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Reinterpreting Traditional Balinese Architecture Through Tri Hita Karana for Sustainable Spatial Development

Ngakan Ketut Acwin Dwijendra
Department of Architecture, Faculty of Engineering, Udayana University, Bali, Indonesia
Corresponding Author: Ngakan Ketut Acwin: acwin@unud.ac.id

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A B S T R A C T

This study explores the reinterpretation of traditional Balinese architecture through the philosophical lens of *Tri Hita Karana* (THK) as a framework for sustainable spatial development. THK emphasizes the harmonious relationship between humans, nature, and the divine, offering a culturally grounded sustainability paradigm. The research adopts a qualitative interpretive approach through spatial ethnography, semi-structured interviews with traditional Balinese architects (*undagi*), document analysis of *Asta Kosala Kosali*, and field observations in heritage sites. Spatial mapping and thematic coding are applied to analyze the integration of ecological, social, and spiritual values in architectural forms. The findings reveal that traditional Balinese spatial configurations inherently support passive environmental strategies, including natural ventilation, daylighting, water management, and social cohesion. However, contemporary architectural practices often reduce these principles to aesthetic elements, neglecting their deeper spatial and philosophical meanings. This study proposes a "Contextual Harmonization Model" that integrates indigenous wisdom with modern sustainability frameworks. The model contributes to the discourse on cultural sustainability and offers a practical design approach for architects, planners, and policymakers in the Global South.

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INTRODUCTION

Sustainability in the built environment has emerged as a critical global concern in the 21st century, driven by escalating environmental degradation, climate change, resource depletion, and rapid urbanization. The construction sector is recognized as one of the largest contributors to carbon emissions, energy consumption, and ecological disruption worldwide. Consequently, contemporary architectural discourse has increasingly focused on sustainable design strategies to minimize environmental impact and enhance long-term resilience. However, many of these approaches—particularly those rooted in dominant Western paradigms—tend to prioritize technological efficiency, quantitative performance metrics, and standardized design solutions, often overlooking the socio-cultural and contextual dimensions that are equally essential to sustainability (Rapoport, 1969).

In contrast, indigenous knowledge systems offer alternative paradigms that are inherently holistic, context-sensitive, and ecologically embedded. These systems are developed through long-term interactions between communities and their environments, resulting in adaptive design strategies that integrate environmental, social, and spiritual values. Within this perspective, sustainability is not merely a technical objective but a way of life that reflects a balanced relationship between humans, nature, and cultural beliefs. Such approaches are increasingly recognized as valuable contributions to the global sustainability discourse, particularly in the Global South, where cultural identity and local wisdom remain integral to spatial development practices.

Balinese architecture represents one of the most sophisticated manifestations of indigenous architectural knowledge, deeply rooted in the philosophical framework of *Tri Hita Karana* (THK). This philosophy emphasizes the harmonious relationship between three fundamental elements: *Parahyangan* (the relationship between humans and the divine), *Pawongan* (the relationship among humans), and *Palemahan* (the relationship between humans and the natural environment) (Mudana & Suamba, 2017). These principles are not abstract concepts but are spatially articulated through architectural forms, settlement patterns, and environmental management systems. Traditional Balinese spatial organization—through concepts such as *Tri Mandala*, *Tri Angga*, and *Sanga Mandala*—demonstrates an integrated approach to zoning, hierarchy, orientation, and material use, which collectively contribute to environmental sustainability, social cohesion, and spiritual continuity.

Despite its richness and relevance, the application of THK in contemporary architectural practice has undergone significant transformation due to the pressures of modernization, globalization, and tourism-driven development. In many cases, traditional architectural elements are superficially adopted as aesthetic symbols rather than being understood and implemented as part of a coherent spatial and philosophical system. This phenomenon has led to a shift from "meaningful space" to "aesthetic surface," diminishing the deeper ecological logic and cultural significance of Balinese architecture (Dwijendra, 2020). Furthermore, the increasing commodification of culture in tourism development has intensified the tension between economic interests and the

preservation of sacred spatial values, resulting in fragmented and often unsustainable built environments.

This condition highlights a critical research gap between traditional architectural knowledge and its contemporary application. While numerous studies have acknowledged the importance of THK as a cultural philosophy, limited research has systematically reinterpreted its spatial logic within the framework of modern sustainability and planning practices. There is a pressing need to bridge this gap by translating indigenous wisdom into actionable design strategies that address current environmental and socio-cultural challenges.

Therefore, this study aims to reinterpret traditional Balinese architecture through the lens of Tri Hita Karana and to develop a sustainable spatial model that integrates cultural wisdom with contemporary planning approaches. Specifically, this research seeks to: (1) explore the architectural expressions of THK within traditional Balinese spaces, (2) identify the spatial logic and principles that contribute to environmental, social, and spiritual sustainability, and (3) propose a conceptual model that enables the application of THK principles in modern architectural and urban design contexts. By doing so, this study contributes to the broader discourse on cultural sustainability and offers a contextually grounded, decolonial alternative to dominant sustainability paradigms in architecture and spatial planning.

THEORETICAL FRAMEWORK

The theoretical framework of this study is grounded in the intersection between indigenous knowledge systems and contemporary sustainable architecture, positioning *Tri Hita Karana* (THK) as an epistemological and operational lens for spatial design. In contrast to dominant sustainability paradigms, often rooted in technocratic and reductionist approaches, this framework emphasizes integrating cultural values, environmental ethics, and spiritual dimensions as inseparable components of sustainable development. Indigenous knowledge systems, as argued by Rapoport (1969), represent accumulated wisdom derived from long-term human–environment interactions, offering adaptive, context-sensitive, and culturally embedded solutions that are increasingly relevant in addressing global sustainability challenges.

Within this context, THK serves not only as a philosophical foundation but also as a conceptual bridge connecting local cultural wisdom to global sustainability discourse. The three core elements of THK—*Parahyangan* (human–divine relationship), *Pawongan* (human–human relationship), and *Palemahan* (human–nature relationship)—form a triadic system that inherently aligns with the multidimensional nature of sustainability. Unlike conventional sustainability frameworks that predominantly emphasize environmental and economic performance, THK introduces a more holistic paradigm by integrating spiritual balance as a fundamental dimension of spatial and environmental harmony (Lansing, 2006). This integration challenges the prevailing Western-centric models by proposing a culturally rooted and ethically grounded approach to sustainable architecture.

Furthermore, the theoretical positioning of THK in this study extends beyond its normative interpretation as a cultural philosophy, reinterpreting it as a *design-generative framework* that informs spatial configuration, environmental adaptation, and socio-cultural interaction. In this regard, THK operates as both an epistemological lens—guiding how space is understood—and a methodological tool—informing how space is designed. This dual function enables the translation of abstract cultural values into tangible architectural strategies, thereby bridging the gap between theory and practice.

Traditional Balinese architecture embodies this theoretical construct through a set of spatial principles that operationalize THK into built form. These principles include:

1. *Tri Mandala (Spatial Zoning Hierarchy).* This principle divides space into three hierarchical zones—*Utama Mandala* (sacred), *Madya Mandala* (transitional), and *Nista Mandala* (profane)—reflecting the gradation of spiritual values within spatial organization. This zoning system not only organizes functional activities but also regulates environmental interaction and social behavior.
2. *Tri Angga (Vertical Hierarchy).* The vertical articulation of space into head (*utama*), body (*madya*), and foot (*nista*) represents a symbolic correspondence between the human body and architectural form. This principle reinforces the integration of anthropomorphic and cosmological concepts in design, ensuring that built structures maintain proportional harmony and symbolic meaning.
3. *Sanga Mandala (Directional Orientation System).* This concept governs spatial orientation based on cosmological directions, integrating natural elements such as the mountain–sea axis (*kaja–kelod*) and sunrise–sunset orientation (*kangin–kauh*). It ensures that the spatial layout responds to environmental conditions while maintaining cultural and spiritual alignment.
4. *Use of Local Materials and Passive Design Strategies.* The utilization of locally sourced materials such as bamboo, brick, wood, and natural fibers reflects an environmentally responsive approach that minimizes ecological impact while enhancing climatic adaptability. These materials support passive cooling, natural ventilation, and thermal comfort, demonstrating an inherent alignment with sustainable design principles.

Collectively, these principles form a coherent spatial system that is adaptive, resilient, and deeply rooted in cultural meaning. The integration of zoning, hierarchy, orientation, and materiality creates a built environment that not only responds to climatic conditions but also reinforces social cohesion and spiritual continuity. This multidimensional approach positions traditional Balinese architecture as a living example of sustainable design that transcends purely technical considerations.

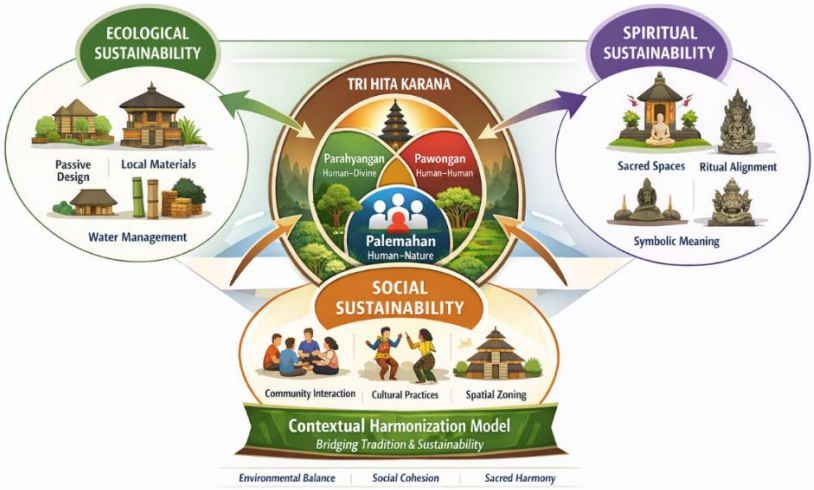

Figure 1. Tri Hita Karana Conceptual Framework for Sustainable Architecture

The conceptual framework developed in this study positions *Tri Hita Karana* as the central integrative axis linking indigenous knowledge systems to sustainable architectural outcomes. It illustrates the dynamic interaction between ecological, social, and spiritual dimensions within spatial design processes. THK serves as the core mediator, translating cultural values into environmental strategies, social structures, and spatial configurations.

The framework further conceptualizes sustainability not as a linear or fragmented process but as a *holistic, cyclical system in which each dimension continuously interacts with* and reinforces the others. Ecological sustainability is achieved through environmentally responsive design and resource efficiency; social sustainability is reflected in communal interaction and spatial inclusivity; while spiritual sustainability is embedded in symbolic meaning and sacred spatial hierarchy.

By integrating these dimensions, the framework proposes an architectural model that is environmentally sustainable, culturally resilient, and spiritually grounded. This conceptualization provides a foundation for developing the "Contextual Harmonization Model," which bridges traditional architectural wisdom and contemporary planning and design practices, offering a locally rooted yet globally relevant paradigm for sustainable spatial development.

METHODS

This study adopts a *qualitative interpretive research methodology* to examine and reinterpret the spatial, cultural, and environmental dimensions of traditional Balinese architecture within the framework of *Tri Hita Karana* (THK). The qualitative approach is considered appropriate due to its capacity to capture complex meanings, symbolic representations, and contextual relationships embedded in indigenous architectural practices. Rather than focusing on numerical measurement, this study emphasizes interpretive understanding, allowing the researcher to explore how architectural space embodies cultural values, environmental adaptation, and spiritual beliefs.

The research is grounded in an *interpretive paradigm,* which seeks to understand architectural phenomena through the perspectives, experiences, and practices of local communities. In this context, spatial configurations are not viewed merely as physical arrangements but as cultural constructs shaped by philosophical, social, and ecological considerations. To support this approach, the study integrates *spatial ethnography*, enabling an in-depth exploration of how traditional spaces are organized, experienced, and maintained in everyday life.

Data collection is conducted through a combination of complementary methods to ensure depth and triangulation. First, *spatial ethnography* is employed to observe spatial practices within traditional Balinese settlements, including the arrangement of zones, circulation patterns, and environmental responses. This method allows the identification of implicit cultural rules governing spatial hierarchy and usage, particularly those associated with *Tri Mandala* and *Sanga Mandala* principles. Second, *semi-structured interviews* are carried out with *undagi* (traditional Balinese master builders), cultural leaders, and local stakeholders. These interviews aim to capture indigenous knowledge, design philosophies, and interpretations of THK in architectural practice. The semi-structured format provides flexibility to explore emerging insights while maintaining consistency across respondents.

Third, *document analysis* is conducted on traditional architectural manuscripts, especially *Asta Kosala Kosali*, which serves as a primary reference for spatial proportions, orientation, and design rules in Balinese architecture. This analysis provides a theoretical foundation that complements field observations and interview findings. Fourth, *field observations* are conducted at selected heritage sites, including traditional villages, temple complexes, and *bale banjar*. These observations enable direct examination of spatial configurations and their environmental performance, while also validating data obtained from other sources.

The research uses several instruments to facilitate systematic data collection, including observation sheets to record spatial configurations, interview guidelines to engage with respondents, and documentation tools such as photography, sketches, and field notes. Spatial mapping tools are also used to record zoning patterns, orientation systems, and hierarchical relationships within the built environment.

Data analysis is conducted through a combination of spatial mapping, thematic coding, and interpretive analysis. Spatial mapping is used to visualize and analyze the organization of space, particularly with respect to zoning hierarchies, directional orientation, and environmental adaptation. Thematic coding is used to categorize qualitative data from interviews and observations into key themes related to ecological sustainability, social interaction, and spiritual meaning. These themes are then interpreted through the lens of THK to establish relationships between architectural form, cultural values, and environmental performance.

To ensure the validity and reliability of the findings, the study *applies data* triangulation, integrating insights from multiple sources, including interviews, observations, and documents. Cross-verification is conducted between field

findings and traditional texts, while contextual validation is achieved through discussions with local experts and practitioners. This multi-layered validation process enhances the credibility of the research and ensures that interpretations remain grounded in local knowledge systems.

The results of the analysis are presented using a combination of descriptive narratives, tables, and conceptual diagrams to illustrate the integration of THK principles within architectural practice. Through this methodological framework, the study provides a comprehensive understanding of how traditional Balinese architecture functions as a sustainable system, linking spatial design, cultural meaning, and environmental performance. Ultimately, this approach enables the translation of indigenous knowledge into a structured framework that can inform contemporary sustainable design and planning practices.

RESULTS

The findings of this study reveal that traditional Balinese architecture inherently embodies a *holistic, integrated model of sustainable spatial development, in which* environmental performance, social interaction, and spiritual values are embedded within the architectural system. These findings are derived from field observations, spatial mapping, interviews with *undagi*, and analysis of traditional manuscripts such as *Asta Kosala Kosali*. The results indicate that sustainability in Balinese architecture is not an external addition but an intrinsic characteristic formed through the application of *Tri Hita Karana* (THK) principles.

One of the most significant findings is the implementation of *passive environmental design strategies*. Traditional Balinese spatial layouts are designed to optimize climatic responsiveness through natural ventilation, daylighting, and thermal regulation. Open courtyards, permeable building envelopes, and orientation based on *Sanga Mandala* allow for effective cross-ventilation and heat dissipation, reducing dependency on mechanical cooling systems. The use of natural materials such as bamboo, wood, and thatch further enhances thermal comfort due to their low thermal mass and high breathability. This demonstrates that traditional architecture inherently aligns with contemporary principles of energy efficiency and low-carbon design.

Another key finding is the integration of *water management systems*, particularly through the *Subak* irrigation network. The *Subak* system reflects a sophisticated ecological approach that integrates agricultural landscapes, water distribution, and religious practices. This system not only ensures efficient water use but also maintains ecological balance and supports biodiversity. The alignment between architectural space and landscape planning illustrates how THK principles facilitate sustainable environmental management (Lansing, 2006).

The study also identifies strong evidence of *social cohesion* embedded within spatial organization. The arrangement of communal spaces such as *bale banjar* and shared courtyards fosters interaction, collective activities, and cultural continuity. Spatial zoning based on *the Tri Mandala creates a clear distinction among*

public, semi-public, and private spaces, thereby enhancing social order and community engagement. This spatial configuration supports inclusivity and reinforces local identity, demonstrating that social sustainability is deeply integrated into architectural design.

In addition, *spiritual integration* emerges as a defining characteristic of Balinese architecture. Sacred spaces such as *sanggah* and temples are positioned according to cosmological orientation, reinforcing the relationship between humans and the divine (*Parahyangan*). This spiritual dimension not only shapes spatial hierarchy but also instills environmental ethics, encouraging respect for nature and responsible resource use. The presence of ritual spaces ensures that sustainability is practiced as a cultural and ethical responsibility rather than merely a technical requirement.

Furthermore, the findings demonstrate that THK principles are inherently aligned with global sustainability frameworks, particularly the *Sustainable Development Goals (SDGs).* The ecological dimension of THK corresponds to SDG 13 (Climate Action), the social dimension aligns with SDG 11 (Sustainable Cities and Communities), and the material and resource efficiency aspects relate to SDG 12 (Responsible Consumption and Production). This alignment indicates that traditional Balinese architecture offers a locally grounded yet globally relevant model for sustainable development.

Table 1. Spatial Sustainability Classification

Score Range	Criteria
50.00–100.00	Low
100.01–150.00	Medium
>150.00	High

Interpretation:

The spatial sustainability classification presented in Table 1 is used to evaluate the degree of sustainability performance observed in traditional Balinese architectural elements. The scoring is based on qualitative assessment of environmental responsiveness, social functionality, and spiritual integration. Most observed cases fall within the *medium-to-high category*, indicating that traditional spatial systems are highly adaptive and sustainable.

Figure 2. Spatial Sustainability Integration in Balinese Architecture

Figure 2 illustrates the integration of *Tri Hita Karana* as the core framework connecting the ecological, social, and spiritual dimensions of Balinese architecture. Each dimension contributes to specific sustainability outcomes, which collectively form a holistic and adaptive spatial system. The diagram demonstrates that, in this context, sustainability is not fragmented but interconnected, reinforcing the idea that traditional architecture serves as a comprehensive model of sustainable development.

Synthesis of Findings

Overall, the results confirm that traditional Balinese architecture functions as a living system of sustainability, in which environmental efficiency, social harmony, and spiritual meaning are inseparably linked. This integrated approach provides a strong foundation for developing contemporary architectural models that are not only environmentally responsive but also culturally and socially resilient.

DISCUSSION

The findings of this study confirm that traditional Balinese architecture functions as a living, dynamic model of sustainability, in which spatial organization is not merely a physical construct but a manifestation of deeply embedded cultural, ecological, and spiritual values. This directly answers the primary research question regarding how indigenous knowledge systems, particularly *Tri Hita Karana* (THK), can inform sustainable spatial development. The results demonstrate that sustainability in the Balinese context is inherently

integrative, aligning environmental performance, social cohesion, and spiritual harmony into a unified architectural system.

From a theoretical standpoint, the findings reinforce the relevance of *holistic sustainability theory*, which emphasizes the interconnectedness of ecological, social, and cultural dimensions (WCED, 1987; Sachs, 2015). However, this study extends beyond conventional frameworks by incorporating the *spiritual dimension*, which is often neglected in mainstream sustainability discourse. As suggested by Lansing (2006), Balinese ecological systems such as *Subak* are not purely technical infrastructures but are embedded within ritual and belief systems. This aligns with the concept of *cultural ecology*, in which human-environment relationships are mediated by cultural practices and cosmological beliefs.

The first critical insight emerging from this study is that *cultural sustainability functions as a core design principle*, rather than a supplementary aspect of architecture. THK transforms sustainability from a predominantly technical and performance-based paradigm into a *lived cultural practice*. In this context, spatial arrangements such as *Tri Mandala* and *Sanga Mandala* are not only functional but also symbolic, guiding human behavior toward balance and harmony. This finding supports Rapoport's (1969) argument that built environments are fundamentally shaped by cultural values and social systems. Therefore, sustainability in Balinese architecture is achieved not through technological optimization alone, but through the internalization of cultural norms that regulate human interaction with nature and space.

Secondly, the study contributes to a *decolonial perspective in architecture*, challenging the dominance of Western-centric sustainability models that prioritize technological solutions, efficiency metrics, and standardized green certifications. Drawing on Geertz (1973), Balinese architecture can be understood as a "cultural text" in which spatial configurations encode meanings, rituals, and social relations. This perspective reveals that sustainability cannot be universally applied through homogenized frameworks such as LEED or BREEAM without considering local epistemologies. Instead, THK offers an *indigenous knowledge-based framework* that is context-specific, adaptive, and resilient. This aligns with emerging discourses in *decolonial architecture and planning*, which advocate recognizing local knowledge systems as legitimate sources of theory and practice.

The third critical insight relates to the tension *between spatial meaning and aesthetic reduction* in contemporary architectural practice. The findings indicate that modern adaptations of Balinese architecture often result in superficial replication of visual elements—such as ornamentation, roof forms, and materials—without understanding their underlying philosophical and spatial logic. This phenomenon leads to what can be described as "*cultural dilution*", where architecture loses its symbolic depth and functional coherence. Norberg-Schulz's (1980) concept of *genius loci* (spirit of place) becomes particularly relevant here, emphasizing that architecture should embody the identity and meaning of its context. The neglect of THK principles in contemporary design

results in spaces that are visually "Balinese" but lack ecological responsiveness, social functionality, and spiritual significance.

In relation to the research objectives, this study successfully demonstrates that THK can be repositioned as an *operational design framework* rather than merely a philosophical concept. The integration of ecological (Palemahan), social (Pawongan), and spiritual (Parahyangan) dimensions provides a structured, measurable, and applicable approach to sustainable design. For instance, ecological sustainability is reflected in passive design strategies and water management systems; social sustainability is evident in communal spatial configurations; and spiritual sustainability is manifested through ritual spaces and cosmological orientation. This triadic framework offers a *multi-dimensional model of sustainability* that can complement and enrich existing global frameworks such as the Sustainable Development Goals (SDGs).

Furthermore, the study highlights the potential of THK to serve as a *bridging framework between traditional knowledge and contemporary architectural practice*. In the context of rapid urbanization and tourism development in Bali, there is a critical need to ensure that architectural transformation does not erode cultural identity or cause environmental degradation. By operationalizing THK into design guidelines, planning regulations, and architectural education, it is possible to develop a model of *contextual sustainability* that is both locally grounded and globally relevant.

In synthesis, this discussion establishes that traditional Balinese architecture is not merely a cultural artifact but a *theoretical and practical model for sustainable spatial development.* It challenges the reductionist tendencies of modern architecture and proposes a paradigm shift toward *integrative, culturally embedded, and spiritually informed sustainability.* This reinforces the importance of repositioning indigenous knowledge systems as central to the future of sustainable architecture and urban planning.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that traditional Balinese architecture should not be understood as a static or purely historical artifact, but rather as a *regenerative and adaptive system of sustainable spatial development* rooted in indigenous cultural wisdom. The findings demonstrate that the *Tri Hita Karana* (THK) philosophy provides a *holistic and operational framework* that integrates ecological balance (*Palemahan*), social cohesion (*Pawongan*), and spiritual harmony (*Parahyangan*) into a unified spatial system. This integrative approach allows traditional Balinese architecture to respond dynamically to environmental, social, and cultural challenges, thereby positioning it as a relevant model for contemporary sustainable design.

In addressing the research objectives, this study confirms that the relationship between architectural form, cultural meaning, and environmental performance is not linear but *interdependent and systemic*. The spatial configurations observed—such as *Tri Mandala*, *Sanga Mandala*, and the use of local materials—function simultaneously as environmental strategies, social structures, and symbolic expressions. This reinforces the argument that

sustainability in Balinese architecture is achieved through *embedded cultural practices*, rather than external technological interventions. Consequently, this study contributes *a conceptual advancement* by repositioning THK from a philosophical doctrine into a *measurable and applicable design framework.*

A key theoretical contribution of this research is the formulation of the *Contextual Harmonization Model*, which serves as a bridge between indigenous knowledge systems and contemporary architectural practice. This model emphasizes that sustainable design must be context-sensitive, culturally grounded, and environmentally responsive. It proposes four principal dimensions of application. First, integrating indigenous wisdom into modern planning ensures that local values and cosmological principles are embedded in spatial policies and design processes. Second, the *restoration of spatial meaning in architectural design* addresses the current tendency toward superficial aesthetic adoption, advocating instead for a deeper understanding of symbolic and functional relationships within space. Third, the *adaptation of environmental logic for sustainability* highlights the relevance of passive design strategies, natural materials, and ecological systems such as *Subak* in reducing environmental impact. Fourth, the *alignment with policy and regulatory frameworks* ensures that these principles are institutionalized through planning regulations, building codes, and governance mechanisms.

From a practical perspective, the study underscores the urgent need to reconcile rapid urban development and tourism-driven transformation in Bali with the preservation of cultural identity and environmental sustainability. Without such integration, there is a significant risk of *spatial homogenization, cultural degradation, and ecological imbalance*. Therefore, the proposed model offers a strategic framework for guiding future development that is both locally rooted and globally relevant.

Based on these conclusions, several key recommendations are proposed. First, it is essential to *incorporate THK principles into spatial planning policies and regulatory instruments*, such as regional spatial plans (RTRW/RDTR), building regulations, and green building certification systems. This integration would enable THK to function not only as a cultural guideline but also as a *formalized planning and evaluation tool*. Second, the role of *undagi* (traditional master builders) should be *strengthened and institutionalized within contemporary design processes*, recognizing their expertise in translating cultural knowledge into spatial form. This can be achieved through collaborative frameworks that involve architects, planners, and local knowledge holders. Third, THK should be systematically *integrated into architectural education and professional training*, ensuring that future architects and designers are equipped with the knowledge and skills to apply culturally embedded sustainability principles.

Additionally, this study recommends developing *quantitative indicators and assessment tools* based on THK to support its implementation in modern projects. Such tools could complement existing sustainability rating systems (e.g., Green Star, LEED) by incorporating cultural and spiritual dimensions into performance evaluation. Future research should also explore the *scalability of the Contextual Harmonization Model* in other regions, examining how indigenous

knowledge systems can inform sustainable architecture in diverse cultural contexts.

In conclusion, this study positions traditional Balinese architecture as a *paradigmatic model of integrative sustainability,* offering valuable insights for rethinking contemporary architectural practice. By bridging indigenous wisdom and modern design, the proposed framework contributes to developing a more *contextual, resilient, and culturally meaningful approach to sustainable spatial development.*

FURTHER STUDY

This research is subject to several limitations that should be acknowledged as opportunities for further investigation. The study primarily adopts a qualitative interpretive approach and focuses geographically on Bali, which may limit the generalizability of the findings to other cultural and spatial contexts. While the depth of cultural analysis provides strong contextual insights, future research is encouraged to broaden the scope through comparative studies of other indigenous architectural frameworks, particularly those that also embody holistic relationships among humans, nature, and spirituality. Such comparisons would contribute to developing a broader theoretical understanding of indigenous sustainability paradigms.

In addition, integrating *Tri Hita Karana* (THK) with contemporary digital technologies presents a promising direction for future research. The incorporation of *Building Information Modeling (BIM) and Geographic Information Systems (GIS)* could enable the translation of THK principles into measurable, visualized, and scalable design tools. This would allow for more precise spatial analysis, performance simulation, and policy implementation, bridging the gap between traditional knowledge and modern technological practices.

Furthermore, given the increasing vulnerability of built environments to climate change and natural hazards, future studies should explore the *application of THK principles in disaster-resilient architectural design*. Investigating how traditional spatial configurations and environmental strategies contribute to resilience against earthquakes, floods, and other risks would enhance THK's relevance within contemporary sustainability and risk-mitigation frameworks. By addressing these areas, future research can strengthen the theoretical robustness and practical applicability of THK as a global model for sustainable and resilient architecture.

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