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"DIGITAL SPACE: THE ANTHROPOLOGY OF PLANNING IN THE ERA OF URBAN TECHNOLOGY"

Djufri[1]

[1]Universitas Muhammadiyah Berau

Email: djufri@umberau.ac.id

Abstract: *Urban digital transformation reshapes how infrastructures function and how citizens interact with space. This study investigates the sociopolitical impact of digital planning in Makassar, Indonesia, using focused ethnography. Data were obtained through in-depth interviews with twelve informants—ranging from informal workers to digital developers—and participant observation. Guided by theories of space production (Lefebvre), governmentality (Foucault), symbolic capital (Bourdieu), and resistance (Scott), findings reveal that digital tools frequently exclude marginalized groups, turning lived spaces into filtered, quantifiable data. Informal actors engage in micro-resistances to reclaim spatial agency. This research contributes a critical anthropological lens on smart cities, advocating for inclusive digital planning.*
Keywords: *Digital Urbanism, Spatial Justice, Ethnography, Urban Exclusion.*

Abstrak: Transformasi digital perkotaan membentuk kembali cara infrastruktur berfungsi dan cara warga berinteraksi dengan ruang. Studi ini menyelidiki dampak sosial-politik dari perencanaan digital di Makassar, Indonesia, menggunakan etnografi terfokus. Data diperoleh melalui wawancara mendalam dengan dua belas informan—mulai dari pekerja informal hingga pengembang digital—dan observasi partisipan. Dipandu oleh teori produksi ruang (Lefebvre), pemerintahan (Foucault), modal simbolik (Bourdieu), dan perlawanan (Scott), temuan mengungkapkan bahwa perangkat digital sering kali mengecualikan kelompok-kelompok yang terpinggirkan, mengubah ruang yang ditinggali menjadi data yang disaring dan terukur. Aktor informal terlibat dalam perlawanan mikro untuk merebut kembali agensi spasial. Penelitian ini memberikan kontribusi berupa sudut pandang antropologis kritis pada kota pintar, yang mengadvokasi perencanaan digital yang inklusif.
Kata Kunci: Urbanisme Digital, Keadilan Spasial, Etnografi, Eksklusi Perkotaan.

INTRODUCTION

The transformation of urban landscapes in the digital era is not merely a physical shift—it signifies a profound change in how cities are imagined and experienced. Urban planning is no longer confined to printed documents or community forums; it now operates through algorithms, sensors, and real-time data systems (Bibri, 2018; Nguyen et al., 2024). The city becomes an entity represented through technocratic performance indicators, raising pressing questions about who is included and who is erased from the digital map (Huovila et al., 2019; Kitchin et al., 2015). Henri Lefebvre reminds us that space is produced through social relations and contested meanings, not merely by technical structures. In the context of digital cities, the production of space is increasingly shaped by digital infrastructures that filter reality through the logic of efficiency. While contemporary literature often focuses on the technical aspects of digital planning, it tends to overlook the lived experiences of those who are spatially and symbolically marginalized (Giest, 2025; Greiman et al., 2025). This study seeks to fill that gap through a critical ethnographic approach in Makassar, amplifying the voices that remain unheard in the system. The novelty of this research lies in its integration of critical theory and citizen practices in the face of digitalization, contributing to a redefinition of spatial justice in smart cities.

Beneath the prevailing narratives of efficiency and modernity lies a fundamental question: who is truly present and heard in digital urban space—and who is gradually being erased? As Giest (n.d.) argues, space is never neutral. Henri Lefebvre warned long ago that space is a product of complex social relations—it is produced, imbued with meaning, and contested (Rutanen, 2017; van Lanen et al., n.d.). Space is not merely a container or location; it is a field of power shaped by and shaping lived experiences (Banerjee-Guha, n.d.; Griffero, 2014). In digital planning, space is produced not just by governments or architects, but by codes, servers, sensors, and platforms embedded across the urban fabric (Duarte & Álvarez, 2019; Uprichard et al., 2009). What we see on screen—zoning maps, traffic heatmaps, or city performance dashboards—is a representation of space already filtered through technocratic logic.

In reality, the city is not made solely of highways and sanitized spaces. It is animated by everyday practices: by street vendors occupying sidewalks, app-based motorcycle taxi drivers navigating based on intuition, and mothers selling under bridges beyond the reach of formal

markets (Torky & Heath, 2021; Veenaa Sri & Sharmila, 2024). As evidenced by interviews with Makassar residents, digital technology often becomes a tool of exclusion (Pishnyak et al., 2025; Polat, 2012). Applications regulating vending spaces, camera-based e-ticketing systems, and surveillance dashboards frequently overlook the social dynamics and spatial meanings embedded in daily life (da Silva & de Moraes Batista Simão, 2025; Ellis et al., 2013). Iqbal, a young architect, noted that digitally designed urban space often misaligns with realities on the ground. Rini, a street vendor, felt marginalized by systems she couldn't understand. Farhan, a motorcycle taxi driver, found himself "fighting" algorithms whose directions put him at risk.

This highlights how technology, while convenient, introduces new forms of power. Michel Foucault refers to this as governmentality—power not enforced through overt coercion but embedded within systems and routines (Häkli & Ruez, 2020; Joseph, 2010). The digital city embodies this mechanism. When CCTV cameras are installed on every corner, when citizen behavior is tracked through navigation systems, and when algorithms dictate the safest routes or zones, urban bodies are no longer fully autonomous (Anthopoulos & Fitsilis, 2010; Berle, 2020). They are controlled, guided, and disciplined by seemingly neutral systems that operate systematically and subtly. Foucault termed this the panopticon: a form of power made effective by the awareness that one could always be watched (Berle, 2020; Ceyhan, n.d.).

This subtle power becomes even more apparent when we consider how data is used to shape urban realities (de Castro Neto & de Melo Cartaxo, 2021; van der Vaart et al., 2024). Foucault's power/knowledge theory is pertinent here. Spatial data, density statistics, and algorithm-based classifications do more than describe the city—they determine policies: who is eligible for aid, which areas deserve investment, and which communities are labeled as "informal" (Garrido-Valenzuela et al., 2023; Sapena et al., 2021). Data becomes a tool not only for managing the city but for erasing those who do not fit within systemic logic. Taufiq, a leader of a coastal community, reported that his neighborhood does not appear on digital maps. Within the system, his community is "nonexistent"—despite having lived there for decades. This is a new form of digital invisibility: where living, breathing spaces are deemed illegitimate simply for not being in the system (Mütterlein et al., n.d.; Reyna et al., 2020).

This condition is further complicated when viewed through the lens of Brian Larkin and Sheila Jasanoff. For them, digital infrastructures are not merely technical tools, but political devices. Behind every citizen reporting system, navigation app, or data-based transport

management platform lies a political decision: who gets categorized, who gets included, and who gets left out (Hrubeš et al., 2024; Marceddu et al., 2024). Digital infrastructure carries what they call sociotechnical imaginaries—futures imagined through technology, but also through ideologies of order, efficiency, and connectivity (Brause et al., 2025; Rahm, 2023). Unfortunately, in these imaginaries, groups with low technological access, limited digital literacy, or those living in informal spaces are often left uncounted (Park, 2018; Smit et al., 2024).

Alarmingly, much of the existing literature on digital planning remains preoccupied with technical efficiency: how to improve traffic flow, optimize waste management, or accelerate public services (Alsrehin et al., 2019; Kulkarni et al., 2024). Few explore how citizens interpret digital space—how they adapt to it, resist it, or ignore it altogether (Balik, n.d.). Yet this is where the core tension lies: between representations of space governed by the system, and representational spaces rooted in lived experience (Angne Alfaro & Patel, 2021; Mulicek et al., n.d.). A dashboard may depict a green zone as open public space, while in practice, that space could serve as a gathering place, a vending site, or a refuge from heat (Bakri et al., 2023; Huang et al., 2022). Systems do not always capture meaning.

In this context, alternative approaches are urgently needed—approaches that not only map cities through data but also uncover citizen narratives, amplify grassroots voices, and recognize the city as a meaningful space, not merely a map of dots (Hart & Homsy, 2020; Zhai, 2025). This research aims to fill that void—demonstrating how digital technology in urban planning not only generates efficiency, but also produces new segmentations, disciplines the body, and fosters increasingly exclusive social spaces (Jachna, 2021; Phalak, 2024). Simultaneously, this study also highlights that citizens are not passive. They negotiate, reshape, and even challenge the systems that attempt to govern them (Feenstra, 2018; Jason et al., 2006).

RESEARCH METHODS

This study is designed as a qualitative research project employing an urban anthropological approach, with a primary focus on the social dynamics emerging from the digitalization of urban spatial planning. This approach was chosen for its ability to capture the everyday dimensions of urban life that are often overlooked by digital maps and technocratic indicators used in technology-based planning systems. Rather than merely describing the

technical operations of digital systems, this research seeks to understand how urban residents experience, respond to, and interpret spaces shaped by such systems—both as individuals and as members of broader communities.

The study employs focused ethnography, a form of ethnographic research with a narrower spatial and temporal scope, yet rich in social interactions, lived experiences, and in-depth narratives from informants. The research centers on the relationship between urban residents and digital infrastructures, particularly in the context of spatial representation, mobility control, and digital participation in planning systems. Ethnography here is not only a method of data collection but also an epistemological stance—a way of thinking about the city through the stories, interactions, and everyday negotiations of those who live within it.

The research site is Makassar City, a major metropolitan area in Indonesia currently developing smart city systems such as digital dashboards, interactive maps, traffic monitoring platforms, and citizen reporting apps. Makassar was selected for its representativeness in reflecting the challenges faced by large cities attempting to adopt digital technologies in spatial governance, while still grappling with issues of civic participation and digital access inequality.

The study population consists of urban residents in Makassar who are directly affected by or engaged with digital planning systems—as users, technical implementers, or socially impacted groups. To ensure a diverse range of perspectives, informants were selected using purposive sampling, taking into account variations in social roles, economic background, digital literacy, and spatial engagement. The sample includes street vendors, app-based motorcycle taxi drivers, municipal technical staff, urban community activists, UX designers, informal settlement residents, and local leaders from coastal and densely populated neighborhoods.

A total of twelve key informants were interviewed in depth, with each session lasting between 45 and 90 minutes. Interviews were conducted in a semi-structured manner, allowing informants to openly share their experiences and perspectives. The key informants included:

- Iqbal (27), a young architect,
- Rini (36), a street vendor in Panakkukang,
- Farhan (40), an online motorcycle taxi driver,
- Taufiq (42), a community leader from the coastal area,

- Lestari (34), an activist from an urban kampung community,
- Aulya (29), a UX designer for a smart-city tech startup,
- Pak Ridwan (52), a neighborhood leader (RT) in northern Makassar,
- Yuni (30), a private employee living in a city center apartment,
- Dimas (27), a digital logistics courier,
- Hidayat (35), staff from Makassar's Regional Planning Agency (Bappeda),
- Arif (32), an operator at the city's Communication and Information Office (Kominfo), and
- Echa (26), a volunteer for a youth urban community.

In addition to interviews, participant observation was conducted in various public spaces such as city parks, street vendor areas, online transport hubs, and digital community centers. This aimed to document real-life interactions between citizens and digital infrastructures—such as responses to surveillance cameras, the use of navigation apps, and reactions to digital regulations in public spaces.

The main research instruments included an interview guide developed based on Henri Lefebvre's theory of the production of space, Michel Foucault's concepts of governmentality and biopower, and the technopolitical frameworks of Brian Larkin and Sheila Jasanoff. The guide was designed to be flexible and responsive to field contexts. Supplementary data were collected through field notes, photographic documentation, and screenshots of the city's digital systems (e.g., city dashboards and planning apps).

The research was conducted in three main stages:

1. Field exploration, including mapping digitized urban spaces, identifying key actors, and gaining initial understanding of the prevailing digital planning system.
2. Data collection through interviews and observations, using a humanistic approach to ensure that informants felt comfortable and safe to share their experiences.
3. Data analysis, carried out thematically and reflectively, linking field narratives with theoretical frameworks and research questions.

The entire research process was conducted over a period of three months, adhering to ethical principles of qualitative research: informed consent, confidentiality, and transparency

of research objectives. All names used in this publication have been anonymized unless explicit permission was granted by the informants to include their real names as a form of acknowledgment for their contributions.

RESULTS AND DISCUSSION

The findings of this study reveal that the digitalization of urban space is far from neutral; it is deeply embedded with interests and selective representations. Drawing on Henri Lefebvre's framework, digital space is dominated by representations of space—constructed and controlled by the state and institutions—while the representational space of residents, such as street vendors and coastal communities, is often excluded. Technologies like smart city dashboards and e-ticketing systems create new boundaries of spatial legitimacy. Michel Foucault's concept of subtle surveillance power explains how citizens are governed through algorithms, without necessarily understanding or controlling them. The interviews reveal micro-resistances: motorcycle taxi drivers rejecting algorithmic directions, informal residents manipulating the system to survive. Using Bourdieu's lens, it becomes clear that those with higher digital capital are better positioned to navigate the smart city system, while others are left behind. This study highlights how digital infrastructure constitutes a political field of knowledge (power/knowledge) that must be critically examined to build inclusive and humane cities (Chiappini & de Vries, 2022; Li & Diao, 2025; Sun et al., 2023).

Observations and interviews indicate that vulnerable urban groups—such as street vendors, ride-hailing drivers, and informal settlement residents—experience the digital city as increasingly inhospitable. For example, Rini, a street vendor in Panakkukang, reported being relocated frequently because she was "not registered in the official route" on the city planning app. Instead of enhancing civic participation, digital systems often reinforce divides between those who are "datafied" and those deemed "illegitimate." In such cases, digitalization narrows the right to space by reducing social complexity into numbers, coordinates, and binary zoning.

These findings align with Lefebvre's assertion that space is not merely a physical entity shaped by technocrats or the state, but a contested field of conflicting interests. He distinguishes between representations of space (produced by institutions and systems) and representational space (lived, felt, and interpreted by society). In digital planning, representations of space take the form of smart city dashboards, GIS systems, and mobility

algorithms, whereas the representational space of people like Rini or Pak Ridwan, a local neighborhood leader in northern Makassar, is marginalized because it cannot be translated into system logic.

However, residents are not entirely passive. Several informants demonstrated adaptive strategies reflecting what James C. Scott refers to as everyday forms of resistance. For instance, Farhan, a ride-hailing driver, deliberately avoids algorithmically suggested routes that he perceives as "socially risky," even if they are faster. This is a form of micro-resistance to a digital system perceived as overly technocratic and insensitive to local realities. Pak Sarman, a traditional angkot (public minivan) driver, lamented how his long-serving route—once crucial for many residents—was deemed "inefficient" and replaced by app-based ride-hailing services that disregard the community's social networks.

From a cultural and habitus perspective, Pierre Bourdieu's approach helps elucidate how urban digitalization impacts not just technical spatial arrangements but also symbolic structures and capital formation. Those who possess digital capital—access to devices, technological literacy, and integration within digital social structures—are more likely to participate in urban spatial production. Conversely, those lacking such capital are often deemed "unready" for the future city, despite being the most affected by its transformations. Nurhayati, a schoolteacher in a Makassar suburb, explained that her students often walk long distances just to find a signal for online classes. This underscores that digital access is not only a technological matter but also a question of power distribution that creates new layers of urban stratification.

When digital technologies are used to standardize public behavior—through surveillance cameras, crowd meters, or data-driven zoning—they manifest what Foucault terms biopower. Urban bodies no longer move intuitively or socially, but are directed to behave according to system logic. Crossing timers, automated reporting systems, and "crowded/uncrowded" classifications choreograph the city into an algorithmic performance, where citizens become subjects who are watched, measured, and guided. Yet beneath this lies a profound sense of loss—of spontaneity, of unquantified social interactions, and of spatial meaning that cannot be computed.

Overall, this research fills a significant gap in the study of digital urban planning, which has often been overly focused on efficiency and technology. It demonstrates that digital space is not a neutral breakthrough, but a political arena of representation that shapes who holds

rights to the city, who participates in policymaking, and who is gradually erased by a system that fails to recognize their existence. By centering the experiences of urban residents, this study underscores that urban planning must not be exclusively top-down but should evolve as a social process open to negotiation, conflict, and local meaning-making.

The theoretical contribution of this study lies in its integration of multiple critical perspectives: Lefebvre's production of space, Foucault's governmentality, Bourdieu's structure and agency, and Scott's everyday resistance—into a single reflective framework for analyzing the digital city. Its scientific novelty lies in asserting that digital representation is not merely about maps or information systems, but a new form of power that must be continuously scrutinized and contested through citizen narratives, critical participation, and more human-centered planning approaches. A just city is not one that excels in data, but one that listens to the stories of those often omitted from the system.

CONCLUSION

This study demonstrates that digitalization in urban planning is not merely a matter of technological adaptation, but a spatial production practice that reproduces power relations, regulates citizen representations, and systematically generates spatial exclusion (Kuppler & Fricke, 2025; Nyhlén & Gidlund, 2019).

Nevertheless, technology should not be viewed as inherently antagonistic. What is required is a critical-reflective approach to how technology is developed, distributed, and interpreted by urban residents.

For urban planners, policymakers, and technology developers, the findings of this research serve as a reminder that the success of a digital city cannot be solely measured by system efficiency or technological sophistication. True success lies in how effectively these systems engage citizens in meaningful ways, provide space for previously unheard voices, and build the city not just for its residents—but with them.

For the academic and urban research community, this study offers an approach that integrates major theoretical frameworks—from Lefebvre's production of space and Foucault's governmentality to Scott's everyday resistance—with grounded ethnographic narratives. In doing so, this research contributes not only to the literature on cities and technology but also

reinforces the value of qualitative methods and intersubjective approaches in understanding the dynamics of contemporary urban space.

Looking ahead, the main challenge is not merely creating efficient digital infrastructure, but ensuring that the digital transformation of cities does not sacrifice spatial justice, social inclusion, and meaningful civic participation

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