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Editorial: Digitalizing and greening the built environment

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Editorial on the Research Topic
Digitalizing and Greening the Built Environment

Background

The rapid urbanization and industrialization of cities, carbon emissions and global warming and increasing expectations from clients and governments have led to calls to innovate and imbibe the green culture in delivering projects. Several building sustainability assessment systems have been developed in practice, such as LEED, BREEAM, BSAM Scheme, Green Mark, and other regional industry standards, to encourage the reduction of greenhouse emissions associated with the construction sector. Also, digital technologies such as BIM (Wong & Kuan, 2014), blockchain technology (Olawumi et al., 2022), artificial intelligence and machine learning (Yang et al., 2021), smart sensors and wearables (Nath et al., 2017), big data, internet of things, laser scanning, and drones are being deployed to help deliver better construction and infrastructure projects that could exceed owners and occupants' satisfaction with fewer carbon footprints. Although these research developments are augmenting, there are still some knowledge gaps that need to be considered and filled up—some of which have been addressed in this Research Topic.

Major highlights of articles' contributions

This Research Topic's contributions addressed key issues related to the digitalizing and greening the built environment. One article each focused especially on sustainability and smart city technologies. At the same time, the other two papers experimented with the application of digital tools to enhance green practices. For instance, Ekhaese and Hussain explored the social and environmental constructs of greening the built environment. The paper contributed by investigating the effect of some psychosocial wellbeing (PW) parameters on the level of happiness in a green community and neighbourhood using interviews with 50 participants, focus group discussions, and observational methods. The identified PW domains align with the hierarchy of needs theory posited by Abraham Maslow (Mathes, 1981). These include: (i) the psychological and biological needs mostly related to warmth, shelter, food, and air; (ii) physical needs which comprise safety, employment, health, and stability; (iii) social needs; (iv) esteem/emotional needs; (v) cognitive domains such as the need to know and comprehend; (vi) aesthetic needs including the pursuit of beauty and form; (vii) intellectual needs; and (viii) self-transcendence domain.

Apart from identifying these 8 PW domains, the authors cross-linked them with relevant residential-happiness provisions, which stakeholders can translate into real-life infrastructural and building projects to foster green neighbourliness. More so, by integrating the features of a green neighbourhood with the PW domains along with support for the residents, the occupants will be able to connect with the relevant green assets and facilities in their community. Hence, there is appreciable health and better wellbeing for the residents. Other findings of the paper include the production of a green neighbourhood checklist and analyzing its effects on occupant happiness.

The concept of smart cities and their actual realization is one of the hot topics in the extant literature in recent years (Anthopoulos, 2017; Olawumi et al., 2021). In this line, Omotayo et al. examined the possibility of scaling smart campus technologies and contracting models for the actualization of smart cities. With an emphasis on using smart campuses as "living labs" for smart city development, the paper used a mix of interviews and causal loop diagrams to establish the interrelationships between smart cities and campus technological initiatives. Based on the study's analysis, the authors presented some salient themes associated with smart campus infrastructure; procurement, contracting, and construction; and the success factors affecting its scalability and the micro-transfer of smart campus technologies to cities. The development of system archetypes in the study evidenced the practical implementation of smart cities.

The use of technological tools during the construction phase has been promoted by researchers and major consultancy firms alike. The benefits range from improving productivity and efficiency, work process automation (Olawumi & Chan, 2022), data management, real-time monitoring and visualization (Yu et al., 2017), and site safety. In this view, Lawani et al. developed an interactive and adaptive drone game to identify safety hazards in a virtual construction site. The single-user game was built using the Unity game engine for WebGL, which makes for its smooth rendering on web browsers. Using validation tests such as cognitive design and usability tests—the interactive drone system was found useful for practical implementation with few refinements suggested. Also, it is useful as an educational and awareness training tool for project stakeholders such as safety managers, construction managers, and site supervisors.

Moreover, an article by Al Qassimi and Jung experimented with the impact of three selected plants on purifying the indoor air in a hot desert climate. The key focus was reducing the volatile organic compounds (VOCs) and formaldehyde using two real-world laboratory spaces in Dubai as a case study. It is important to note that the room space with more planting volume has lower air impurities; this increases especially in the summer when the concentration of VOCs and formaldehyde are higher in the atmosphere. The three plants used for the air purification experiments include *Pachira aquatica*, *Ficus benjamina*, and *Aglaonema commutatum.* AutoCAD was used in calculating the leaf area of the three species of the plants, and the same volume of plants was maintained for the plant species in the experiment. Likewise, the interior material type of the experimental spaces. The authors reiterated that the use of indoor air-purifying plants (IAP) could help buildings achieve the LEED indoor environmental quality criteria. Of the three IAP, *Ficus benjamina* was found the most effective.

Summary

It is worth reiterating that the scope of digitalizing and greening the built environment is larger than what was discussed in the articles' contributions in this Research Topic. But it clearly shows the practical benefits, future prospects, and perceived challenges encountered in enhancing the livability of cities and buildings and facilitating better project delivery. Also, these papers published in this Research Topic have advanced the current understanding of the implication of technological innovations and green practices in the construction industry, environment, and society at large.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Acknowledgments

The Research Topic attracted over 14,000 views from around the world as of 30 July 2022. The Research Topic editors appreciate the interest and participation of all the authors who greatly contributed to the Research Topic with their valuable manuscripts. It is anticipated that the findings of the papers will influence and promote the digitalization and greening efforts in building and infrastructure projects in the built environment. The editors also appreciate the invited reviewers and the Frontiers support team in managing the Research Topic.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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