

Informal Futures: Rethinking the Smart City to Bridge the Digital Divide and Foster Urban Belonging^{*}

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Abstract

Cities are complex, evolving ecosystems where urban transformations are shaped by a dynamic interplay between actors, infrastructures, and technologies. The integration of information and communication technologies (ICTs) has accelerated these processes, promising greater efficiency and responsiveness in urban governance. However, the implications of these technological advancements—particularly in relation to the digital divide, socio-spatial inequalities, and power dynamics—remain underexplored. This paper applies Actor-Network Theory (ANT) to examine the entanglement of formal urban planning and informal practices in the development of smart cities. Informality, often framed as an urban deficiency, is instead conceptualized as a resilient and adaptive response to rigid urban structures. Rather than dismissing informality, this study argues for its integration into smart city initiatives, recognizing its role in shaping citizen agency, participation, and spatial justice. Through the Urban Living Lab framework, this study explores how digital technologies can be leveraged to bridge the digital divide, enhance human-centered urbanism, and prevent smart city interventions from reinforcing corporate-led urban governance and the privatization of public space. By prioritizing citizen needs, democratic participation, and urban inclusivity, this paper repositions smart cities as sites of negotiation rather than top-down technocratic projects, ensuring that digital advancements serve urban inhabitants rather than control them.

Keywords

Inclusive smart city, ICTs, urban informality, digital divide, right to the city, democratic technocratic urbanities

1. Introduction

Cities are constantly evolving spaces where transformation occurs through the interaction of people, policies, and urban infrastructure. While smart city initiatives aim to foster sustainability, inclusivity, and resilience, the reality often falls short, with digital technologies reinforcing existing inequalities rather than bridging them [1]. Despite promises of enhancing urban life, the implementation of smart city technologies raises fundamental concerns.

To analyze these concerns, this study adopts Actor-Network Theory (ANT) as a lens to examine the interplay between actors (governments, corporations, citizens, and informal communities) and technological artifacts (digital platforms, surveillance systems, and smart infrastructure) in shaping urban life. The balance of power in these networks dictates whether smart city technologies empower citizens or merely serve corporate and governmental interests, consolidating power rather than redistributing it [2][3].

Urban transformations, historically, have been guided by the inclusivity of public spaces—a debate oscillating between openness and restriction, accessibility and exclusivity [4]. With the rise of digital urbanism, this discussion extends beyond physical spaces to virtual infrastructures, where barriers exist not only in physical accessibility but also in digital literacy, data ownership, and surveillance mechanisms [5]. The emergence of data-driven governance models raises concerns about algorithmic bias, privacy intrusion, and the erosion of democratic participation, as decision-making shifts from public institutions to technocratic, corporate-led frameworks [6].

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Simultaneously, cities operate through a dual system of formal and informal practices in governance, spatial organization, and economic production [7]. Informality—whether in housing, labor markets, or civic engagement—often emerges as a grassroots response to exclusion from formal urban planning [8]. Smart city technologies introduce a new layer to this dynamic: while they can exacerbate digital divides, they also offer new channels for civic participation, fostering urban cohesion [9].

Research question: Is the integration of informality in Smart Cities creating more inclusive urban environments, or do they reinforce existing socio-spatial divides?

This study investigates whether the integration of digital technologies in informal urban practices serves as a tool for fragmentation or reconnection. The research follows a multi-phase approach: 1) Tracing Inclusivity in Urban Planning: analyzing how smart city interventions shape socio-spatial inequalities. 2) Evaluating Digital Platforms in Smart Cities: examining whether technological implementations empower marginalized communities or reinforce barriers. 3) Urban Living Lab Experimentation: applying smart city interventions in different informal settings to observe real-time inclusivity impacts. 4) Evaluating Resilience through Informal Integration: identifying successful urban policies that incorporate informality for sustainable smart city applications. By positioning Actor-Network Theory at the core of this analysis, the study moves beyond a top-down, technocratic approach to urban digitalization and instead reveals the power dynamics, resistances, and socio-technical entanglements that shape smart cities. The results contribute to the ongoing debate on whether digital urbanism can truly foster inclusivity or if it merely serves as a tool for governance and surveillance under the guise of progress.

Declaration on Generative AI

During the preparation of this work, the author(s) used Chat-GPT-5 for: Grammar and spelling check. After using these tool(s)/service(s), the author(s) reviewed and edited the content as needed and take(s) full responsibility for the publication's content.

References

- [1] J. Nederhand, F. Avelino, I. Awad, P. D. Jong, M. Duijn, J. Edelenbos, J. Engelbert, J. Fransen, M. Schiller, N. V. Stapele, Reclaiming the city from an urban vitalism perspective: critically reflecting smart, inclusive, resilient and sustainable just city labels, *Cities* 137 (2023) 104257. doi:10.1016/j.cities.2023.104257.
- [2] R. K. R. Kummitha, N. Crutzen, How do we understand smart cities? an evolutionary perspective, *Cities* 67 (2017) 43–52. doi:10.1016/j.cities.2017.04.010.
- [3] F. Cugurullo, The business of utopia: Estidama and the road to the sustainable city, *Utopian Studies* 24 (2013) 66–88. doi:10.5325/utopianstudies.24.1.0066.
- [4] J. Gehl, A. Matan, Two perspectives on public spaces, *Building Research & Information* 37 (2009) 106–109. doi:10.1080/09613210802519293.
- [5] S. Graham, A. Aurigi, Virtual cities, social polarization, and the crisis in urban public space, *Journal of Urban Technology* 4 (1997) 19–52. doi:10.1080/10630739708724546.
- [6] O. Bina, A. Inch, L. Pereira, Beyond techno-utopia and its discontents: On the role of utopianism and speculative fiction in shaping alternatives to the smart city imaginary, *Futures* 115 (2020) 102475. doi:10.1016/j.futures.2019.102475.
- [7] R. B. Recio, I. Mateo-Babiano, S. Roitman, Revisiting policy epistemologies on urban informality: Towards a post-dualist view, *Cities* 61 (2017) 136–143. doi:10.1016/j.cities.2016.08.018.
- [8] C. McFarlane, Rethinking informality: Politics, crisis, and the city, *Planning Theory & Practice* 13 (2012) 89–108. doi:10.1080/14649357.2012.649951.
- [9] A. Caragliu, C. F. D. Bo, Smart cities and the urban digital divide, *npj Urban Sustainability* 3 (2023) 43. doi:10.1038/s42949-023-00117-w.