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Technology at the Heart of Smart Cities: Urban Planning Between Technological Intelligence and Urban Consequences – A Sociological Reading

التكنولوجيا في قلب المدن الذكية: تخطيط المدن بين ذكاء التقنية والتداعيات الحضرية
قراءة سوسيولوجية

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Abstract:

This article examines contemporary urban planning's widespread adoption of digital technologies and artificial intelligence as tools to enhance administrative efficiency and quality of life in smart cities. However, this form of "technical intelligence" is accompanied by growing debate over its urban implications, particularly regarding privacy and the nature of social life in the city. Drawing on a descriptive approach and a critical sociological analysis, the study argues for the need to move beyond techno-utopian visions that reduce urban intelligence to digital infrastructures at the expense of the city's social dimensions. It further underscores the importance of integrating technological intelligence with social and urban intelligence in order to place human experience and urban justice at the core of smart city planning

Keywords: Smart cities; Smart urban planning; Technological intelligence; Social-urban intelligence.

المخلص:

يشهد التخطيط الحضري الحديث تبني واسع للتكنولوجيا والذكاء الاصطناعي بهدف تحسين كفاءة إدارة المدينة وجودة الحياة في المدن الذكية، لكن هذا "الذكاء التقني" يرافقه جدل متزايد حول تداعياته الحضرية كالخصوصية، وطبيعة الحياة الاجتماعية. تهدف هذه الدراسة التي تعتمد المنهج الوصفي من خلال تقديم تحليل سوسيولوجي نقدي إلى تأكيد ضرورة تجاوز الرؤية التكنو-يوتوبية التي تحصر الذكاء في البنية التحتية الرقمية على حساب البعد الاجتماعي للمدينة، إضافة إلى أهمية الدمج بين الذكاء التقني والذكاء الاجتماعي-الحضري.

الكلمات المفتاحية: المدن الذكية، التخطيط الحضري الذكي، الذكاء التقني، الذكاء الاجتماعي-الحضري.

1. INTRODUCTION

In the era of digital transformation, urban planning is witnessing widespread and growing use of digital technology and artificial intelligence within smart urban planning projects and the shift toward the policy of building smart cities, since it provides effective tools and technologies to improve the quality and efficiency of urban spaces and the environment through successful management and operation of urban services. It also improves the residents' quality of life within the framework of sustainable urban development. The smart city is considered an intelligent and innovative urban planning model that increases the effectiveness of urban policies and helps solve traditional cities' problems such as traffic, pollution, and governance issues by adopting digital infrastructure and predictive algorithms.

However, some recent critical literature reviews in the field of urban studies revealed the dominance of technological intelligence

in planning policies of cities and urban spaces, at the cost of social and urban life aspects. A study (Abdessalem et al., 2025), which, through a systematic literature review, explored the main research fields addressing smart cities, ranked urban studies as the eighth and last. In contrast, various fields of computer and technology studies ranked at the top. This proves that most studies about smart cities focus on technical aspects and ignore the social ones. Starting from this point, the main research question of this study is: To which extent will the focus on smart technology in smart cities planning affect social relations and the quality of urban life? What are the social and urban implications of reducing planning to digital algorithmic solutions?

Drawing on sociological critical analysis within a descriptive framework, this paper aims to show the reliance of smart cities planning on smart technologies, through the use of the Internet of Things, cloud computing, and artificial intelligence...

Although these technologies are effective, by providing individuals with valuable opportunities for empowerment, facilitating urban life and improving the problems of traditional cities, it is also important to emphasize the importance of the social dimension in smart city planning, as it ensures opportunities for personal communication and social interaction, thus promoting a harmonious urban life, achieving sustainable urban development and guaranteeing quality of life for individuals. This is what makes this article a valuable contribution to enriching urban studies on smart cities and to highlighting the social dimension in smart urban planning that supports urban life, in light of the theoretical approach of 'technological sociology/digital urban sociology', which views the smart city as a 'socio-technical formation', rather than just a technical structure. The smart city is a physical space whose quality and efficiency can be improved by using technology to facilitate the lives of residents and achieve urban wellbeing; yet, more importantly, it is a space for social interaction and honest communication, a source of human culture and a manifestation of the human condition.

This paper is divided into four main sections: an introduction providing background to the subject of the study, defining the research question, objectives and significance. We then addressed the methodology section, in which we outlined the research approach, adopting a descriptive method involving a critical sociological analysis of the academic literature. We then presented the third section, which contains the research findings derived from the literature review, along with a discussion of these findings. Finally, we concluded the study with the fourth section: a conclusion containing a comprehensive summary of the study and a set of recommendations to open up future possible research.

2. Methodology:

This research follows a theoretical, analytical, and critical approach that combines urban sociology with a descriptive methodology, seeking to analyze the

technological structure of smart cities and expose their urban sociological implications. By focusing on the importance and necessity of technology in smart cities planning, but mostly, the need to integrate the social aspect as a fundamental and effective key in the planning process to limit the dominance of technology.

We adopted a selective analytical literature review approach as the primary method to extract scientific knowledge, including a critical review of a selected body of modern global, Arab, and local urban sociology literature directly relevant to the research topic. Along with a focus on primary sources that provide deep insight into the structure of smart cities and the different priorities of smart planning.

The sources were selected according to their quality (peer-reviewed journals), theoretical originality and linguistic diversity (Arabic, English). The research depends on references selected from academic databases and recent articles in the field to support the theoretical framework with relevant material and critical analysis.

In the theoretical analysis, we used conceptual analysis to decode the components of the technological infrastructure of smart cities, yet we used a critical functional analysis to examine the role of technology in defining social relations within urban spaces that adopted smart urban planning, as well as to focus on the need to prioritize the social dimension. Furthermore, interpretative analysis was used to understand the implications of the interaction between individuals and technology in urban environments, particularly smart cities, depending on selected references to build analytical evidence and provide theoretical arguments.

The theoretical framework used here integrates multiple theoretical perspectives, such as urban systems theory, by presenting an analysis of the city as a combined techno-social system that emphasizes the need for technology to fit with the social dimension in order to create an urban environment that supports social

interaction and achieves sustainability. As well as critical functional structure, which reinforces the functional role of technology in the urban system, and to what extent it contributes to improving its efficiency through the adoption of technology in urban planning, all of which is based on the main references selected for the research .

The critical analysis is based on the dimensions of smart cities, with a focus on the social dimension and social interaction as a priority in their urban planning and as a balance to technical intelligence. A distinction was made between smart technology (the technical capabilities of the digital infrastructure) and urban implications (the sociological effects on social interaction and social relations), and we record a constructive critique of the technology-centered approach to urban planning, with an integrated sociological framework for the planning of socially sustainable smart cities.

3. Results and Discussion:

Smart cities as an innovative system for modern urban planning

The concept of smart cities has become one of the most important topics in urban studies, because it integrates information technology to improve residents' quality of life. As part of this development, the shift toward a sustainable digital transformation is essential to ensure continuous adaptation with environmental changes and people's needs. Sustainability in the digital transformation of smart cities ensures a positive impact in the use of resource, and the reduction in carbon emissions, and the improvement in public services. (Hariyadi et al., 2023, p. 1)

Smart cities are also known by relying on digital technologies to optimize the use of resources, such as smart urban transport networks, improved water supply, smart waste management, and more efficient methods of lighting and heating buildings. (Areej Musa Isa al-Musa, 2024, p. 199); to clarify our understanding of smart cities, the concept can be analyzed by identifying the purpose, approach and tools:

– Purpose (Why?): A smart city aiming to

achieve sustainability at environmental, social and economic levels.

– Method (How?): A collaborative city based on collective intelligence and the active citizens' participation.

– Tools (by what?): A digital city based on artificial intelligence, the Internet of Things and technological infrastructure.

This vision signifies a production in which the smart city settles a sustainable vision, a sharing approach and digital empowerment (Ali Siham, 2025, p. 130).

Smart city planning is based on a set of guiding principles centred on technology, sustainability and community participation, and aims to guide urban planning and development measures to improves efficiency, quality and the standard of residents' lives.

The foundations of smart city planning include several principles that seek to achieve a balance between economic, environmental, and social aspects, whereas emphasizing the use of modern technologies efficiently to achieve sustainability, including information and communication technologies, sustainable infrastructure, smart transport, community participation, cyber security, economic development and job creation, and improvements in the healthcare and education quality. (Areej Musa Isa Al-Musa, 2024, p. 203). This is what makes smart cities stand out for:

• **The smart economy:** This is considered the most important pillar, as it supports the city's economic performance, such as the ability to attract investment by improving both local and global competitiveness, and to boost productivity by integrating marginalized and rural areas. It also supports innovation and human resource development, as well as entrepreneurship and start-ups (Ali Siham, 2025, p. 131).

• **Smart Citizens:** These are an effective component of the smart city system, as they are characterized by professionalism and quality, thus attracting high-potential individuals; they are also distinguished by a high degree of flexibility, innovation, and contribution to sustainable development

(Omar Salim, n.d., p. 28).

•**Smart community:** A smart city is built on a community whose members are characterized by knowledge and digital literacy, strong interaction between human and social capital, and the intensive use of information and communication technology; it also encourages active civic participation and promotes the values of transparency and cooperation to achieve comprehensive development and a better quality of life.

• **Smart governance:** characterized by participatory and transparent management of public affairs; that is, involving citizens, civil community and the private sector in the decision-making process through digital platforms that provide direct and open channels of communication. This model of governance helps to build trust and improve the effectiveness of urban policies.

•**Smart transport:** This involves the use of information technology and sensors to develop efficient and sustainable transport systems in order to reduce traffic, minimize pollution and optimize energy consumption, thus improving the quality of residents' daily life (Ali Siham, 2025, pp. 131–132).

•**Smart waste management:** Integrating smart technology into waste bins, such as installing fill-level sensors and compactors to increase capacity, enabling urban waste management systems to manage resources effectively (Omar Salim, n.d., p. 25)

•**Maintaining a clean and sustainable environment:** by adopting renewable energy and technologies to reduce pollution resulting from human activities, particularly carbon pollution, and by addressing the global climate challenges facing contemporary cities (Wali Siham, 2025, p. 132) .

Contemporary urban planning policies and programmes involve modern technology and use artificial intelligence within the framework of sustainable urban development, aiming to improve the quality of urban life. Smart cities are constructed in various countries around the world through the adoption of big data and communication technologies, and technological infrastructure. This contributes effectively in

solving the problems and complexities of traditional cities, such as urban pollution, wasteful use of energy resources, traffic and the poor quality of various community services, as well as problems of mismanagement, poor administration and urban governance. These smart cities introduced models of urban policies and smart community services such as smart transport, smart lighting, smart household waste management and smart urban governance... making urban life easier and more flexible within the physical framework.

Smart cities showed a modern, intelligent and contemporary urban planning model that provided many valuable opportunities for cities and urban centers within the framework of sustainable urban development, yet these cities continue to face several challenges at various levels, such as the cost of technology, citizens' personal privacy, cyber security, the digital divide within communities, and the issue of urban justice .

It is also important to take into consideration the dominance of the technical aspect over the social ones in the planning of these cities, as they must not lost the fundamental objective of any urban community, which is to create a social environment for interaction and communication among residents; in other words, the physical environment of cities must serve the social environment and be devoted for its benefit.

Smart City Planning: The Dominance of Technological Intelligence at the Expense of Social Justice

The current execution of the smart city model focuses primarily on technology and secondarily on solving social problems. Yet, authorities planned to develop information and communications technology solutions that fulfil the needs of a diverse range of clients, such as government agencies, other organizations, and civil society. at the same time, there is a debate whether these technologies facilitate an improvement in the 'general' quality of all citizens' life, or they serve only a specific 'elite' part of society that

is digitally literate and able to afford the financial cost, with the exclusion of sections of society with living in low-income areas, limited resources, migrant camps' residents, the elderly, or young people on low incomes (Mohammed Al-Suhaimat, 2023, p. 1086).

Opportunities for digital empowerment in smart cities may not reach all city residents fairly and equally, and their establishment may worsen long-standing inequalities. Cities are a source of wealth but are characterised by sharp social and digital divides, the same between the rich and the poor, as well as other spatial divides.

Not to mention that many citizens lack digital literacy, the ability to use technological tools, or sufficient and reliable internet connectivity to benefit from smart city technologies. According to the *Pew Research Centre*, around 75 per cent of Americans in urban areas have High-speed internet at home, which is 12 percentage points higher than in rural areas. Another Pew study found that 14 per cent of American adults have low digital skills and low trust in digital information. Such gaps form part of the digital divide and may affect the effectiveness of smart city technologies (Marta Ziosi1).P1193

These smart city solutions may improve the quality of life for some citizens, at the same time it may marginalize those who lack access to 'smart services' and creating a digital divide, which could lead to the marginalization of certain communities with limited or no digital footprint. As was the case with Hurricane Sandy in the United States, social media misled the public into believing the storm was centered on Manhattan due to greater access and engagement with social media there, leading to mistaken predictions and misguided responses from the authorities. Issues of social exclusion go beyond representation and access to technology, distorting the 'reality of the city' and the specific characteristics of the local area (Mohammed Al-Suhaimat, 2023, p. 1086)

Concerning the objectivity issues in using algorithms, those responsible of smart cities

technologies point out to that the results of algorithmic predictions and decisions are objective and free from bias. However, these algorithms are trained with data collected by real-world individuals, and it always reflects some ethical and political choices that may be open to criticism. These algorithms help to decide who is going to have a bank loan, or affect the economic choice to construct a new highway in a poor area, or where the police should send more patrols, which reinforces and supports the economic and social inequalities that tend to punish the poor (Marta Ziosi). P1194

Smart cities offered diverse and valuable technological opportunities that helped in increasing the efficiency in the urban environment, promoting urban services, as well as addressing various urban problems faced by traditional cities, along with upholding the principles of sustainable urban development. However, smart city planning has seen an imbalance between technological intelligence, which focuses on the technical capabilities of the physical digital infrastructure, and social justice, characterized by spatial digital inequality and social exclusion, and limited use of technology on the other hand. Technical priorities have taken priority over social considerations, creating social divides within the context of smart cities that undermine their ability to ensure a high quality of life for individuals, a matter of great importance, as cities have been always built to support human quality of life and well-being.

This phenomenon is not just a planning failure, but rather a structural sociological phenomenon that reflects urban social implications, directed to the reproduction of social inequalities through the spatial digital divide, isolation, and social marginalization caused by technology. Moreover, the lack of social inclusion resulting from the exclusion of certain sections of society, such as the elderly and those with no technical skills; as well as digital bias, which reflects the subjectivity, ethics, policies and orientations of decision-makers in the real world. It is therefore essential to plan with a view to

improving individuals' quality of life.

The Necessity to Humanize Smart Cities: Smart Urban Planning for People

Smart cities were created for people, not the opposite; technology and technical advancement are not the aim of building these cities. Rather, the fundamental objective is to create an environment that provides a better urban life for people. Smart cities must provide a space that supports people psychologically, socially and urbanistically, and provides them with all means of comfort, privacy and safety. Since we are the ones who shape cities, and cities reshape us; a city will only be humane if its inhabitants participate in its design and planning matching their individual characteristics and needs, taking into account their diverse cultures and socio-economic backgrounds, and work to create an interactive environment that fits them and contributes to the improvement of their urban lives (Omar Salim, n.d., p. 16).

Smart urban planning, which outlines the guidelines for city planning framed by the *International Conference on Modern Engineering*, emphasizes, under the fourth principle, Friendliness, which is the importance of social interaction through public spaces. This principle prioritizes, in a hierarchical sequence, places designed to promote personal interaction, companionship, romance, neighborhood, community and civic life. According to supporters of smart urban expansion, vibrant communities are interactive and socially engaging, providing individuals with space to connect and gather. Society operates within a hierarchy of social relationships defined by places, which can be conceptualized as a system of social divisions, with each division corresponding to a physical location within the settlement structure.

Principles of Urban Planning

Humanizing cities means making them people-friendly, which requires designers and planners to try to improve the human dimension and create smart urban spaces that embody values such as sustainability, familiarity, empathy, well-being,

coexistence, solidarity, and respect. Traditional cities achieved a form of humanization that respects the users' humanity, incorporating architectural elements such as the 'mustaba', a raised platform where neighbors gather for socializing and interaction. In contrast, in high blocks, there is a floor dedicated to machines in the middle of the building, the 'mechanical floor', yet there is no dedicated floor for residents to gather, for children to play, or for social activities (Omar Salim, n.d., p. 16).

One of the objectives of smart urban growth is to create areas of privacy in places that offer tranquility and peace, where individuals can enjoy observation as an escape from the noise of contemporary urban life. Urban plans must also include spaces for friendship and close relationships; such places do not exist spontaneously within the contemporary urban fabric and must therefore be included into urban designs, serving as relaxing spaces for residents to interact and connect, and as vital areas to people's emotional well-being and mental health.

The humanization of smart cities is not an optional extra but a structural sociological necessity for urban life, because the current technological dominance, despite the valuable opportunities for empowerment it offers, transforms the city from a vital social space into an automated, material-technological system that neglects humans as the most important urban performers. The humanization of cities reconsiders this imbalance by placing 'people at the center' of urban planning strategies and policies, while applying the principles of 'integrated, people-centered urban planning.'

The social dimension of urban planning and sustainable development policies must be fundamental and dominant, taking priority over technical and physical considerations, and including urban presence, equality and social justice, and community participation, to achieve sustainable urban development that guarantees citizens' quality of life.

Humanizing cities escapes 'digital façades' that hide deep social divides, and promotes

social connection and interaction between individuals by integrating and emphasizing social and emotional aspects. Researcher Adnan Fannoun emphasizes that urban intelligence is not measured by the concentration of technology but by the extent to which it is suited to people and the environment, warning against turning the smart city into a digital façade that hides enduring social and spatial imbalances.

4. CONCLUSION

‘Smart cities’ must represent the ability of cities to harmonize social intelligence with technical intelligence in a functional, interactive and integrated manner, prioritizing the social dimension within the framework of sustainable urban development. Sustainable smart cities are safe and sustainable environments centered on the well-being and quality of life of their residents, rather than on the efficiency of technical systems, by recognizing the right of individuals to a smart urban environment that values their social and emotional lives as part of their quality of urban life, while offering opportunities to benefit from smart technology in the physical sphere. In an attempt to overcome these challenges, the study proposes a set of recommendations:

- The need to move towards socially sustainable smart urban planning that centers people at urban planning strategies and policies, while making use of technology, and the need to involve local communities and citizens in the planning process.
- Ensuring that smart urban spaces preserve the ‘social and cultural identity’ of residents and support face-to-face human interaction rather than virtual interaction
- The need to reduce social inequalities and achieve social justice to ensure urban integration and quality of life for residents in smart cities.
- Treating the spatial digital divide by ensuring efficient internet coverage across all areas of the smart city, without marginalization or exclusion .

- Prioritizing education and training opportunities for technical services, and developing personalized programs to teach marginalized groups (the elderly, low-income, and minorities) on how to use technology, to ensure they are not excluded from smart services.
- Conducting deep socio-urban studies on the importance and necessity of prioritizing social, cultural, and emotional aspects in the construction of smart cities.
- Establishing urban legislation for smart cities by passing laws and regulations that ensure the ‘integration of artificial intelligence and social intelligence’ in urban planning.

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