

CHAPTER

4

SMART TECHNOLOGIES FOR ISTANBUL'S URBAN LIVABILITY

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4.1 INTRODUCTION

The rapid advancement of technology, coupled with a growing emphasis on sustainable living, has catalysed a transformative fusion of smart technology and the built environment. Smart or intelligent buildings represent a significant leap towards creating more efficient, responsive, eco-friendly living and working spaces. Smart buildings utilise a network of interconnected devices and systems that collect and analyse data to optimise building operations, enhance occupant comfort, and reduce environmental impact (Mirrahimi et al., 2016). These buildings are equipped with sensors, actuators, and communication technologies that enable real-time monitoring and control of various building functions such as lighting, heating, ventilation, air conditioning (HVAC), security, and energy management.

One of the primary benefits of integrating smart technology into the built environment is the substantial improvement in energy efficiency. These innovations contribute to significant reductions in energy consumption and carbon footprint, aligning with broader sustainability goals. Furthermore, smart buildings enhance the quality of life for occupants through improved comfort, safety, and convenience (De Dear et al., 2002; Agboola et al., 2023). Automated systems can

create optimal indoor environments by maintaining ideal temperature, humidity, and air quality levels. Additionally, smart security systems provide robust protection through real-time surveillance, access control, and emergency response mechanisms (Roth, 2017).

The fusion of smart technology with the built environment also supports the concept of a smart city, where interconnected buildings contribute to a larger, integrated urban ecosystem (Mirrahimi et al., 2016). This ecosystem leverages data to optimise urban planning, traffic management, and public services, ultimately creating a more environmentally friendly and healthy city (De Dear et al., 2002). However, the transition to smart buildings is challenging. Issues such as cybersecurity, data privacy, and the high initial costs of smart technologies must be addressed to ensure widespread adoption (Roth, 2017). Despite these hurdles, the trajectory towards smarter, more sustainable built environments is evident, driven by technological advancements and an unwavering commitment to sustainability (Mirrahimi et al., 2016; Agboola et al., 2023). As this fusion continues to evolve, it promises to reshape our living and working spaces, making them more efficient, comfortable, and environmentally friendly (De Dear et al., 2002).

Roth (2017) described thermal comfort as the condition in which individuals perceive their environment as neither too hot nor too cold. This state of comfort is crucial for maintaining overall well-being, productivity, and satisfaction in residential and workplace settings. Establishing thermal comfort necessitates a precise balance of environmental elements such as air temperature, moisture, ventilation, and radiant heating. These factors must be adjusted dynamically to accommodate the diverse preferences and activities of occupants. Smart living solutions encompass various technologies designed to enhance convenience, efficiency, and sustainability in everyday environments. These include smart lighting, HVAC systems, security systems, and interconnected devices communicating via the internet of things (IoT) (Mirrahimi et al., 2016).

Current trends in smart living emphasise energy efficiency, security, and personalised user experiences (de Dear et al., 2002). Energy-efficient systems automatically adjust to reduce consumption based on real-time data, significantly lowering utility costs and environmental impact (Roth, 2017). Smart security solutions offer advanced monitoring and control features, enhancing safety in homes and public spaces (Mirrahimi et al., 2016). Personalised user experiences are achieved through devices that learn individual preferences, creating more comfortable and intuitive living environments (de Dear et al., 2002). User experience is a critical component in the success of smart living solutions. A seamless and user-friendly interface is necessary for widespread adoption, as complex or unintuitive systems can deter users (Roth, 2017). Ensuring data privacy and security is also paramount, given the sensitive information smart devices handle (Mirrahimi et al., 2016). Design insights highlight the importance of integrating smart technologies into the architectural fabric of spaces. This involves smart devices' functionality, aesthetics, and ergonomics, ensuring they complement the overall design and effectively meet user needs (de Dear et al., 2002).

As smart living continues to evolve, a comprehensive understanding of these aspects will guide the development of more advanced, user-centric, and sustainable solutions, ultimately enhancing the quality of life in our interconnected environments (Roth, 2017). While current research thoroughly investigates the effect of smart technologies on thermal comfort and quality of life within the built environment, only a few investigations have explored the complex factors impacting the implementation and acceptance of these advancements by individuals (Roth, 2017).

This research gap highlights the need for comprehensive investigations into smart living environments' socio-cultural and contextual dimension. Thus, this study considers the interpersonal interactions of consumers that influence their acceptance and use of smart technology for thermal comfort. Recognising these nuanced dynamics is vital for customising smart living options that adapt to people's different needs and preferences, resulting in more accessible, productive, and user-focused smart environments.