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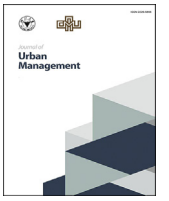

Editorial

Digital technologies in urban planning and urban management

1. Introduction

Over the last decade, there has been growing attention to applying digital technologies in urban planning and management (see Geertman and Stillwell, 2020 for an overview). One of the underpinning reasons for this is the technological development and the global political, social, and economic push toward developing smart cities concepts and applications (Sabri, 2021). Similarly, attention to urban informatics, urban analytics, and city science paradigms is rising. Accordingly, the demand for new skill sets led the higher education institutes to offer new programs for training the next generation of urban planners with capabilities of urban analytics, urban informatics, and city science (see, e.g., Punt et al., 2020). Therefore, there is more appreciation for the practice of urban planning and management of emerging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and Digital Twins (Lin & Benneker, 2022).

In addition, the advancements in digital technologies, including cloud computing, high-performance, and optimized computing systems, as well as customized sensor manufacturing, increased the capability of agencies to collect, store, and process an unprecedented amount of data in very high resolution (Liu et al., 2022). For example, the essential role of cloud computing and digital platforms was acknowledged during the recent pandemic due to the COVID-19 outbreak (Kim et al., 2021). With these advancements in knowledge and technologies, we expect a paradigm shift and improvement in the quality of public services. However, the evidence suggests otherwise, and in many jurisdictions, the planning process is manual, paper-based, and tedious (Daniel & Pettit, 2021). As an example, in the process of decision-making for the development of infrastructure and assessment of building development proposals, there is a lack of data harmonization, which generate inaccurate, complex, and contestable results.

While many ad hoc planning and decision-making processes may not be evidence-based, the role of digital technologies and best practices to support collaborative and inclusive decision-making needs to be further communicated. Therefore, in the wake of uncertainty on the implications of digital technologies and smart city investments for changing urban planning and urban management functions, this special issue aims to enlighten on their implications for urban planners.

Recent literature indicates that the role of digital technologies in the urban planning and management context should be beyond the scope of automated routine functions serving buildings, infrastructures, and people (Sabri et al., 2015; Jiang, 2021). Instead, these technologies should create an integrative and collaborative ecosystem that facilitates a network and stream of continuous information to plan for equity, environmental sustainability, quality of place and life, and efficiency in cities (Sabri et al., 2016).

Many governments, industries, and academia worldwide believe that adopting emerging technologies, including Digital Twins, Artificial Intelligence (AI), Machine Learning, and IoT, can improve the quality of public services and result in community satisfaction and quality of life (ANZLIC, 2019; Dembski et al., 2020; Deren et al., 2021). However, it is unclear which planning processes can be affected and what are the benefits, advantages, risks, and implications of adopting such technologies. Against this background, the present special issue on 'Digital Technologies in Urban Planning and Urban Management' aims to stimulate theoretical discussion on this topic and contribute to a roadmap for the digital transformation of planning that supports quality urban planning and management.

2. Outline of the special issue

The contributions to the special issue are structured as follows. After presenting a holistic overview of the academic debate on digitalization in urban planning and urban management (Mortaheb & Jankowski, 2022), we will highlight different examples of digital applications in urban planning from a planning professional's perspective (Liyanage et al., 2022; Al-Sehrawy et al., 2023), before reflecting on different examples of how such technologies are implemented in the local planning context (Jiang et al., 2022; Sucupira

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Furtado et al., 2023) and what this implies for the role of the planner (Nummi et al., 2022) and leadership (Bastidas et al., 2023).

First, to give a holistic overview of the debate, Mortaheb and Jankowski (2022) highlight the role of GeoAI (Geospatial Artificial Intelligence) in enhancing the efficiency of urban services, improving the quality of urban life, and addressing sustainability and resilience challenges. They suggest integrating IT infrastructure and planning activities to leverage networked computing and interoperable data and analytics would remove the barriers to applying GeoAI in the planning, design, and management of cities. To do so, they offer a schematic overview of how city planning interacts with fields of GIScience, data science, and big data to achieve smart city goals. This schematic overview is illustrated with practical experiences using real empirical cases. They argue that the discipline of (urban) planning should play a more prominent role in the planning, design, and management of smart cities.

Next, from a planning professional's perspective, the special issue indicates that new business models as outcomes of emerging technologies will impact the skillset and code of practice among planning experts. For instance, Liyanage et al. (2022) explain applying AI-based neural network models in the city of Melbourne to forecast public transport demands. This modelling practice requires transportation planners to improve their capabilities using AI and Deep Learning (DL) analytics for scenario-based developments. Their findings show that applying AI outperforms existing forecasting models and leads to passenger demand predictions with over 90% accuracy. In terms of urban management, costs and efficiency of transport operations can be improved, as well as customer satisfaction and sustainability of public transport.

As the example of applying AI and DL in Melbourne shows, technological development is ever-increasing. New technologies, such as Digital Twins, are introduced to the planning society, with significant potential opportunities to improve public services. However, according to Al-Sehrawy et al. (2023), their variety and extent of applications in urban management need further investigation. They point out that however refined Digital Twins could be, they still largely fail to shed light on the underlying worldviews and values of the urban planners that are either developing or using these Digital Twins in their daily practices. This calls for more specific attention to the role of the planner, and the urban context in which digital technologies are applied.

The next contribution of Jiang et al. (2022) is continuing on the point of putting a planner's perspective central in the contextualization of smart city technologies. They argue that given that the adoption of digital technologies in urban planning and management is growing fast, the contextualization of smart city technologies in different jurisdictions is important. Planners and smart city advocates should consider the role of context in the handling of urban issues with the support of digital technologies. Three smart city projects in China, Singapore, and the Netherlands were compared. It was concluded that the difference in sociotechnical and political contexts determine the scale and multiple domain application areas of digital technologies. For smart city strategies to be successful, a close connection between the technology itself and the socio-spatial context in which the technology is embedded is needed. The planner plays a key role in establishing such a connection. Moreover, Sucupira Furtado et al. (2023), examined smart governance and digital government in Brazil. Their findings highlighted the critical role of data literacy, transparency, and commitment to social justice among planners and policymakers to achieve a sustainable smart city.

In line with this, Nummi et al. (2022) emphasize the planning context and planners' requirements to determine the scale and level of sophistication in adopting digital technologies. They argue that the adoption of Information Model (IM)-based planning practices is not only based on the planning outcomes, but also the planners' capabilities, planning legislation, as well as planning practice. Therefore, the contextual elements of organizations, governance, and practice are important determinants for deciding the type and level of digital technologies. They draw on insights from the digitalization of planning processes in Finland to show how factors such as local planning practices, rhetoric, planners' cognitive frames and mindsets, and collaboration between planners are often undervalued for driving the implementation of digital technologies in planning practice.

Finally, in looking forward, Bastidas et al. (2023) explore the topic of leadership for responsible digital innovation in the built environment. From a multi- and inter-disciplinary perspective, they reflect on competencies needed for leaders to create public value in dealing with digital technologies in urban planning. They conclude that comprehensiveness is often lacking in identifying competency requirements. Their suggested framework helps to define multi-faceted competencies in city 'smartification', to discover multidisciplinary strategic and operational leadership roles, and to define tasks in digital innovation processes more clearly.

3. Concluding remarks

In conclusion, this special issue indicates that changing the planning practice and code of conduct in dealing with digital technologies in urban planning and urban management is inevident. City planning is becoming a dominant integration domain in the wider debate on geo-/spatial AI, data science, and big open data. This is reflected in how digital technologies are already transforming urban practices, for instance, through AI-based urban modeling and digital twins. Our contribution point to the urgency of putting the planner more central in the management of such technologies in the urban realm. To sustain professional services and ensure the success of digital technologies applications, attention to the context elements is crucial, together with more in-depth attention to planning culture, planners' cognitive frames, and the role of multi-faceted and multi-disciplinary leadership of digital innovation processes in cities.

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