainability and harmony with the natural environment.

Meaning and Signs, Nature, Design, Sustainable architecture

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INTRODUCTION

In this modern era, architecture does not just create physical structures, but also becomes a form of expression and reflection of societal values contained in sustainable architectural design, which is directed at creating an environment that is environmentally friendly and in line with ecological sustainability (Tanuwidjaja, 2011). Sustainable architectural design is not only about functional and aesthetic aspects, but also contains deep messages about the relationship between humans and nature (Sardjono, 2017).

Modern life is often characterized by rapid technological developments, causing major challenges in environmental conservation. Understanding the meanings and signs that can be taken from nature is becoming increasingly important in guiding the steps of architects and designers in creating buildings that

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are not only aesthetic, but also resilient to climate change and environmentally friendly (Manurung, 2014).

Sustainable architecture designers integrate meaning and signs from nature into their work. It is hoped that these steps will make a positive contribution to global efforts to build and design more sustainable buildings, creating an environment that not only meets human needs, but also maintains the balance of natural ecosystems (Kurniawan & Pamungkas, 2020).

Sustainable architecture offers proactive solutions to climate change and environmental imbalances caused by human activities. The main goal is to reduce the ecological footprint of buildings by increasing efficiency and wisdom in the use of materials, energy and space arrangement (Sulistiawan et al, 2020). The application of sustainable architectural principles involves strategic steps, such as the use of recycled materials, development of renewable energy resources, and space design that minimizes energy consumption (Sudarwani et al, 2021).

In the design process, awareness of future impacts is key. Every decision regarding design and construction must consider the long-term implications for the environment and society (Messah et al, 2017). Sustainable architects do not simply view buildings as separate entities, but as an integral part of the wider environment. Integration of the material life cycle concept is important, with an emphasis on the use of environmentally friendly materials and the ability to recycle or recycle (Mu'min, 2020).

Meanwhile, environmental awareness is not only limited to technical aspects, but also forms a more holistic design philosophy (Kristiawan & Pramudito, 2022). Design that is responsive to local natural characteristics and community needs is an important element in sustainable architecture. This includes planting appropriate vegetation, utilizing natural lighting, and spatial planning that supports environmental health (Senasaputro, 2017).

Through the application of environmental awareness in building design, sustainable architecture not only creates environmentally friendly physical structures, but also becomes a catalyst for cultural and behavioral change towards a more sustainable lifestyle (Wahab et al, 2014). By combining these principles, sustainable architecture encourages a shift towards a more balanced future, where the needs of the current generation can be met without sacrificing potential and balance for future generations (Hidayat, 2011).

The Copenhagen Declaration presented by the International Union of Architects (UIA) on 7 December 2009, marked an important milestone in the framework of "Sustainable Architecture". UIA firmly recognizes the large impact that the building and construction industry has on global climate change (Aryani & Tanuwidjaja, 2013). In the declaration, UIA emphasized that reducing these negative impacts requires determining a more sustainable form of built

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environmental system. This understanding includes key aspects such as energy efficiency, use of sustainable materials, and spatial planning that minimizes consumption of natural resources (Rajendra, 2012). With this commitment, UIA guides architects to prioritize sustainability in their designs, creating a new paradigm where sustainability aspects are not just additional, but essential in every stage of the design process (Widyapuspita et al., 2021).

This declaration reflects a deep awareness of the role of architecture in facing environmental challenges, spurring practitioners to adopt a holistic approach in designing buildings. By embracing the concept of sustainable architecture, UIA is not only establishing global standards, but also paving the way for cultural transformation in the world of architecture. Collaboration between architects, governments, the construction industry and society is key to creating a more environmentally friendly built environment, and the Copenhagen Declaration is an important guide on the journey towards a sustainable future.

METHOD

In this research, the approach that will be used is a qualitative method, a type of contextual research that uses humans as the main instrument. This method is adapted to situations that arise in qualitative data collection, where the data produced is in the form of verbal or spoken descriptions from participants as well as observable behavior. According to Bogdan and Taylor (as quoted in Moleong, 2014), the qualitative method is a procedure that aims to produce descriptive data and does not involve precise quantification, especially when the observed symptoms are difficult to measure. The qualitative approach itself is characterized by the aim of understanding phenomena involving non-numerical dimensions. In an effort to ensure research is more focused and efficient in data collection, this research will determine the focus of previous research. In accordance with the views of Lexy J. Moleong (2014), this approach requires determining research boundaries based on the focus that appears as a problem in the research. Determining the research focus is crucial for directing and narrowing the scope of the research, considering the complexity of reality and interactions between the researcher and the research focus. Thus, determining the research focus not only sharpens the research direction, but also helps determine relevant boundaries to support effective data collection.

RESULTS AND DISCUSSION

Buildings that we often think of as residences, schools or offices in fact unconsciously use a large amount of resources involving energy, water, raw materials, and even contribute to waste production (Muktiono et al, 2023). Awareness of the environmental impacts produced by these buildings is

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increasingly becoming an urgent need, considering the increasing population and ongoing urbanization. Energy used for lighting, heating and cooling, as well as large water usage are some of the aspects that can create a significant ecological footprint (Wihardjo et al, 2023). In addition, construction residue, household waste, and other impacts from daily activities in and around buildings reinforce the need for design and planning that focuses on sustainability.

Therefore, it is very important to design and plan buildings taking into account the principles of sustainable architecture. Sustainable design includes efficient use of resources, utilization of renewable energy, effective waste management, and integration with the surrounding environment (Hidayatulloh, 2021). Including these aspects in building planning can produce structures that not only minimize their negative impact on the environment, but also have the potential to generate positive benefits for the surrounding community and ecosystem. By prioritizing sustainable design, we can help create buildings that are more environmentally friendly, more efficient in their use of resources, and overall more in line with global sustainability principles (Hidayanati, 2022).

There are at least 6 (six) fundamental principles regarding sustainable building design, although the design continues to develop along with the times, the essence of the principles never changes.

Optimizing land potential

The principle of optimizing land potential is the main foundation in sustainable building design. Focusing on optimal land use not only involves efficiency in the use of space, but also takes into account the characteristics of the surrounding environment. In this context, architects must consider the layout of the building, open space use patterns, and integration with the natural surroundings. By maximizing land potential, buildings can not only function efficiently but also contribute to ecological sustainability. Wise selection and placement of buildings can create a harmonious relationship between the built and natural environments, creating comfortable and sustainable spaces. The principle of optimizing land potential also views land as a limited resource, therefore, design must minimize waste and consider the potential for sustainable development. These steps support a long-term sustainability vision and create buildings that use land in a responsible way and have a positive impact on their environment. As time goes by, this principle remains relevant and continues to adapt to meet increasing sustainability demands.

Optimizing energy use

The principle of optimizing energy use is a key element in sustainable building design. In this context, the approach of prioritizing energy efficiency and diversification of energy sources is a major concern. Energy efficiency involves measures such as improving building insulation, utilizing natural lighting, and using advanced technology to optimize energy use. In addition, this principle encourages

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the use of renewable energy sources as an alternative to reduce dependence on non-renewable fossil energy. Diversifying energy sources is a strategic step to achieve long-term sustainability. By incorporating renewable energy such as solar, wind and water, buildings can reduce their carbon footprint and contribute to climate change mitigation. The integration of environmentally friendly technologies, such as solar panels and geothermal energy systems, allows buildings to become more energy independent and participate in global efforts to reduce greenhouse gas emissions. The principle of optimizing energy use not only takes into account the operational efficiency of buildings, but also creates the foundation for the transformation towards a sustainable and environmentally friendly energy system. Over time, these principles remain relevant in responding to sustainability challenges and guiding building design towards a more sustainable future.

Water protection and savings

Water sustainability is becoming increasingly critical given the growing water crisis in many regions around the world. In this context, sustainable building design focuses on strategies to protect and save water resources. This involves the use of green technologies such as rainwater collection, wastewater recovery, and the use of water-efficient equipment. Water protection is not only related to its quantity, but also to its quality. Sustainable design includes methods to prevent water pollution through the selection of environmentally friendly materials and good waste management. This principle also encourages the use of plants and materials that require less water in the landscape, creating a system that is resistant to drought and promoting efficient water use throughout the building. Thus, the principle of protecting and saving water not only optimizes water use but also maintains water quality as a very valuable resource for the sustainability of human life and the surrounding ecosystem. As time goes by, this principle remains the basis for efforts to achieve environmentally friendly and sustainable building designs.

Optimizing the Use of Space and Building Materials

In this context, the main focus is to create a design that is efficient and sustainable in terms of use of space and materials. Optimal use of space involves wise layout planning, placement of building elements, and design strategies that optimize space functionality. Flexible and modular interior design was also considered to allow adaptation of spaces to suit changing needs over time. The importance of optimizing building materials includes selecting materials that are environmentally friendly, recycled and have a long life cycle. This principle encourages the use of local materials that minimize the impact of transportation, as well as materials that can be recycled or are easily broken down after use. Sustainable design also considers material efficiency, ensuring that each material used plays an important role in the structure and performance of the building. By reducing waste and considering the impact of materials throughout their life cycle,

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these principles support building designs that are not only efficient but also contribute to waste reduction and sustainable use of resources. As time goes by, the principle of optimizing the use of space and building materials remains an important pillar in designing buildings that are responsive to global sustainability challenges.

Improve the quality of the indoor environment

Sustainable building design takes into account aspects such as indoor air quality, natural lighting and acoustics to create an environment that supports well-being and comfort. Air quality management involves providing good air circulation and using effective filtration systems to reduce indoor air pollutants. Good ventilation design also helps control humidity, prevent mold growth, and provide optimal fresh air. The application of natural lighting is an important aspect to reduce dependence on artificial lighting, creating a more natural and healthy atmosphere. Acoustic aspects are also considered to reduce noise levels in the room, creating a calm environment and supporting concentration. Apart from that, choosing environmentally friendly materials and furniture also contributes to indoor air quality. By improving the quality of the indoor environment, this principle not only creates aesthetically pleasing buildings, but also supports the health and comfort of its occupants, making building design a vehicle for sustainable quality of life. As technology advances and understanding of human well-being needs, this principle continues to be a relevant and important pillar of sustainable building design.

Optimizing operations and building maintenance

Operational optimization involves applying advanced technologies to manage energy and resource use efficiently. Temperature control, lighting and energy monitoring systems are an integral part of this principle. Efficient energy use during building operations not only reduces environmental impacts but also provides financial benefits by reducing operational costs. Building maintenance includes effective and sustainable maintenance strategies. Using materials that are durable and easy to repair, as well as planning for regular maintenance, can extend the life of a building and reduce construction waste. This principle encourages a preventive approach, such as routine inspections and early repairs, to ensure buildings continue to operate optimally. By integrating these six principles, sustainable building design not only creates a low-impact environment, but also minimizes long-term operational costs and extends the useful life of the building. These principles provide a bridge between design and operational sustainability, creating a holistic and sustainable model for the complete life cycle of a building. Along with changes in technology and practical demands, the principles of optimizing building operations and maintenance remain relevant and crucial in producing environmentally friendly and sustainable buildings.

In the principles of sustainable architectural design, the use of meanings and signs contained in nature becomes a deep and relevant foundation. First of all,

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architects are directed to holistically understand the surrounding natural context before starting the design process. This involves in-depth research into the geographic characteristics, climate, and natural elements unique to a particular location. The use of natural meanings and signs is not only an aesthetic element, but a guide in forming a harmonious relationship between buildings and their environment.

The second aspect regarding adaptation to the environment emphasizes the importance of buildings to interact and adapt to the surrounding natural context. This includes building orientation to maximize the use of sunlight, natural ventilation arrangements, and the selection of materials appropriate to local climate conditions. By imbuing the meaning and signs of nature, design not only creates buildings, but also harmonizes them as an organic part of the natural ecosystem.

The third concept involves inspiration from natural forms, applied through a biomimicry approach. Designers seek inspiration from nature's function and form to create designs that are not only structurally efficient, but also naturally functional. This principle leads to the development of solutions that integrate natural wisdom in the formation of built spaces.

The selection of sustainable materials is the focus of these four principles. By understanding the meaning and signs contained in natural resources, architects can choose materials that are environmentally friendly, recycled and have a long life cycle. Thoughtful material selection is an important step to creating a design that is not only visually beautiful but also has a positive impact on the environment.

Through the holistic integration of these principles, sustainable architectural design becomes not just a manifestation of the building, but a reflection of the relationship that exists between humans, architects, and the natural environment. The design not only stands as a physical entity, but also imbues the meaning and values that exist in natural sustainability.

CONCLUSION

The principles of sustainable architectural design encapsulate a commitment to creating buildings that not only meet human needs but also interact harmoniously with the natural environment. The use of natural meanings and signs becomes a strong foundation, encouraging architects to absorb and understand the surrounding natural context before designing. This principle is reflected in adaptation to the environment, inspiration from natural forms, and the selection of sustainable materials that support ecological sustainability. Adaptation to the environment leads to designs that respect and interact with the surrounding natural context, creating efficient and sustainable buildings. Inspiration from natural forms, through biomimicry, allows the creation of designs that are not only aesthetic, but also utilize natural structural efficiency and functionality. Choosing sustainable

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materials is a critical step to respect and use natural resources wisely. All of these principles underscore the holistic integration between humans, architects and the environment. Sustainable architectural design is not just about creating buildings, but also creating a deep connection with the natural environment. By imbuing it with the meaning and signs of nature, this design embodies a commitment to ecological, social and economic sustainability. In conclusion, the principles of sustainable architectural design lead us towards a more sustainable and harmonious direction between human work and nature.

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