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Redefining Adaptive Reuse through User Experience: A Human-Centered Framework for Abandoned Architecture in Taman Festival Bali

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Abstract Adaptive reuse has become a key strategy in sustainable architecture, enabling the preservation of cultural heritage while revitalizing urban environments. Despite its ecological and economic advantages, most adaptive reuse studies emphasize material and structural performance while overlooking the human experiential dimension. This research proposes a Human-Centered Adaptive Reuse Framework that integrates emotional, perceptual, and cultural factors into the design evaluation process. Using Taman Festival Bali, an abandoned theme park rich in symbolic and spatial value, as a case study, the study applied a Semantic Differential (SD) method with 30 participants to assess three design scenarios: Traditional Balinese, Modern, and Parametric. Eight experiential dimensions were measured: spatial comfort, sensory experience, emotional engagement, cultural meaning, spatial cognition, social interaction, environmental connection, and aesthetic perception. The results reveal a perceptual continuum. The Traditional design scored highest for cultural meaning (M = 6.0) and environmental connection (M = 5.7), emphasizing heritage identity and ecological harmony. The Modern design achieved balanced performance across dimensions (M ≈ 5.0). The Parametric design excelled in emotional engagement (M = 6.1) and aesthetic perception (M = 5.8) but lacked cultural depth. These findings demonstrate that adaptive reuse success depends on technical transformation and affective and symbolic resonance. The proposed framework establishes a replicable approach to integrating human experience, cultural continuity, and design innovation in the sustainable revitalization of heritage architecture.

Keywords Adaptive Reuse, Human-Centered Design, Perception, Cultural Heritage

1. Introduction

Adaptive reuse has emerged as a pivotal strategy within sustainable architecture, providing a means to preserve cultural heritage while stimulating urban regeneration. It has been increasingly emphasized across urbanism, engineering, environmental design, and the social sciences, as scholars and practitioners seek sustainable responses to rapid urban and ecological change. Adaptive reuse offers an effective method for conserving architectural history while responding to contemporary functional needs. The repurposing of existing structures aligns closely with global sustainability objectives by extending the lifecycle of materials and reducing the environmental impact of demolition and new construction [1]. Driven by escalating recycling costs and a growing awareness of resource scarcity, adaptive reuse has become a pragmatic and

ecological alternative to conventional redevelopment [2].

Beyond its environmental advantages, adaptive reuse contributes to urban areas and cultural and economic revitalization [3]. It enables heritage buildings to be transformed into accessible and functional spaces, thereby enhancing the social and spatial dynamics of their surroundings. As Ball [4] observes, many cities now recognize the reuse of heritage structures as a vital component of urban regeneration strategies [5]. Architectural scholarship increasingly affirms that reactivating abandoned or underutilized structures promotes environmental stewardship, social cohesion, and economic sustainability [6]. In regions such as Bali, where cultural heritage and tourism intersect, the approach is particularly significant for preserving local identity while fostering community resilience.

Recent studies further highlight the growing relevance of user experience and human-centered design within adaptive reuse [6], [7]. These approaches emphasize integrating human needs, values, and emotional connections into design processes, moving beyond purely technical or economic considerations toward participatory and affective engagement. Adaptive reuse can generate new layers of meaning that reinforce cultural continuity and experiential depth by focusing on how people perceive, inhabit, and emotionally respond to architectural spaces.

Taman Festival Bali, an abandoned theme park in Sanur, provides a compelling case study for this exploration. Once a vibrant venue for cultural festivals and tourism, it now stands as a reminder of lost potential and a canvas for innovative, community-driven reuse. Its unique combination of Balinese cultural heritage, festival history, and current state of decay presents an opportunity to investigate how human-centered frameworks can redefine adaptive reuse in culturally rich, tourism-driven environments [6].

Human-centered design has been extensively utilized across various design fields to improve well-being and fortify the emotional bond between individuals and their environment [8]. In architectural contexts, user experience research elucidates how individuals perceive, navigate, and ascribe meaning to building environments. The environment, including light, sound, proportion, and materiality, affects how people feel, how comfortable they are, and how they interact with others [9]. Architectural design elements such as symmetry, spatial flow, and volumetric openness thus play a critical role in modulating psychological and emotional responses [10].

By intentionally shaping these elements, architects can influence sensory and affective dimensions, promoting engagement, comfort, and identity [11]. Although existing literature extensively addresses spatial composition and its aesthetic outcomes, quantifying the emotional impact of built environments remains a methodological challenge. These perspectives collectively suggest that integrating human-centered principles into adaptive reuse design can enhance spatial meaning, emotional resonance, and the overall cultural value of heritage architecture [12]. Although adaptive reuse has been widely discussed in sustainability and heritage discourse, most existing studies focus on technical, material, and economic dimensions rather than the human experiential aspects of architectural transformation. Literature often prioritizes issues such as structural integrity, lifecycle cost, and energy efficiency [2], [4] while users' psychological, emotional, and perceptual responses remain underrepresented.

Recent frameworks in adaptive reuse [6], [13] have begun to acknowledge the role of user participation and cultural context. Yet, few have systematically integrated affective and cognitive data into the design evaluation process. The experiential dimension of how users perceive, recall, and emotionally connect to reused spaces is still insufficiently theorized and rarely operationalized within empirical assessment tools. As a result, adaptive reuse is mainly treated as a spatial or economic optimization problem, rather than a human-centered process that shapes well-being, memory, and identity. Another critical gap lies in the lack of integrative frameworks that combine participatory, affective, and multisensory evaluation methods. While human-centered design principles are well-established in product and interface design [9], their application in architecture remains fragmented, particularly in heritage conservation and adaptive reuse. The absence of empirical models that capture emotional and perceptual feedback limits the potential for adaptive reuse to become a truly inclusive and culturally resonant practice. Therefore, this study addresses these limitations by proposing a framework of human-centered integration adaptive reuse by combining experiential analysis, cultural interpretation, and design evaluation. This research expands the theoretical and methodological understanding of adaptive reuse, linking emotional experience with spatial transformation to create environments that are both sustainable and meaningful.

Adaptive reuse research has traditionally emphasized technical feasibility, material performance, and economic efficiency. While these dimensions remain essential, recent scholarship has increasingly recognized that the success of adaptive reuse interventions also depends on how users emotionally perceive, experience, and attribute meaning to transformed spaces. Emerging studies have begun to explore experiential, affective, and multisensory aspects of reused heritage environments; however, these perspectives often remain descriptive and lack operational frameworks for empirical evaluation.

This study positions itself within this emerging discourse by proposing a human-centered design framework that systematically integrates emotional, perceptual, and cultural dimensions into design assessment. Unlike prior approaches that treat user experience as a secondary or qualitative outcome, the proposed framework operationalizes user perception through measurable

experiential dimensions. In doing so, the study extends existing adaptive reuse models by bridging architectural design, environmental psychology, and heritage studies, offering a structured and replicable method for evaluating how adaptive reuse interventions resonate with users at both cognitive and affective levels.

2. Materials and Methods

This study adopted a mixed qualitative and quantitative methodology that integrated conceptual framework development with user perception analysis to evaluate adaptive reuse design alternatives for *Taman Festival Bali*. The approach was grounded in the *Human–Space–Culture Integration Model*, which emphasizes that adaptive reuse is not merely a technical transformation, but a human-centered and affective process shaped by emotion, perception, and cultural meaning.

The research was implemented in two complementary phases. The first phase, Conceptual Synthesis, involved a comprehensive literature review on adaptive reuse, affective architecture, and human-centered design. This phase established eight experiential dimensions that form the core of the proposed *Human-Centered Adaptive Reuse Framework*: Spatial Comfort, Sensory Experience, Emotional Engagement, Cultural Meaning, Spatial Cognition, Social Interaction, Environmental Connection, and Aesthetic Perception. These dimensions collectively represent how users emotionally and cognitively interact with built environments undergoing adaptive transformation.

The second phase, Empirical Evaluation, employed a Semantic Differential (SD) method to translate these experiential dimensions into measurable perceptual data. Three design proposals, such as Traditional Balinese, Modern, and Parametric were developed to represent distinct adaptive reuse strategies. Each design scenario was visualized through high-quality renderings created under consistent lighting, scale, and perspective, ensuring objective comparison.

A total of 30 participants were purposively selected to represent a diverse range of perspectives, including architects, students, and local community members familiar with Balinese culture and architecture. Participants viewed each image independently and completed a Semantic Differential questionnaire comprising 24 bipolar adjective pairs, such as *Closed–Open*, *Cold–Warm*, *Unfamiliar–Familiar*, and *Ugly–Beautiful*, each rated on a 7-point scale. These items corresponded to the eight experiential dimensions of the framework. Each participant evaluated all three design scenarios, resulting in 72 individual responses.

Data was analyzed through descriptive statistics to summarize mean ratings and standard deviations for each dimension and design type, followed by exploratory factor analysis (EFA) to identify underlying perceptual structures.

3. Result and Discussion

Adaptive reuse, especially in its management phase, can be defined as the orchestration of a complex, dynamic, and adaptive system. This necessitates continuous reconstruction via innovative management, considering the substantial interdependencies among economic, social, and ecological subsystems, along with the potential activation of positive-sum strategies [14]. This management is achieved through complex decisions that require recognition of the diverse ways in which cultural heritage value is expressed. It includes utilitarian values as well as values that are independent of immediate utility. It also includes intrinsic anthropocentric and non-anthropocentric values that both complement and counterbalance the former. It is imperative to consider each of these factors in decisions regarding adaptive reuse [15].

The transdisciplinary frameworks for decision-making utilize various forms of information, including social, economic, and ecological dimensions, in their evaluation. The focus on the ecological foundation of the economy and a human-centered approach necessitates alterations in current evaluation processes, thereby demanding the development of new evaluation methodologies, criteria, and indicators [16].

Understanding user experience within adaptive reuse requires a multidimensional approach that integrates physical, perceptual, affective, and cultural dimensions of spatial engagement. The first dimension, Spatial Comfort (Physical), refers to users' perception of safety, accessibility, and environmental quality, factors that directly influence well-being and sense of ease within reused architectural spaces [4], [17]. The second, Sensory Experience (Perceptual), encompasses how users visually and spatially interpret architectural stimuli such as light, color, and material texture, which can heighten awareness and shape affective interpretation [9], [18]. Emotional Engagement (Affective) captures the intensity of emotional immersion and resonance, emphasizing that architecture elicits not only functional responses but also feelings of curiosity, nostalgia, and excitement [19], [20].

The fourth dimension, Cultural Meaning (Symbolic), reflects how spatial arrangements and architectural narratives sustain collective memory, ritual value, and heritage interpretation [6], [7]. In parallel, Spatial Cognition (Cognitive) concerns users' ability to comprehend, orient, and navigate within the environment, qualities that determine perceptual clarity and psychological comfort [10]. Interaction (Behavioural) examines how spaces facilitate communication and community engagement, reinforcing architecture's role as a social interface that nurtures inclusion and shared identity [21].

Complementing these is Environmental Connection (Ecological), which assesses how design fosters biophilic responses, environmental awareness, and sustainable behaviour through integration with natural systems [22]. Finally, Aesthetic Perception (Artistic) addresses users'

appreciation of beauty, harmony, and visual balance, emphasizing that aesthetic coherence contributes to emotional satisfaction and symbolic recognition [19], [23]. Together, these eight dimensions form a holistic framework for evaluating user experience in adaptive reuse, reaffirming that successful architectural revitalization must align emotional resonance, cultural meaning, and environmental sensitivity within a human-centered design paradigm (Table 1).

The qualitative synthesis of interviews, field documentation, and emotional response mapping at Taman Festival Bali revealed several recurring experiential patterns. Participants described the site as simultaneously *haunting and inspiring*, evoking nostalgia linked to its former role as a cultural landmark [19]. Spaces with greater natural light, visual openness, and surviving cultural artifacts such as the stage ruins and forest-edge courtyards elicited stronger feelings of comfort, curiosity, and connection. Conversely, enclosed or deteriorated interiors triggered sensations of anxiety and disorientation, confirming the influence of geometry and spatial proportion on human emotion [20], [23]. Perceptual mapping showed that participants favored zones where architectural rhythm, material texture, and color palettes produced coherent visual narratives. Similar to findings by Chiu, vivid contrasts and natural hues reduced stress and increased attentional engagement. Acoustic observations also indicated that ambient sounds of birds, wind, and distant waves are related to relaxation and a sense of belonging, underscoring the multisensory dimension of adaptive reuse spaces [18]. Collectively, these results suggest that *emotional, perceptual, and sensory variables* strongly mediate user attachment to reactivated heritage environments. The interview results revealed that participants perceived the Taman Festival Bali site as a space rich in memory and emotional attachment, yet lacking safety and functionality. Documentation analysis indicated that most structures retained strong architectural character despite physical decay, presenting potential for adaptive reuse.

The images in Figure 1 depict the current spatial condition of the abandoned structures within *Taman Festival Bali*, revealing the interplay between decay, openness, and spontaneous reoccupation. The first image shows a partially collapsed roof structure that exposes the interior to natural light, creating a dramatic spatial rhythm and a heightened sense of openness. The remnants of murals and ritual motifs suggest traces of cultural identity amidst neglect. The second image illustrates a large interior space where sunlight, shadow, and graffiti converge, producing both visual richness and emotional ambivalence. Participants identified such areas as simultaneously "alive" and "haunting," evoking curiosity and nostalgia. The third image captures visitors navigating overgrown courtyards, where vegetation reclaims the built fabric. This re-naturalization of space reinforces the biophilic and temporal dimension of adaptive reuse, demonstrating how nature, art, and memory coexist within the ruins. Collectively, these scenes reflect a spatial narrative of transition from abandonment toward potential reactivation, where emotional resonance and environmental interaction become central to reimagining heritage architecture.

Table 1. Dimensions of User Experience in Human-Centered Adaptive Reuse Framework

No	Category	Dimension	Purpose
1	Spatial Comfort	Physical	Measures safety, accessibility, and environmental quality
2	Sensory Experience	Perceptual	Captures multisensory reactions (light, sound, texture)
3	Emotional Engagement	Affective	Evaluates emotional immersion and resonance
4	Cultural Meaning	Symbolic	Reflects memory, ritual, and heritage interpretation
5	Spatial Cognition	Cognitive	Assesses orientation, wayfinding, and spatial understanding
6	Social Interaction	Behavioural	Assesses the potential space on how people connect and communicate in space
7	Environmental Connection	Ecological	Identifies biophilic responses and sustainability awareness
8	Aesthetic Perception	Artistic	Relates to visual harmony, beauty, and atmosphere

Source: author compilation

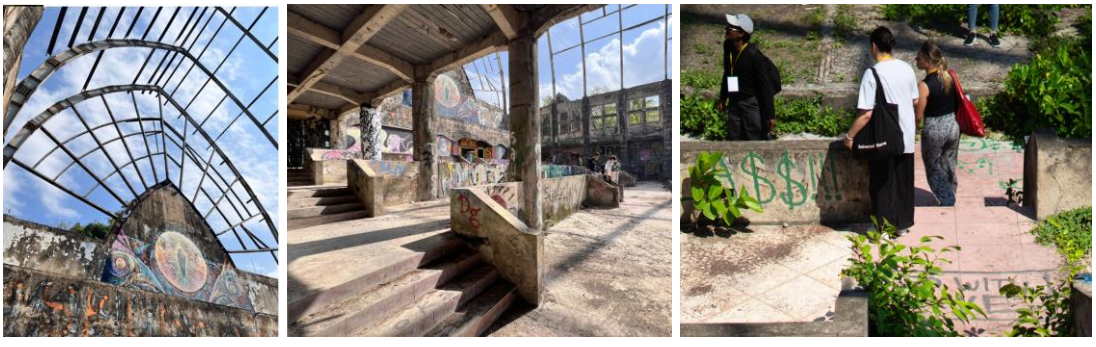

Figure 1. Taman Festival Bali field documentation. Source: author

Table 2. Comparative Analysis of Architectural Paradigms in the Context of Adaptive Reuse

No	Aspects	Traditional Balinese Architecture	Modern Architecture	Postmodern / Parametric Architecture
1	Exterior			
2	Interior			
3	Local Identity	Robust cultural and ritual identity rooted in Tri Hita Karana philosophy and symbolic cosmology; form and space directly express local beliefs and social order.	Weak connection to local culture; dominated by global aesthetics and functionalist values that often overlook symbolic meaning.	Identity may be weak unless cultural symbolism is intentionally reinterpreted through computational or parametric form-finding; it relies on the designer's ability to embed meaning digitally.
4	Flexibility of New Function	Limited flexibility due to sacred spatial hierarchy and ritual-specific functions; reuse potential restricted to cultural or educational purposes.	High flexibility through modular and open layouts allows for diverse commercial and public functions.	Very high flexibility due to advanced computational design and multifunctional spatial logic; suitable for transformation and hybrid programs.
5	Sustainability	High uses local materials (bamboo, stone, and thatch) and passive climatic strategies aligned with environmental and spiritual balance.	Moderate depends on technological efficiency and maintenance; sustainability is linked to material performance.	Low to moderate relies on high-energy materials and complex fabrication, but digital optimization can improve ecological performance.
6	Community Acceptance	High forms part of collective cultural identity; well-integrated with social customs and rituals.	Moderate depends on adaptation to local cultural context; often perceived as foreign if not localized.	Low to moderate based on visually iconic but may face cultural resistance due to abstraction and alien materiality; requires participatory interpretation.
7	Intervention Cost	Medium cost requires craftsmanship, restoration, and cultural maintenance; the cost is linked to heritage conservation.	Low to medium construction efficiency and standardization reduce costs; maintenance is relatively simple.	High cost demands advanced materials, fabrication technology, and digital design expertise; costly to build and maintain.
8	Adaptive Reuse Potential	Heritage-based Reuse: Focused on preserving authenticity, cultural meaning, and ritual heritage; suitable for interpretive or educational reuse.	Functional Reuse: Prioritizes programmatic efficiency, commercial viability, and flexible functionality within existing structures.	Transformational Reuse: Integrates technological innovation and symbolic reinterpretation; transforms heritage into new hybrid spatial experiences.
9	Narrative Summary	It represents continuity and sacred authenticity; adaptive reuse emphasizes cultural stewardship and material preservation.	Embodies pragmatism and efficiency; adaptive reuse emphasizes flexibility and modernization.	Embodies innovation and symbolic transformation; adaptive reuse emphasizes reinterpretation through technology and multisensory design.

Source: author

Table 2 presents a comparative analysis of three architectural paradigms, traditional Balinese, modern, and postmodern/parametric, to illustrate their contrasting principles, material logic, and adaptive reuse potential. The comparison aims to contextualize how each paradigm negotiates the balance between cultural identity, spatial flexibility, sustainability, and community acceptance in transforming built heritage. Traditional Balinese architecture embodies continuity, ritual symbolism, and ecological harmony rooted in the *Tri Hita Karana*

philosophy, emphasizing authenticity and cultural stewardship. In contrast, Modern architecture privileges efficiency, modularity, and functional adaptation, often at the expense of symbolic depth. Postmodern or Parametric architecture, emerging from computational design paradigms, introduces expressive formalism and multisensory potential but risks detachment from local meaning unless reinterpretation is consciously embedded. Through these distinctions, the table highlights how adaptive reuse operates as both a technical and cultural negotiation, where the success of transformation depends on the synthesis between heritage authenticity, user perception, and technological innovation.

The comparative analysis reveals that each architectural paradigm contributes distinct values to the adaptive reuse process. Traditional Balinese architecture offers cultural authenticity and environmental harmony, while Modern architecture provides efficiency and spatial flexibility. Postmodern or Parametric architecture introduces innovation and sensory engagement but often lacks contextual depth. Synthesizing these paradigms within a human-centered adaptive reuse framework enables a balanced approach for preserving heritage identity while embracing technological adaptability and user experience. This integration supports a more holistic model of architectural transformation, where culture, emotion, and sustainability converge in the revitalization of built heritage.

Table 3 presents the descriptive statistics derived from the Semantic Differential (SD) analysis of user perceptions toward three adaptive reuse design alternatives (Traditional Balinese, Modern, and Parametric). The table summarizes the mean and standard deviation (SD) scores across eight experiential dimensions: Spatial Comfort, Sensory Experience, Emotional Engagement, Cultural Meaning, Spatial Cognition, Interaction, Environmental Connection, and Aesthetic Perception. Each dimension reflects participants' emotional and perceptual responses to visual renderings of the proposed designs, evaluated through bipolar adjective pairs rated on a seven-point scale.

Table 3. Descriptive Statistics of User Perceptions toward Adaptive Reuse Design Alternatives

No	Category / Dimension	Bipolar Scale Example	Traditional Design (Mean ± SD)	Modern Design (Mean ± SD)	Parametric Design (Mean ± SD)
1	Spatial Comfort (Physical)	Unsafe — Safe	5.8 ± 0.6	4.9 ± 0.8	4.1 ± 1.0
		Inaccessible — Accessible	5.5 ± 0.7	5.0 ± 0.9	3.9 ± 1.2
		Chaotic — Orderly	5.2 ± 0.9	4.7 ± 0.7	3.8 ± 1.1
2	Sensory Experience (Perceptual)	Dark — Bright	4.8 ± 0.8	5.6 ± 0.7	5.9 ± 0.6
		Cold — Warm	5.6 ± 0.7	4.7 ± 0.9	3.5 ± 1.0
		Flat — Textured	5.3 ± 0.9	4.8 ± 0.8	4.2 ± 1.1
3	Emotional Engagement (Affective)	Boring — Exciting	4.2 ± 1.0	5.4 ± 0.8	6.1 ± 0.6
		Distant — Immersive	5.0 ± 0.8	5.3 ± 0.7	6.0 ± 0.6
		Unpleasant — Pleasant	5.7 ± 0.6	4.9 ± 0.8	4.3 ± 1.1
4	Cultural Meaning (Symbolic)	Global — Local	6.2 ± 0.5	4.6 ± 0.9	3.4 ± 1.1
		Non-symbolic — Symbolic	5.9 ± 0.7	4.8 ± 0.8	3.6 ± 1.2
		Ordinary — Sacred	5.8 ± 0.6	4.3 ± 0.9	3.2 ± 1.0
5	Spatial Cognition (Cognitive)	Confusing — Clear	5.4 ± 0.7	5.0 ± 0.8	4.4 ± 0.9
		Fragmented — Coherent	5.6 ± 0.8	5.2 ± 0.7	4.5 ± 0.8
		Disorienting — Legible	5.5 ± 0.9	4.9 ± 0.8	4.3 ± 0.9
6	Interaction (Behavioral)	Isolated — Connected	5.7 ± 0.7	5.1 ± 0.9	4.5 ± 1.1
		Exclusive — Inclusive	5.4 ± 0.8	5.0 ± 0.8	4.3 ± 1.0
		Static — Lively	4.9 ± 1.0	5.5 ± 0.8	5.8 ± 0.7
7	Environmental Connection (Ecological)	Artificial — Natural	5.9 ± 0.7	5.0 ± 0.8	4.2 ± 1.1
		Polluting — Sustainable	5.6 ± 0.8	5.2 ± 0.7	4.5 ± 1.0
		Hard — Soft	5.7 ± 0.6	4.8 ± 0.8	4.1 ± 1.1
8	Aesthetic Perception (Artistic)	Ugly — Beautiful	5.8 ± 0.7	5.1 ± 0.8	6.0 ± 0.6
		Unbalanced — Harmonious	5.9 ± 0.6	5.2 ± 0.9	5.5 ± 0.8
		Plain — Elegant	5.6 ± 0.8	5.0 ± 0.7	5.8 ± 0.6

Source: author

The results provide a comparative understanding of how users perceive comfort, clarity, symbolism, and aesthetic appeal across different architectural paradigms. Higher mean scores indicate stronger positive associations, while lower means reflect reduced familiarity, comfort, or cultural resonance. This quantitative assessment forms the basis for interpreting the relationship between spatial form, emotional response, and cultural identity in adaptive reuse. By translating user impressions into measurable data, Table 3 supports the study's aim to demonstrate how human-centered perception can inform design decision-making and enhance the affective success of adaptive reuse strategies.

The findings reinforce the argument that adaptive reuse cannot be viewed solely as a technical or economic intervention but must be understood as a human-centered and affective process [6], [7]. By translating user experiences into design parameters, the project at Taman Festival Bali demonstrates how Spatial Comfort, Sensory Experience, Emotional Engagement, Cultural Meaning, Spatial Cognition, Interaction, Environmental Connection, and Aesthetic Perception influence well-being and emotional resonance [9], [10]. The evidence supports the claim that curvilinear or open forms evoke more positive affective states, while rigid geometries and visual clutter correspond to discomfort [20], [23].

Furthermore, the research highlights that emotional connection and perceptual clarity are crucial for fostering *authenticity* and *place identity* in abandoned architecture [4], [13]. Adaptive reuse functions as a physical transformation and an emotional reconstruction of collective memory, where the old and new merge into what De Matteis [19] calls "atmospheric assemblages." Integrating these affective and sensory parameters within a multicriteria, participatory decision-making framework [21] can enhance sustainability by aligning design interventions with cultural and psychological needs. The study, therefore, fills the previously identified gap, while much of the literature emphasizes the participant's experience. This research demonstrates that emotion, perception, and sensory experience are equally vital components of adaptive reuse success in Southeast Asia. Applying a human-centered framework in Taman Festival Bali provides a replicable model for other culturally rich yet neglected sites, linking ecological regeneration, cultural continuity, and human well-being into one holistic process.

4. Result and Discussion

The descriptive statistics derived from the Semantic Differential (SD) ratings of 30 participants reveal distinct perceptual differences among the three adaptive reuse design scenarios for *Taman Festival Bali*: Traditional Balinese, Modern, and Parametric approaches. Although participants evaluated only visual renderings, their responses reflected multidimensional perceptions across emotional, spatial, cultural, ecological, and aesthetic dimensions.

Overall, the Traditional Balinese design achieved the highest mean scores for *Cultural Meaning* (M = 6.0) and *Environmental Connection* (M = 5.7), followed by *Aesthetic Perception* (M = 5.8) and *Spatial Comfort* (M = 5.5). These results indicate strong associations with local identity, ritual symbolism, and environmental harmony. Participants described this design as *warm*, *familiar*, and *orderly*, embodying cultural continuity and ecological sensitivity. The Modern design demonstrated balanced performance across most dimensions, averaging around (M ≈ 5.0). It was perceived as *clear*, *functional*, and *accessible*, particularly in *Emotional Engagement* (M = 5.5) and *Spatial Cognition* (M = 5.0), though it lacked symbolic and cultural richness (M = 4.6). In contrast, the Parametric design displayed polarized responses. While it received the lowest ratings in *Cultural Meaning* (M = 3.4) and *Spatial Comfort* (M = 4.0), it achieved the highest scores for *Emotional Engagement* (M = 6.1) and *Aesthetic Perception* (M = 5.8). This pattern suggests that users perceived the Parametric approach as visually stimulating and emotionally engaging, yet less grounded in cultural familiarity and spatial coherence.

Across categories, participants consistently rated the Traditional design highest in contextual and cultural dimensions, the Modern design as functionally balanced, and the Parametric design as aesthetically innovative but emotionally detached from local heritage. These results reveal a perceptual continuum: user preference transitions from cultural resonance and comfort (Traditional) toward aesthetic novelty and sensory stimulation (Parametric). Such findings affirm that adaptive reuse design is experienced not solely through physical and functional performance but also through affective, perceptual, and symbolic dimensions. This underscores the importance of human-centered strategies that harmonize emotional engagement, cultural authenticity, and environmental responsiveness in revitalizing heritage architecture.

4.1. Limitations and Future Directions

This study has several limitations that should be acknowledged. First, the evaluation was based on visual renderings rather than full-scale or immersive environments, which may limit participants' perception of materiality, spatial depth, and environmental dynamics. Future studies should integrate immersive tools such as Virtual Reality (VR) or Augmented Reality (AR) to enhance perceptual realism and spatial engagement. Second, the sample size was limited and purposively selected, reflecting the exploratory nature of the research. While sufficient for identifying perceptual trends, broader demographic representation would strengthen generalizability. Third, the study focused on a single case

study within a culturally specific context. Applying the framework to additional sites with different heritage typologies would further validate its robustness and adaptability. Finally, the Semantic Differential method primarily captures conscious evaluations of perception and emotion. Future research could incorporate neurophysiological or behavioral measures to complement subjective assessments and deepen understanding of affective responses in adaptive reuse environments. Despite these limitations, the study provides a methodological foundation for integrating human experience into adaptive reuse research and practice.

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