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Integration of Modern Facade Design with Traditional Bubungan Tinggi Facade: Towards a Sustainable Smart Home

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Integration of Modern Facade Design with Traditional Bubungan Tinggi Facade: Towards a Sustainable Smart Home

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Abstract: This study investigates the transformation of Bubungan Tinggi, a traditional Banjar house with a high roof, into a modern home through the integration of modern facade design with traditional Bubungan Tinggi facade elements. Bubungan Tinggi is a monumental artifact in South Kalimantan representing the collective memory of the Banjar community with its distinctive typology and anatomy. This study uses a qualitative approach with design experiments to explore the integration of smart home systems, eco-friendly materials, and contemporary design principles. The findings highlight the potential of blending traditional architecture with modern innovations to create sustainable, smart, and culturally sensitive housing solutions.

Keywords: traditional facade; modern design; smart technology; sustainable materials; Bubungan Tinggi

1. Introduction

1.1. Research Background

Bubungan Tinggi, a traditional house from South Kalimantan, is an architectural form rich in cultural and historical values. This house is known for its high symmetrical roof, which serves not only an aesthetic function but also a practical one in coping with the local climate. However, with the advancement of time and changing societal needs, there is a significant challenge in preserving the authenticity of this traditional house while integrating modern elements to meet current functional and aesthetic needs.

Previous research has extensively discussed the preservation of traditional architecture or the partial modernization of traditional houses. However, there has been a lack of studies specifically exploring the integration of modern facade design with the traditional Bubungan Tinggi facade to create sustainable smart homes. This study aims to fill this gap and develop an innovative transformation model.

1.2. Characteristics of Bubungan Tinggi Architecture

Bubungan Tinggi, with its striking high roof, symbolizes the social status and cultural identity of the Banjar community. This house is usually made from durable and robust ulin wood. The symmetrical design and distinctive ornaments on Bubungan Tinggi reflect the Banjar community's philosophy of a harmonious and balanced life [4†source].

These unique architectural elements offer significant potential for combination with modern facade design. The primary challenge is how to maintain the traditional essence of Bubungan Tinggi while adding modern features that can enhance the house's comfort, energy efficiency, and functionality.

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1.3. Smart Technology and Sustainability in Modern Architecture

Technological advancements have brought various innovations in modern home design, including the use of smart technology and sustainable materials. Smart technology encompasses various automation systems that can control lighting, climate, security, and other devices within the home, enhancing energy efficiency and occupant comfort.

The use of sustainable materials such as bamboo, recycled wood, and energy-efficient insulation is also becoming increasingly popular in modern architecture. These materials are not only environmentally friendly but also provide excellent performance in terms of thermal and acoustic insulation.

1.4. Research Gap and Latest Utility

The identified research gap is the lack of holistic studies integrating modern facade design with the traditional Bubungan Tinggi facade. Most previous studies focused on preserving traditional elements or applying modern technology separately. Therefore, this research aims to bridge this gap by developing a transformation model that combines these two aspects.

The latest utility of this research is to provide housing solutions that are not only energy-efficient and environmentally friendly but also respect and preserve local cultural heritage. By integrating smart technology and sustainable materials into traditional facade design, it is expected to create sustainable smart homes adaptable to future needs.

1.5. Research Objectives and Significance

The main objective of this research is to develop a transformation model for Bubungan Tinggi houses that integrates modern facade design with traditional facade elements. This research is expected to significantly contribute to the field of architecture by offering a new approach to the preservation and modernization of traditional houses.

The significance of this research lies in its potential application on a broader scale, not only in South Kalimantan but also in other areas with rich traditional architectural heritage. The transformation model developed in this research can serve as a reference for architects and building designers in creating innovative, sustainable, and culturally sensitive housing solutions.

2. Methodology

2.1. Introduction and Identification

This stage involves a comprehensive study of the historical and cultural significance of Bubungan Tinggi, identifying core architectural elements, and exploring contemporary challenges in preserving and modernizing traditional houses. Relevant literature and existing case studies will be analyzed to gain a deep understanding of elements that can be retained and integrated into modern facade design.

2.2. Object Observation in Case Studies

The second stage involves object observation in case studies, including examining existing examples of Bubungan Tinggi and modern houses that have successfully integrated traditional elements with modern innovations. This observation focuses on understanding how such transformations were achieved and identifying best practices as well as potential pitfalls.

2.3. Transformation Approach

This stage develops a transformation approach that combines geometric design principles with smart technology and sustainable materials. This approach aims to retain core Bubungan Tinggi elements while adapting them to modern architectural needs and technological advancements.

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2.4. Transformation Techniques and Applications

At this stage, various transformation techniques are applied, including integrating smart home systems, using energy-efficient materials, and applying advanced construction methods. These techniques are tested through design experiments to create innovative transformation models applicable in different contexts.

2.5. Transformation Modeling

The final stage involves detailed modeling of transformations in various contexts, such as narrow lots, corner lots, and large lots. These models are evaluated based on their ability to integrate smart technology and sustainable materials while maintaining the architectural character of Bubungan Tinggi. This evaluation involves analyzing energy performance, occupant comfort, and design aesthetics.

3. Results and Discussion

3.1. Smart Facade Buildings on Narrow Lots

One transformation model involves adapting core Bubungan Tinggi elements into narrow lots by integrating smart home systems such as automated lighting, climate control, and security systems. This model demonstrates how traditional architecture can be enhanced with modern technology to improve functionality and sustainability.

The modern facade design, while retaining traditional elements such as distinctive wood carvings and high roof shapes, creates a unique and harmonious impression. The use of sustainable materials like composite bamboo and recycled wood not only enhances aesthetics but also contributes positively to the environment.

3.2. Sustainable Facade Buildings on Corner Lots

Another transformation model focuses on creating buildings that integrate core Bubungan Tinggi elements while adapting them to the unique challenges and opportunities of corner lots. This model uses sustainable materials such as bamboo composites, recycled wood, and energy-efficient insulation to create eco-friendly and culturally sensitive housing solutions.

The facade design, which combines traditional elements with modern technology such as solar panels and rainwater harvesting systems, shows how sustainability principles can be applied in traditional architecture. The integration of smart technology also allows automatic control of lighting and ventilation, which can enhance energy efficiency and occupant comfort.

3.3. Innovative Transformation Model on Large Lots

The final transformation model involves large lots, allowing greater flexibility in integrating smart technology and sustainable materials. This model includes features such as solar panels, rainwater harvesting systems, and green roofs, demonstrating how traditional architectural forms can be adapted to meet modern sustainability goals.

This innovative facade design not only retains traditional elements such as wooden ornaments and high roof shapes but also integrates modern technology to improve energy performance and occupant comfort. The use of sustainable materials like recycled ulin wood and energy-efficient insulation shows a commitment to sustainability principles.

4. Conclusions

The transformation of Bubungan Tinggi into modern homes through the integration of modern facade design with traditional facade elements offers various possibilities for retaining core elements while adapting them to contemporary needs. The design experiment methodology used in this research provides a systematic approach to achieving this transformation. The transformation models

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created in this research show that it is possible to combine traditional architecture with modern innovations to create sustainable, smart, and culturally sensitive housing solutions. Further research should explore additional case studies and refine transformation techniques to enhance the integration of traditional and modern elements.

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