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Editorial Article

Converging Perspectives: Human Experience, Digital Innovation, and Professional Pathways Toward Sustainable Built Environments

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Abstract

This editorial introduces 2026–01 issue of ABC2, offering five research contributions that collectively offer insights for understanding sustainable transitions in architecture, building, construction, and cities. The issue bridges human-centered approaches with technological innovation, examining how cognitive science informs urban density management, how fuzzy-based methods assess green building performance, what barriers constrain 3D printing adoption in developing economies, how theory-informed frameworks enable construction exoskeleton implementation, and how quantity surveying practice evolves to incorporate embodied carbon accounting. Drawing on theoretical frameworks from Salama's work on perceptual approaches and transformative pedagogy, alongside Rahimian's research on digital construction transformation and socio-technical innovation systems, the editorial argues that sustainable futures emerge through convergence rather than technical determinism alone. Seven cross-cutting themes are identified, including perception-performance relationships, socio-technical innovation pathways, professional role evolution, evaluation-based improvement, contextual appropriateness, workforce-centered approaches, and interdisciplinary synthesis. The contributions demonstrate that innovation becomes embedded in practice when organisational capacity, workforce competencies, institutional frameworks, and user acceptance align with technical capabilities. This integrative perspective positions ABC2 to support scholarship that refuses artificial boundaries between disciplines, between theory and practice, between technological possibility and human experience, and ultimately advancing built environments that serve human flourishing and ecological integrity.

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Highlights

- Cognitive and socio-technical frameworks integrate perception, organisational capacity, and technological innovation.
- Technology adoption requires supportive ecosystems beyond technical capabilities for successful implementation
- Sustainability imperatives transform professional roles, demanding carbon literacy and interdisciplinary curriculum reformABC2 as an integrated platform bridging architecture, building, construction, and cities.

1 Beyond Technical Determinism

The first issue of ABC2 for 2026 advances the journal's commitment to interdisciplinary scholarship that bridges technological innovation, human experience, and environmental sustainability. Contemporary challenges in architecture, building, construction, and cities demand analytical frameworks that transcend disciplinary boundaries and acknowledge the complex interplay between physical infrastructure, social perception, and organisational capacity. As Salama and Wiedmann (2013) argue, sustainable urbanism requires attention to measurable physical parameters alongside the intangible dimensions of human-environment interaction, including the meanings, feelings, and perceptions that shape how populations experience built environments. Similarly, Pour Rahimian et al. (2021) demonstrate that digital transformation in construction encompasses technological adoption together with organisational learning, workforce adaptation, and fundamental reconceptualization of design and delivery processes.

This issue presents five research contributions that collectively illuminate how sustainable transitions emerge through convergence: between perception and performance, innovation and implementation, human factors and technical systems, cost optimisation and carbon reduction. Drawing on theoretical frameworks from cognitive science, socio-technical analysis, digital construction transformation, and professional role theory, these papers advance understanding of how built environment professions navigate complexity while pursuing sustainability, resilience, and social value.

2 Theoretical Underpinnings: Perception, Experience, and Innovation

Understanding how built environments function requires frameworks that integrate subjective experience with objective measurement. Salama's extensive work on perceptual approaches to urban environments (Salama and Gharib, 2012; Salama et al., 2013) demonstrates that spatial quality encompasses multiple dimensions beyond physical characteristics. Urban spaces are perceived differently based on user characteristics, cultural background, and patterns of inhabitation. This perceptual dimension—what Lefebvre conceptualises as "lived space"—represents the experiential reality through which design intentions are mediated, contested, and ultimately validated or rejected through user experience (Salama and Wiedmann, 2013).

Post-occupancy evaluation (POE) and building performance evaluation (BPE) methodologies provide systematic approaches to capturing this lived dimension of architecture and urbanism (Preiser et al., 2014). These methods enable evidence-based design culture where user feedback informs ongoing adaptation and future decision-making. As Salama (2019) articulates in his methodological framework for architectural research, systematic inquiry into human-environment interactions requires philosophical clarity about ontology, epistemology, and methods, distinguishing between what exists, what can be known, and how knowledge should be constructed.

Parallel theoretical developments in digital construction emphasise that technological innovation follows social and organisational pathways alongside technical dimensions. Pour Rahimian et al.'s (2021) and research on Industry 4.0 and Construction 5.0 positions Building Information Modelling, digital twins, artificial intelligence, and blockchain technologies as enablers of systemic transformation integrated within broader organisational change. The socio-technical perspective recognises that innovation adoption depends on organisational capacity, workforce competencies, collaborative frameworks, and cultural readiness (Pour Rahimian et al., 2014; Sheikhkhoshkar et al., 2019; Elghaish et al., (2023). Technology becomes transformative when embedded within supportive institutional arrangements and professional practices that facilitate learning, experimentation, and scaled implementation.

3 Reflections on the Contributions to ABC2, 2026 – 01

The five papers operationalise theoretical frameworks discussed above, demonstrating how cognitive science, socio-technical analysis, and professional development research generate actionable insights for practice. Each contribution addresses distinct challenges while collectively revealing that sustainable transitions require integration of human factors, organisational capacity, technological innovation, and contextual understanding across architecture, building, construction, and cities.

3.1 Cognitive Science Frameworks for Urban Density Management

Patil (2026) opens the issue with a rigorous examination of how cognitive science can inform urban density management through visual field thresholds and environmental quality elements. This contribution represents a significant theoretical advancement in understanding human perception of urban density; this is a topic of increasing urgency as cities pursue compact urban forms to achieve sustainability goals while maintaining liveability and human well-being.

The research develops a cognitive science framework that operationalises visual field thresholds—the perceptual boundaries within which environmental stimuli can be effectively processed and integrated. Through identifying specific environmental quality elements that influence density perception, Patil provides empirically grounded guidance for urban designers and planners seeking to optimise density without overwhelming human perceptual capacities. The framework bridges neuroscience, environmental psychology, and urban design practice, demonstrating how interdisciplinary synthesis can generate actionable insights for built environment professions.

This work resonates strongly with Salama's sustained engagement with perceptual approaches to urban quality assessment (Salama and Gharib, 2012; Salama et al., 2013). Salama's research emphasises socio-cultural dimensions of perception and how different demographic groups experience urban spaces based on cultural background, age, and patterns of use. Patil extends this inquiry into cognitive mechanisms underlying spatial perception. Together, these complementary perspectives suggest that effective density management requires integration of universal cognitive constraints with culturally specific experiential dimensions.

The implications extend to architectural pedagogy and professional practice. As Salama (2015) argues in his work on transformative pedagogy, design education must cultivate capacities for evidence-based decision-making that integrates scientific understanding with creative exploration. Patil's cognitive framework exemplifies how systematic inquiry into human perception can inform design processes, suggesting that curricula should incorporate cognitive science alongside traditional design disciplines to equip practitioners with conceptual tools for human-centred urbanism.

3.2 Comprehensive Evaluation of Green Building Performance

Mohandes, Singh, Agyekum, and Zayed (2026) contribute a meticulous SWOT analysis of green buildings using fuzzy-based approaches, addressing critical questions about whether the construction industry possesses adequate knowledge of green building performance across multiple dimensions. Through systematic analysis of strengths, weaknesses, opportunities, and threats, the research reveals nuanced patterns in how green buildings perform relative to conventional construction.

The fuzzy-based methodology acknowledges inherent uncertainty in performance assessment, recognizing that green building outcomes depend on contextual factors including climate, occupant behaviour, maintenance practices, and management capabilities. Through incorporating fuzzy logic, encompassing mathematical frameworks for reasoning under uncertainty, the analysis generates insights that accommodate complexity and variability. Findings indicate that green buildings demonstrate clear environmental benefits and often achieve operational cost savings, while performance gaps persist related to initial cost premiums, complexity of integrated systems, and requirements for specialised expertise in design, construction, and operation.

This contribution connects to broader discussions about evidence-based design and post-occupancy evaluation (Preiser et al., 2014). Green building rating systems, such as LEED, BREEAM, Green Star, establish performance targets, yet systematic evaluation of achieved outcomes remains essential for continuous improvement. Evaluation research serves as mechanism for critical inquiry and knowledge construction (Salama, 2012), enabling professions to learn from successes and failures while refining design approaches and implementation strategies.

The research also illuminates tensions between certification achievement and actual performance. Buildings may satisfy rating system criteria while underperforming user expectations or environmental targets, suggesting that metrics must evolve to capture outcomes alongside inputs and design intentions. This finding aligns with arguments about the limitations of technocratic approaches to sustainability (Salama and Wiedmann, 2013), reinforcing that green buildings succeed when they integrate environmental performance with experiential quality and organisational capacity for effective operation.

3.3 Barriers to 3D Printing Adoption in Nigerian Construction

Rimtip, Olatunbosun, and Ebiloma (2026) investigate key barriers to 3D printing technology adoption for sustainable project delivery in Nigeria, providing critical insights into how contextual factors shape innovation diffusion in construction. 3D printing promises transformative benefits, including reduced material waste, accelerated construction timelines, geometric flexibility, and potential for localised production using indigenous materials. Yet, adoption remains limited, particularly in developing economies where needs are often most acute.

Through empirical investigation combining surveys and case study analysis, the research identifies multifaceted barriers spanning technical, economic, regulatory, and socio-cultural dimensions. Technical barriers include limited availability of suitable printing materials, challenges in achieving structural integrity for load-bearing applications, and requirements for specialised expertise in design for additive manufacturing. Economic barriers encompass high initial capital investment, uncertain lifecycle costs, and limited access to financing for innovative construction technologies. Regulatory barriers reflect absence of codes and standards specifically addressing 3D-printed construction, creating legal uncertainty and limiting insurer willingness to cover projects. Socio-cultural barriers include scepticism about durability and safety among potential clients, resistance from construction workers concerned about job displacement, and limited awareness among design professionals about 3D printing capabilities and constraints.

These findings resonate with Pour Rahimian et al.'s (2021) socio-technical perspective on construction innovation. Technology adoption requires technical capability alongside supportive ecosystems, including regulatory frameworks that accommodate innovation, financing mechanisms that manage risk, training programs that build workforce capacity, and demonstration projects that generate evidence and build confidence. The research underscores that sustainable project delivery depends on appropriateness of technologies to local contexts, accounting for economic and institutional environments.

The Nigerian case illuminates broader challenges facing construction innovation in developing economies, where rapid urbanisation creates urgent needs for expanded housing and infrastructure while resource constraints and institutional limitations complicate technology adoption. The research suggests that innovation strategies must prioritise technologies compatible with local materials, skills, and regulatory capacities while building institutional infrastructure, including standards, training, financing, to support scaled implementation. This contextualist perspective aligns with arguments about decolonised architectural pedagogies (Harriss et al., 2022), recognizing that sustainable development pathways must emerge from local conditions through contextually appropriate processes.

3.4 Theory-Informed Framework for Construction Exoskeletons

Gonsalves, Akanmu, Agee, and Shojaei (2026) develop a theory-informed framework for implementing passive back-support exoskeletons in construction, addressing persistent challenges of musculoskeletal injuries and physical strain affecting construction workers. Despite evidence that exoskeletons can reduce physical demands of manual tasks, adoption remains limited due to concerns about comfort, mobility constraints, compatibility with personal protective equipment, and worker acceptance.

The research employs theoretical frameworks from ergonomics, human factors engineering, and technology acceptance to develop implementation guidelines addressing technical, organisational, and human dimensions. Through biomechanical analysis and worker feedback studies, the framework identifies task categories where exoskeletons provide greatest benefit. Repetitive lifting sustained awkward postures, overhead work, while acknowledging activities where mobility restrictions outweigh assistance benefits. Organisational guidelines address training requirements, maintenance protocols, and strategies for building worker trust and acceptance. The theory-informed approach ensures that implementation considers biomechanical assistance alongside psychosocial factors influencing technology adoption.

This contribution exemplifies workforce-centred innovation, recognizing that construction workers deserve technologies that enhance their work capabilities (Salama and Courtney, 2013). Just as workplace environmental quality influences job satisfaction and productivity among knowledge workers, construction site conditions shape workforce health, safety, and long-term employability. Technologies that reduce physical strain and injury risk contribute directly to sustainable construction systems through supporting workforce well-being and retention.

The research also connects to broader discussions about Construction 4.0 and human-technology collaboration (Pour Rahimian et al., 2021; Elghaish et al., 2023). While much attention focuses on automation and robotics potentially replacing human labour, exoskeletons represent augmentation technologies that enhance human capabilities. This distinction matters for equitable transitions, suggesting pathways where technological advancement supports workers. The framework's emphasis on worker acceptance and participatory implementation processes aligns with socio-technical perspectives recognizing that successful innovation requires stakeholder engagement and user-centred design.

3.5 Professional Role Evolution: Quantity Surveyors and Embodied Carbon

Ghansah, Jesuorobo, Edwards, and Young (2026) examine integration of embodied carbon accounting into quantity surveying practice, addressing critical gaps in how construction professions respond to climate imperatives. While operational carbon has received substantial attention through energy codes and green building rating systems, embodied carbon, emissions associated with material extraction, manufacturing, transportation, construction, and end-of-life, accounts for increasing proportions of buildings' total carbon footprints, particularly for highly insulated, low-operational-energy structures.

The research investigates how quantity surveyors, as professionals traditionally responsible for cost estimation, value management, and procurement advice, can incorporate embodied carbon assessment into their core competencies. Through interviews with practitioners and analysis of recent project experiences, the study reveals tensions between established professional identities focused on cost optimisation and emerging expectations for carbon literacy and lifecycle thinking. Many quantity surveyors recognise importance of embodied carbon yet lack training in assessment methodologies, access to reliable emissions databases, and institutional support for integrated cost-carbon analysis.

The research proposes a professional development framework equipping quantity surveyors with capabilities for whole-life carbon assessment, carbon-cost trade-off analysis, and procurement strategies favouring low-carbon materials and construction methods. Through positioning embodied carbon as fundamental competency, the framework challenges conventional separation between cost management and environmental performance, arguing that sustainable project delivery requires professionals capable of simultaneous optimisation across multiple objectives.

This contribution resonates with Salama's arguments about evolving professional roles and architecture's relationship to society (Salama, 2021). As environmental imperatives intensify, professional identities must expand to encompass interdisciplinary collaboration, systems thinking, and evidence-based decision-making integrating performance criteria across environmental, economic, and social dimensions. The research suggests that professional bodies, educational institutions, and industry leaders must collaborate to embed carbon literacy within core curricula and continuing professional development, ensuring that emerging practitioners enter the workforce equipped for complexity and uncertainty characterizing contemporary practice.

The findings also connect to discussions about digital transformation in construction (Pour Rahimian et al., 2021; Seyedzadeh and Pour Rahimian, 2021). BIM platforms increasingly incorporate lifecycle assessment tools enabling automated embodied carbon quantification linked to material specifications and construction sequencing. However, technology requires professional accompaniment and the conceptual understanding of carbon accounting principles, critical judgment about data quality and assumptions, and communication skills for engaging clients and stakeholders. The research underscores that digital tools enable professional expertise, supporting complex decision-making requiring contextual interpretation and value judgments.

4 Convergence as Pathway to Sustainable Futures

Collectively, these five contributions illuminate how sustainable transitions in architecture, building, construction, and cities emerge through convergence rather than technical determinism. Several cross-cutting themes merit emphasis.

- *First*, perception and performance exist in dynamic relationship. Built environments succeed or fail not only through technical function but through experiential quality and social recognition of value. Patil (2026) demonstrates that urban density management requires understanding of cognitive constraints on spatial perception. Mohandes et al. (2026) reveal that green building performance depends partly on occupant acceptance and behaviour. Theoretical frameworks integrating Lefebvre's spatial triad with evidence-based design methodologies (Salama, 2019; Preiser et al., 2014) provide conceptual tools for bridging these dimensions.
- *Second*, innovation adoption follows socio-technical pathways requiring organisational capacity, workforce competencies, and institutional support. Rimtip et al. (2026) document multifaceted barriers to 3D printing adoption in Nigeria, demonstrating that technology transfer requires supportive ecosystems. Gonsalves et al. (2026) develop implementation frameworks acknowledging that exoskeleton adoption depends on worker acceptance alongside biomechanical effectiveness. Digital technologies, such as BIM, AI, digital twins, enable transformative capabilities, yet only when embedded within collaborative frameworks, learning cultures, and practice models that facilitate experimentation and scaled implementation (Pour Rahimian et al., 2021).
- *Third*, professional roles evolve in response to sustainability imperatives, challenging conventional boundaries and demanding new competencies. Ghansah et al. (2026) examine how quantity surveyors must integrate embodied carbon assessment into cost management practice. Embodied carbon assessment, lifecycle thinking, digital fluency, and systems analysis represent fundamental rather than specialised capabilities, necessitating curriculum reform and continuing professional development preparing practitioners for complexity, uncertainty, and interdisciplinary collaboration (Salama, 2015).

- *Fourth*, evaluation and evidence generation prove essential for continuous improvement. Mohandes et al.'s (2026) SWOT analysis exemplifies systematic performance assessment enabling learning from successes and shortcomings. Gonsalves et al. (2026) emphasise worker feedback in exoskeleton implementation. As Salama (2012) argues, evaluation research serves as mechanism for critical inquiry and knowledge construction, enabling professions to refine approaches while building evidence bases supporting innovation adoption.
- *Fifth*, context matters profoundly for sustainable transitions. Rimtip et al. (2026) demonstrate that innovation strategies must account for local materials, skills, regulatory capacities, and economic conditions. What proves appropriate in one context may fail in another, suggesting that sustainable development pathways must emerge from contextual understanding rather than imposed through uncritical technology transfer. This recognition aligns with arguments about decolonised pedagogies and practice models responsive to diverse global contexts rather than dominated through Western frameworks alone (Harriss et al., 2022).
- *Sixth*, workforce-centred innovation warrants explicit recognition within sustainability agendas. Gonsalves et al. (2026) demonstrate that technologies supporting worker health and safety contribute directly to resilient construction systems. Just as user-centred design improves building performance (Salama and Courtney, 2013), workforce-centred innovation strengthens construction industry capacity for continuous improvement and sustainable practice. Technologies that augment rather than displace human capabilities offer pathways for equitable transitions where workers benefit from rather than suffer through technological change.
- *Seventh*, interdisciplinary synthesis generates actionable insights exceeding contributions of isolated disciplines. Patil's (2026) cognitive framework bridges neuroscience and urban design. Mohandes et al. (2026) combine SWOT methodology with fuzzy logic. Ghansah et al. (2026) integrate cost management with carbon accounting. These examples illustrate that contemporary challenges require conceptual frameworks transcending traditional disciplinary boundaries, demanding professionals capable of navigating complexity through integration rather than specialisation alone.

5 Integrative Scholarship for Transformative Practice

This 2026 issue of ABC2 reinforces the journal's commitment to advancing research that bridges theory and practice across architecture, building, construction, and cities. Emphasizing human, organisational, and professional dimensions of sustainability, the contributions provide critical insights into how innovation becomes embedded within real-world contexts rather than remaining theoretical possibility or pilot-scale demonstration.

The five papers in this issue exemplify convergence between intellectual traditions: Patil (2026) integrates cognitive science with urban design; Mohandes et al. (2026) combine performance evaluation with fuzzy methodology; Rimtip et al. (2026) examine socio-technical barriers to innovation; Gonsalves et al. (2026) develop theory-informed implementation frameworks; Ghansah et al. (2026) investigate professional role evolution responding to sustainability imperatives. These contributions demonstrate that sustainable transitions emerge when human-centred approaches combine with technological capabilities, when perceptual research informs performance evaluation, when pedagogical innovation enables professional development.

This issue continues to articulate foundations for scholarly discourse that refuses to separate technical innovation from human experience, professional practice from social responsibility, or environmental performance from experiential quality. The journal remains committed to research that matters. This is best exemplified this way: scholarship informing practice, challenging assumptions, generating evidence, and ultimately contributing to built environments serving human flourishing and ecological integrity.

As cities and construction industries confront interconnected challenges of unprecedented scale and urgency, the need for rigorous, integrative, and engaged scholarship intensifies. Climate disruption, resource scarcity, biodiversity collapse, social inequality, and rapid urbanisation demand responses that transcend disciplinary boundaries and conventional practice patterns. ABC2 provides a forum for research illuminating pathways forward—research grounded in evidence, informed through theory, responsive to context, and committed to transformation.

We invite the global community of researchers, practitioners, educators, and policymakers to engage with this issue's contributions, to identify connections with ongoing work, and to contribute scholarship advancing understanding of architecture, building, construction, and cities. Through sustained dialogue, methodological rigor, and commitment to meaningful inquiry, ABC2 will continue supporting research that shapes more sustainable, equitable, and resilient built environment futures. The convergence of perception and performance, innovation and implementation, human experience and technical capability, offers pathways toward built environments worthy of the complex challenges and possibilities characterizing our era.

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