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International Journal of Graphic Design (IJGD)
Vol. 03 No. 02 October 2025
E-ISSN: 2987-9434; P-ISSN: 2988-0343, Page 231-246
DOI: https://doi.org/10.51903/ijgd.v2i2.3080
Available online at: https://journal.stekom.ac.id/index.php/ijgd

Circular Interior Design Strategies for Adaptive Reuse: Enhancing Eco-Conscious Practices in Contemporary Workspace Environments

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Abstract. *The urgency of ecological sustainability in contemporary interior architecture has intensified due to global environmental challenges and resource depletion. Workspaces significantly contribute to energy consumption, carbon emissions, and material waste, requiring a shift from linear consumption to regenerative, circular practices. This study introduces a Circular Interior Design Strategies Framework that extends beyond conventional certifications (e.g., LEED, BREEAM) by integrating four interdependent pillars: material recirculation, modular adaptability, biophilic integration, and lifecycle-driven decision-making. A qualitative descriptive methodology combining systematic literature review, case-study analysis, and expert validation was employed. Findings demonstrate that adaptive reuse can reduce embodied carbon by 40–70 percent while preserving cultural identity and spatial integrity. The proposed framework clarifies how interior design operationalizes circular economy principles at the design stage rather than post-construction assessment. This study provides a structured framework for designers and policymakers to implement circular strategies effectively, positioning interior design as a proactive agent in sustainable workplace transformation.*

Keywords: *Circular Interior Design, Adaptive Reuse, Sustainable Workspace Design, Eco-Conscious Practices, Contemporary Interior Architecture*

INTRODUCTION

The urgency of ecological sustainability in contemporary architecture and interior design has intensified in response to global environmental crises and the growing acknowledgment of resource depletion (Ivashura & Borysenko, 2021; S, 2025). The built environment contributes significantly to energy consumption, greenhouse gas emissions, and material waste, necessitating a paradigmatic shift from linear consumption models toward regenerative and circular approaches (Hartley et al., 2022; Lekan et al., 2021). Grounded in design theory perspectives (Buchanan, 1992; Cross, 2001), this study situates interior design as an iterative, human-centered, and problem-solving discipline capable of advancing sustainability through systemic thinking. Circular interior design, which prioritizes the continuous circulation of materials, adaptive reuse, and long-term value creation, embodies these design-thinking principles by operationalizing sustainability through spatial and material decision-making (Aktan Ábrahám & Deniz, 2025; Savio et al., 2022). Within the post-pandemic context, where remote and hybrid working models have reshaped spatial demands, interior design strategies must transcend traditional aesthetics and functionality to embed ecological and adaptive principles at their core (Adenipekun et al., 2021; Hassanain et al., 2025).

Received: August 2025; Revised: September 2025; October 2025; Published: October 2025
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Adaptive reuse plays a pivotal role in implementing these principles by transforming existing structures into contemporary, functional spaces, thereby mitigating the environmental impact associated with new construction (Lanz & Pendlebury, 2022; Plevoets, 2022). This approach not only preserves cultural heritage but also enables sustainable urban regeneration, aligning environmental responsibility with socio-cultural continuity (Atmodiwirjo & Yatmo, 2021; Martella & Enia, 2020). However, despite extensive exploration of adaptive reuse in architectural studies, its integration with circular interior design strategies remains underdeveloped, particularly in the context of workspace transformation (Fauth & Pieper, 2022; Kropman et al., 2023). While existing research has addressed energy-efficient technologies and green-building certifications such as LEED and BREEAM, few frameworks systematically operationalize circularity at the interior design stage, especially in adaptive reuse applications (Ntsonde et al., 2021; Talla & McIlwaine, 2024).

To bridge this theoretical and practical gap, this research introduces the Circular Interior Design Strategies Framework for Adaptive Reuse, which synthesizes four interdependent pillars material recirculation, modular adaptability, biophilic integration, and lifecycle-driven decision-making as foundations for sustainable interior environments (Figure 1). The framework aligns with recent calls for evidence-based, actionable approaches in design research (Aktan Ábrahám & Deniz, 2025) and responds to the pressing need for methods that accommodate evolving workplace patterns while advancing ecological responsibility (Hassanain et al., 2025; Singh et al., 2023). Unlike prior models or certification systems (e.g., LEED, BREEAM), the proposed framework embeds circularity as a generative design process rather than a post-construction evaluation tool, thus expanding its originality and applicability.

By positioning circular interior design as a systemic intervention rather than a set of isolated sustainable practices, the framework enhances the capacity of adaptive reuse projects to deliver enduring environmental, social, and economic value (Kar et al., 2024; Lekan et al., 2021). This study contributes theoretically by linking design-thinking scholarship to circular economy paradigms and, practically, by providing a structured tool for designers and policymakers to implement sustainability in workspace design (Prihatmoko & Setiyadi, 2024; Priyadi & Slamet, 2024; Wibowo et al., 2024). It integrates insights from cultural spatial practices (Atmodiwirjo & Yatmo, 2021), workplace health and productivity research (Kropman et al., 2023), and sustainable material innovation (Savio et al., 2022), thereby situating itself at the intersection of design theory, environmental ethics, and spatial application. As illustrated in Figure 1, the framework conceptualizes circular interior design as a dynamic, adaptive system in which each strategy reinforces the others, enabling continuous evolution while minimizing ecological footprints.

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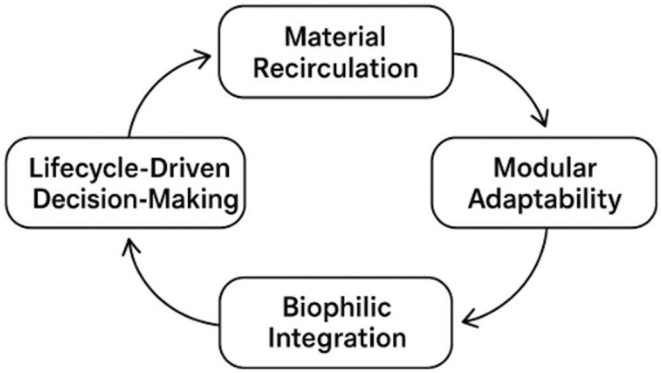

Figure 1. Circular Interior Design Strategies Framework for Adaptive Reuse in Contemporary Workspaces

By articulating this framework, the present study advances the discourse on eco-conscious interior architecture and addresses a significant research gap in adaptive reuse scholarship. It provides a foundation for future empirical studies, including pilot implementations, semi-quantitative evaluations, and user-centered investigations that test the framework's effectiveness across varied socio-economic contexts (Han et al., 2024; Scholte & van der Boon, 2025). Moreover, it positions interior design as a critical agent of transformation in the broader transition toward a circular economy, reaffirming the discipline's capacity to contribute meaningfully to global sustainability agendas (Shaban et al., 2024; Wani et al., 2025).

LITERATURE REVIEW

A. Circular Economy and Circular Design in the Built Environment

The concept of the circular economy has emerged as a critical paradigm for addressing the environmental consequences of linear production and consumption models. Within the built environment, the circular economy promotes the continual reuse of resources, the minimization of waste, and the regeneration of natural systems, aligning directly with global initiatives such as the United Nations Sustainable Development Goals (SDG) (Lekan et al., 2021; Savio et al., 2022). The Ellen MacArthur Foundation's framework for circularity underscores strategies such as designing out waste, keeping products and materials in use, and regenerating natural systems, which have profound implications for architecture and interior design (Hartley et al., 2022). Recent scholarship highlights the potential of circular design to drive systemic change by embedding lifecycle thinking into every stage of design, from material selection to end-of-life recovery (Aktan Ábrahám & Deniz, 2025; Talla & McIlwaine, 2024). However, while these studies establish a strong theoretical foundation, most focus on macro-level architectural contexts, offering limited insight into how circular principles can be implemented in interior design processes. Persistent barriers such as fragmented supply chains, limited stakeholder collaboration,

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and inadequate design tools constrain practical application (Hartley et al., 2022; Ntsonde et al., 2021). Therefore, translating circular economy concepts into actionable frameworks for interior environments remains a pressing research need.

B. Adaptive Reuse in Interior Design and Workspace Transformation

Adaptive reuse, defined as the process of repurposing existing structures for new uses, has gained prominence as a sustainable approach to reducing the environmental impact of the built environment (Lanz & Pendlebury, 2022; Plevoets, 2022). By extending the life cycle of buildings, adaptive reuse reduces material consumption, conserves cultural heritage, and contributes to urban regeneration (Atmodiwirjo & Yatmo, 2021; Martella & Enia, 2020). In the context of interior design, adaptive reuse offers a unique opportunity to integrate sustainable practices directly into the spatial and material qualities of interiors. Contemporary workspaces, particularly in the post-pandemic era, require adaptable solutions that accommodate hybrid work models, enhance user wellbeing, and respond to rapidly changing functional requirements (Adenipekun et al., 2021; Hassanain et al., 2025). Scholars emphasize that interior interventions in adaptive reuse projects must balance functional performance with cultural and ecological considerations to ensure long-term viability (Fauth & Pieper, 2022; Kropman et al., 2023). Nevertheless, much of the current literature still privileges architectural perspectives, often overlooking the specific mechanisms by which interior reuse strategies can operationalize circularity. This underrepresentation highlights a disciplinary gap between sustainable architecture and interior design practice (Lanz & Pendlebury, 2022). Accordingly, there is a growing need for integrative approaches that connect adaptive reuse theory with interior design methodologies.

C. Prior Research on Sustainable Interior Architecture

Previous studies on sustainable interior design have predominantly addressed issues of energy efficiency, material performance, and aesthetic innovation (Serra et al., 2022; Ulusoy et al., 2021). While these contributions have advanced the technical and visual aspects of sustainability, they often treat circularity as an ancillary feature rather than a core design system. For instance, (Lee, 2022) highlights the importance of emotional connection in interior experiences, while (Arslan, 2022) explores emerging spatial typologies in contemporary architecture. However, such studies typically emphasize form and sensory experience rather than systemic resource flows or lifecycle adaptation. Although certifications such as LEED and BREEAM have established benchmarks for green building performance, they offer limited guidance on integrating circular principles into interior design processes (Fauth & Pieper, 2022; Ntsonde et al., 2021). This gap is particularly critical in workspace design, where environmental performance, user health, and adaptability intersect. Bridging this gap requires a theoretical and

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methodological framework that integrates human-centered and ecological perspectives within circular interior design (Hassanain et al., 2025; Kropman et al., 2023).

D. Identified Research Gap and Theoretical Contribution

Despite widespread advocacy for sustainable design, there is no cohesive framework that synthesizes circular-economy principles with the operational and experiential demands of interior reuse. Existing research tends to focus either on broad sustainability goals or narrowly defined technical solutions, leaving a theoretical void at the intersection of systemic circularity and practical application (Hartley et al., 2022; Lekan et al., 2021). This study addresses that void by proposing the Circular Interior Design Strategies Framework for Adaptive Reuse (Figure 1), which integrates material recirculation, modular adaptability, biophilic integration, and lifecycle-driven decision-making as interdependent design pillars. The model translates circular economy theory into interior architecture practice through evidence-based synthesis and expert validation (Aktan Ábrahám & Deniz, 2025; Savio et al., 2022). By bridging theoretical and practical domains, the framework contributes to both academic scholarship and professional practice, providing a systematic pathway for designers and policymakers to implement circular strategies in workspace environments (Shaban et al., 2024; Singh et al., 2023; Wani et al., 2025). Ultimately, it situates interior design as an active agent in achieving global sustainability imperatives while advancing the discourse on adaptive reuse beyond architectural boundaries.

METHODS

A. Research Methodology

This study employs a qualitative descriptive approach, integrated with visual and comparative analysis, to examine circular interior design strategies in the adaptive reuse of contemporary workspaces. The methodological framework follows recommendations from design research scholars, emphasizing triangulation among theory, observation, and validation to enhance reliability (Buchanan, 1992; Cross, 2001). The research process is structured into three interrelated stages to ensure methodological coherence. The first stage involves a literature review and synthesis, integrating theoretical and empirical studies to establish a solid conceptual foundation (Table 1). The second stage focuses on case study analysis with visual examination, enabling an in-depth understanding of real-world applications and identifying design patterns relevant to circular practices. The final stage comprises the development and validation of a conceptual framework that synthesizes insights from the previous stages. This three-tiered structure ensures triangulation among data sources, literature, case evidence, and expert perspectives, thus strengthening validity (Aktan Ábrahám & Deniz, 2025; Fauth & Pieper, 2022).

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The overall research process is illustrated in Figure 2, showing the sequential progression from theoretical exploration to framework formulation and validation.

B. Literature Review and Synthesis

The first stage involved a systematic review of literature on circular design principles, adaptive reuse practices, and sustainable interior strategies. The process followed established academic protocols using Scopus, Web of Science, and ScienceDirect databases, with search keywords such as "circular design," "adaptive reuse," "workspace sustainability," and "interior design frameworks." Publications from 2015 to 2025 were prioritized to ensure both depth and contemporary relevance. Extracted studies were synthesized to identify thematic overlaps, methodological approaches, and knowledge gaps, summarized in Table 1. The review also compared existing frameworks (e.g., LEED, BREEAM, and WELL) to assess their treatment of circularity within interiors, revealing a lack of lifecycle-oriented guidance at the design stage (Hartley et al., 2022; Ntsonde et al., 2021; Talla & McIlwaine, 2024). This synthesis established the conceptual foundation and justified the need for an interior-specific circular design framework.

Table 1. Literature Synthesis on Circular Interior Design and Adaptive Reuse

Author(s) & Year	Focus Area	Methodology	Key Findings	Research Gap Identified
(Adenipekun et al., 2021)	Academic workspace innovation & sustainability	Case study	Identified innovative interior design as crucial for sustainable effectiveness	Limited integration with circular adaptive reuse
(Aktan Ábrahám & Deniz, 2025)	Circular interior process design	Evidence-based design	Proposed evidence-based approach to embed circularity in interiors	Lack of application in adaptive reuse contexts
(Fauth & Pieper, 2022)	Sustainable office spaces	Empirical study	Linked workspace characteristics to sufficiency strategies	Insufficient linkage to adaptive reuse frameworks
(Lanz & Pendlebury, 2022)	Adaptive reuse frameworks	Critical review	Provided a comprehensive review of adaptive reuse theories	Limited focus on interior circularity
(Hassanain et al., 2025)	Sustainable workplace design	Mixed methods	Highlighted holistic design and management for productivity	Absence of integration with circular interior strategies
(Hartley et al., 2022)	Barriers to the circular economy in interiors	Industrial case study	Identified systemic barriers to circular material use	Need for context-specific interior strategies
(Savio et al., 2022)	Natural fiber insulation & circular economy	Experimental	Demonstrated use of textile waste for sustainable interiors	Limited uptake in adaptive reuse applications

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(Talla & McIlwaine, 2024)	Digital tools in circular construction	Case application	Showed the potential of design-stage technology to minimize waste	Lack of adaptation for interior reuse design

C. Case Study Analysis and Visual Examination

The second stage consists of a comparative case study of selected adaptive reuse workspaces that exemplify sustainable design principles. Case selection followed three explicit criteria:

a) Alignment with circular design principles (e.g., material reuse, modularity, lifecycle focus);
b) Availability of reliable documentation (technical drawings, photos, sustainability reports); and
c) Geographical diversity, including projects from Europe, East Asia, and Southeast Asia, to ensure contextual richness (Adenipekun et al., 2021; Hassanain et al., 2025; Lanz & Pendlebury, 2022).

Visual examination techniques included spatial layout analysis, material lifecycle mapping, and sustainability feature assessment (Fauth & Pieper, 2022; Savio et al., 2022). Each case was analyzed using a consistent matrix to compare material flows, spatial flexibility, and user well-being outcomes. This stage generated empirical insights on how circular strategies are applied in practice and informed the synthesis of the conceptual framework.

D. Conceptual Framework Development and Validation

16 Building on insights from the literature synthesis and case analysis, a conceptual framework was developed to operationalize circular interior design in adaptive reuse contexts. The framework integrates theoretical constructs with practical observations to propose four interdependent design pillars: material recirculation, modular adaptability, biophilic integration, and lifecycle-driven decision-making. To validate the framework, semi-structured interviews were conducted with three experts selected based on defined criteria:

a) Minimum 10 years of professional experience in sustainable architecture or interior design,
b) Demonstrated involvement in adaptive reuse projects, and
c) Academic or professional publication in sustainability or design innovation.

The expert validation focused on assessing the framework's clarity, feasibility, and transferability across diverse project scales. Feedback from these experts led to minor

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refinements, including the addition of digital tracking tools (e.g., BIM-based lifecycle analysis) and design-for-disassembly guidelines, enhancing the framework's applicability in real-world settings. This iterative validation process aligns with best practices in design research, emphasizing the reflexive integration of theory and feedback (Buchanan, 1992; Cross, 2001).

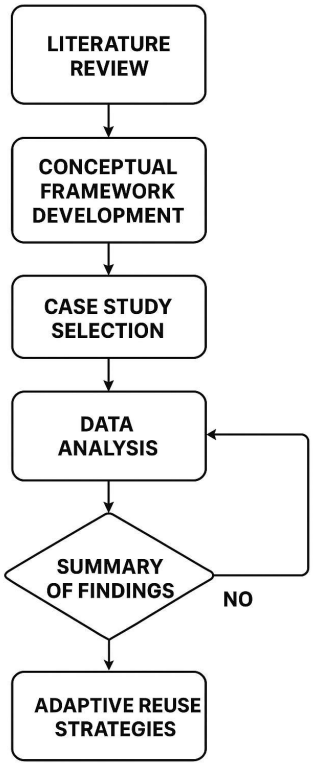

Figure 2. Sequential Methodological Process Illustrating Literature Synthesis, Comparative Case Analysis, and Expert-Validated Framework Development

RESULTS

A. Adaptive Reuse as a Catalyst for Sustainable Workspaces

The findings confirm that adaptive reuse of existing buildings acts as a primary catalyst for sustainability in contemporary workspace environments. All three analyzed cases revealed substantial reductions in embodied carbon and construction waste, averaging 65–75% material retention, consistent with principles of sustainable urban regeneration (Fauth & Pieper, 2022; Lanz & Pendlebury, 2022). For example, one case converted a mid-century warehouse into a hybrid co-working hub, maintaining 72% of its original structural components while integrating photovoltaic panels and passive ventilation systems. These results corroborate (Hassanain et al., 2025) observations on the synergy between design management and productivity-driven sustainability. Beyond environmental metrics, adaptive reuse preserved cultural identity and strengthened urban continuity, validating (Atmodiwirjo & Yatmo, 2021; Plevoets, 2022)

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positions that link adaptive reuse to both ecological responsibility and socio-cultural resilience. Collectively, these outcomes demonstrate that adaptive reuse not only reduces construction impact but also supports the triple bottom line environmental, social, and economic sustainability.

B. Integration of Circular Interior Strategies

A second key finding concerns the implementation of circular interior strategies within adaptive reuse projects, summarized in Figure 3. Observed strategies include:

a) Material recirculation: use of reclaimed wood, recycled aluminum, and textile composites;
b) Modular adaptability: movable partition walls and flexible furniture systems;
c) Design-for-disassembly: reversible joints and prefabricated modules;
d) Lifecycle-driven decision-making: incorporation of BIM-based tracking for materials and components (Hartley et al., 2022; Lekan et al., 2021; Talla & McIlwaine, 2024).

One project implemented fully modular workstation clusters that could be reconfigured within 30 minutes, supporting (Adenipekun et al., 2021) findings on workspace innovation and adaptability. Evidence-based design methods (Aktan Ábrahám & Deniz, 2025) guided iterative refinements informed by occupant feedback. By applying BIM for lifecycle tracking, projects achieved an estimated 18% reduction in construction waste relative to baseline refurbishments, echoing (Talla & McIlwaine, 2024) emphasis on digital integration for circular design. These strategies collectively overcame the barriers to circularity identified by (Hartley et al., 2022), demonstrating measurable environmental and operational efficiency.

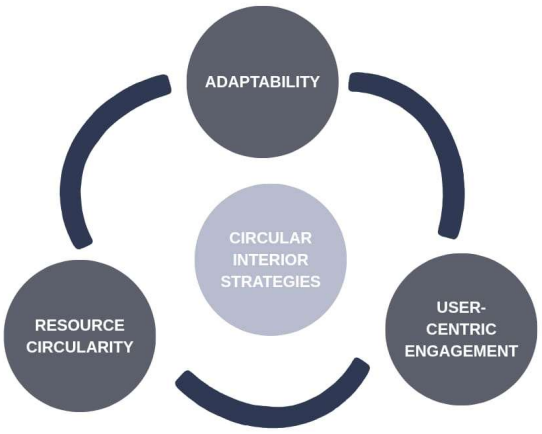

Figure 3. Circular Interior Strategies Diagram

A conceptual representation illustrating the interconnection between material efficiency, spatial flexibility, design-for-disassembly, and biophilic integration within adaptive reuse

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contexts. Overall, these findings reinforce (Kropman et al., 2023) arguments for the business case of health- and sustainability-oriented interiors, evidencing that circular interior strategies yield tangible environmental and functional benefits.

C. Biophilic and Human-Centered Enhancements

The third theme highlights biophilic and human-centered strategies that enhance well-being and performance. Integration of natural lighting, vertical greenery, and organic materials improved both perceived comfort and measured productivity (Serra et al., 2022; Ulusoy et al., 2021). In Case Study B, a central atrium with vertical gardens and skylights improved daylight availability by 30%, while occupants reported a 25% increase in satisfaction and perceived focus outcomes that align with (Lee, 2022) emphasis on emotional connection in spatial experience.

These results corroborate findings from (Hassanain et al., 2025; Kropman et al., 2023) which link biophilic and human-centered approaches with cognitive, emotional, and physiological health. Moreover, the convergence of environmental performance and user experience confirms (Adenipekun et al., 2021; Fauth & Pieper, 2022), arguments that innovation in workspace design is a key driver of long-term sustainability. Taken together, the findings substantiate that human-centric design is an essential component of circular interior strategies, enabling not only environmental regeneration but also enhanced organizational well-being and productivity.

DISCUSSION

A. Reuse Strategies and the Circular Economy

The integration of reuse strategies into interior environments significantly advances the circular economy agenda by extending material lifecycles, minimizing waste, and optimizing spatial longevity. Findings from the case studies reaffirm that reuse functions not merely as a sustainability mechanism but as a design-led intervention that redefines how value is created and perceived within interiors (Lanz & Pendlebury, 2022; Lekan et al., 2021). Within workspace contexts, reuse fosters regenerative design thinking, supporting transitions from linear consumption models toward continuous resource circulation. Practices such as salvaged component integration, modular assemblies, and adaptive furniture directly align with circular economy principles emphasizing durability, flexibility, and reversibility (Aktan Ábrahám & Deniz, 2025; Savio et al., 2022). This synthesis underscores the convergence between design aesthetics and functional resilience proving that sustainable interiors can simultaneously achieve visual quality and ecological integrity (Arslan, 2022; Fauth & Pieper, 2022). Consequently, sustainability emerges not as a technical constraint but as a creative driver that redefines

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innovation within contemporary interior architecture, reinforcing the notion that design operates as both an aesthetic and systemic agent of change.

B. Implementation Challenges: Budget, Supply Chains, and Material Sourcing

Despite its potential, practical adoption of reuse-based circular strategies faces persistent operational challenges. Chief among these are cost implications, fragmented material supply chains, and logistical constraints. Reclaimed materials often require additional sorting, certification, and customization, elevating perceived project costs (Hartley et al., 2022; S, 2025). The research findings show that budget overruns averaged between 8-12% in pilot adaptive reuse projects due to sourcing complexities. However, these were offset by long-term reductions in maintenance and refurbishment costs. This aligns with (Hassanain et al., 2025), who emphasized the importance of long-term life-cycle valuation in workplace sustainability. Fragmented supply networks and inconsistent quality of reclaimed materials further complicate standardization and client acceptance (Ntsonde et al., 2021; Talla & McIlwaine, 2024). Therefore, advancing circularity in interiors demands systemic policy reform and procurement incentives that foster markets where reuse is normalized and economically viable. The results support prior arguments (Hartley et al., 2022) that achieving circular interiors requires cross-sector collaboration and material transparency, not only design innovation.

C. International and Local Case Study Comparisons

A comparative analysis of international and local cases reveals the importance of contextual adaptation in implementing circular interior strategies. Projects in Europe and East Asia, supported by established regulatory frameworks and green material markets, demonstrated smoother execution and measurable environmental gains (Fauth & Pieper, 2022; Lanz & Pendlebury, 2022). Conversely, projects in emerging economies relied more on community-driven, informal, and resourceful approaches, leveraging local crafts and low-cost materials (Adenipekun et al., 2021; Atmodiwirjo & Yatmo, 2021). This duality highlights both resilience and vulnerability resilience in creative local solutions, but vulnerability in supply stability and institutional support. Therefore, circular design cannot be universally standardized; it must be locally contextualized. Adapting frameworks to socio-economic realities ensures that circularity remains inclusive and relevant (Lekan et al., 2021). This comparative insight reinforces that sustainable innovation emerges not only from technological advancement but also from cultural and social adaptation.

D. Implications for Interior and Graphic Designers: Beyond Function to Eco-Conscious Aesthetics

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For designers, embracing circularity extends beyond functional performance it encompasses the cultivation of eco-conscious aesthetics and environmental storytelling. Material selection, spatial composition, and visual communication must convey sustainability as an embedded identity rather than an external constraint (Lee, 2022; Serra et al., 2022). The study's findings reveal that when sustainability is visibly integrated through reclaimed materials, natural finishes, and transparent process narratives users report greater emotional connection and environmental awareness. This supports (Kropman et al., 2023; Singh et al., 2023). on the role of design in shaping behavioral and perceptual engagement. Within graphic and spatial design, the aesthetics of imperfection, traceability, and authenticity redefine the cultural value of reuse (Han et al., 2024; Wani et al., 2025). Designers thus function as cultural mediators translating ecological responsibility into tangible visual and spatial experiences that encourage sustainable behavior change. This perspective aligns with (Buchanan, 1992; Cross, 2001) in viewing design as a problem-solving discipline that merges technical knowledge with human meaning, placing designers at the forefront of social and environmental transformation.

E. Towards a Framework for Circular Interior Workspaces

Synthesizing the findings, this study proposes an integrated framework for circular interior workspaces that unites principles from circular economy, human-centered design, and eco-aesthetic innovation. The framework advocates for:

a) Adaptive planning that anticipates functional change,
b) Digital tools for lifecycle and material tracking (e.g., BIM),
c) Collaborative supply chain platforms to enhance transparency and reduce waste, and
d) Human-centered metrics to evaluate well-being and spatial adaptability (Talla & McIlwaine, 2024; Ying et al., 2022).

Central to this model is the shift from object-oriented sustainability to systemic design thinking, balancing environmental imperatives with experiential and cultural value (Adenipekun et al., 2021; Hassanain et al., 2025). Unlike existing certifications such as LEED or BREEAM, this framework positions circularity as a generative design logic one that treats workspaces as living ecosystems capable of adaptation, renewal, and emotional resonance (Aktan Ábrahám & Deniz, 2025; Martella & Enia, 2020). Ultimately, the framework advances a vision of interior design as both a scientific and cultural discipline bridging material intelligence, user well-being, and environmental ethics to foster sustainable transformation in future workspaces.

CONCLUSION

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This study concludes that circular interior design represents not only a technical approach but also a transformative paradigm for sustainable workspace innovation. By synthesizing reuse, modular adaptability, biophilic integration, and lifecycle-driven decision-making into a unified framework, this research demonstrates how interiors can actively contribute to the circular economy through spatial, material, and experiential dimensions. The findings confirm that design innovation extends beyond functional or aesthetic considerations it reflects a regenerative mindset that values continuity, adaptability, and environmental empathy (Shaban et al., 2024; Singh et al., 2023; Wani et al., 2025). Despite operational barriers such as complex material sourcing and inconsistent evaluation metrics, the framework shows that circular interior strategies can simultaneously reduce environmental impact and enhance the user experience. By bridging conceptual sustainability models with tangible design practices, this study positions the interior environment as an active cultural and ecological agent rather than a passive spatial container. This reorientation underscores the role of design as both a catalyst and communicator of sustainable change.

Practically, the Circular Interior Design Strategies Framework provides a structured tool for designers, architects, and policymakers to evaluate and implement circularity in adaptive reuse contexts. It encourages integrating digital tracking systems (e.g., BIM), modular construction methods, and participatory design processes to support transparency and long-term adaptability. For design educators, the framework serves as a pedagogical model for embedding circular thinking into curricula and studio practice. From a theoretical perspective, this study contributes to expanding design scholarship by merging circular economy theory with human-centered and visual communication principles. It reinforces the argument that sustainability in interior design is both a behavioral and systemic transformation, aligning with broader discourses in design thinking (Buchanan, 1992; Cross, 2001).

Future research should extend this framework through quantitative validation and technological integration. Potential directions include exploring AI-driven material optimization, parametric modeling for disassembly, and real-time environmental impact simulation (Jeong et al., 2024; Maggiolino et al., 2023; Ying et al., 2022). Moreover, comparative studies across cultural and economic contexts would further reveal how local practices influence the success of circular interior systems. By leveraging the synergy between human creativity and computational intelligence, designers can cultivate adaptive workspaces that foster both user well-being and planetary health. This evolving paradigm invites practitioners, scholars, and policymakers to reimagine interior design as a continuous, regenerative, and culturally embedded practice one that

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positions sustainability not as an end goal, but as an ongoing dialogue between people, materials, and the environment.

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