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Responding to Rapid Urbanization: Institutional Perspectives from Indonesia and Singapore's Smart City Initiatives

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ABSTRACT

This research aims to examine smart cities in Indonesia in responding to the wave of urbanization through comparison with the Smart Nation implemented in Singapore. This research uses a descriptive and systematic qualitative approach in the form of a systematic literature review utilizing secondary data. The analysis was conducted by referring to the concepts of urban governance and institutional capacity to understand how smart cities are operationalized as governance instruments in facing the challenges of urbanization in both countries. Research findings indicate that smart cities development in Indonesia is still dominated by digitalization and technical innovation, while policy integration, cross-sector coordination, and strengthening the institutional capacity of local governments have not been optimal. In contrast, Singapore's smart nation model demonstrates a more systematic and coordinated approach, where technology is leveraged as part of a governance mechanism to support data-driven decision-making and strategic urbanization management. This study concludes that the success of a smart city in facilitating urbanization is not determined solely by the level of technology utilization, but rather by the quality of governance and supported institutional capacity.

Keyword:

smart city, urbanization,

institutional capacity,

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INTRODUCTION

Massive wave of urbanization remains a dominant global phenomenon in the 21st century. Rapid population migration from rural to urban areas and changes in economic structures continue to drive urban population growth. Even though urbanization contribute

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to innovation and economic progress, this process places a heavy burden on city capacity, particularly in the provision of public services, infrastructure, and governance in developing countries with limited resources and institutional capacity.

Indonesia is one of the countries that experience significant acceleration in urbanization. This concentration of population in urban areas is generally driven by expectations of better access to education, employment, and economic activity. Unfortunately, this phenomenon has not been accompanied by adequate urban planning and governance. As a result, chronic issues such as traffic congestion, limited housing, environmental degradation, and inequality in basic services remain a major challenge in many large cities (UN Habitat, 2022).

To address these issues, the Indonesian government has adopted smart city concept as a strategic urban management policy. By integrating information technology, data-driven systems, and digitalized services, smart cities are expected to create a more efficient, transparent, and responsive bureaucracy. This step is strengthened through the national program Movement Towards Smart City (GMSC) which serves as a guide for local governments to create local technology-based solutions (Kementerian Komunikasi dan Informatika, 2022).

Although smart city implementation in Indonesia continues to grow, most existing practices and studies are still focused on technical aspects and digital innovation. Meanwhile, the role of smart cities as an urban governance instrument in managing the pressures of urbanization and improving institutional capacity has not been thoroughly analyzed. This condition shows that there is a gap in studies between technology implementation and policy approaches in smart city development.

In the Southeast Asia region, the establishment of the ASEAN Smart Cities Network (ASCN) reflects the commitment of Southeast Asian countries to develop adaptive and sustainable cities in the face of massive waves of urbanization. ASCN, which encompasses cities across ten ASEAN countries, is expected to facilitate collaboration and partnership to help realize these smart cities. However, differences in political, institutional, and technological readiness across ASEAN countries has led to variations in the strategies and achievements of each smart city's development (ASEAN Secretariat, 2018).

Among ASEAN countries, Singapore is a significant example of technology-based city management through its Smart Nation initiative, particularly since the strengthening of the Smart Nation 2.0 agenda. This initiative emphasizes digital transformation oriented towards public trust, inclusivity, and improving the quality of life for its citizens. Through centralized governance and a mature digital infrastructure, Singapore has been able to integrate technology into various strategic sectors, including transportation, healthcare, urban planning, and public services. This success has made Singapore a leading reference for smart city development globally.

Beyond physical infrastructure issues, the urbanization process also impacts the institutional capacity of city government to respond to the increasingly diverse and complex needs of their communities. Population growth in urban areas demands a more flexible, responsive, and information-based governance system, particularly in development planning, public service management, and policy-making processes. In practice, weak coordination between institutions, overlapping policies, and low data integration often become the main obstacles in city management, especially in developing countries such as Indonesia.

However, smart city is not merely understood as the application of digital technology, but rather as a form of policy innovation and institutional reform, thus positioning this concept as a modern, multidimensional concept. Author uses the definition of smart city

concept by Caragliu, Del Bo, and Nijkamp as a city where investment in human capital, social, traditional (transportation) and modern infrastructure (technology, information, and communication) encourages sustainable economic growth and improved quality of life, accompanied by wise management of natural resources through participatory governance (Caragliu, Bo, & Nijkamp, 2011). This approach emphasizes the integration of technology utilization, governance, the involvement of non-governmental actors, and public participation in formulating and implementing sustainable urban solutions. Therefore, smart cities have the potential to serve as a policy instrument to strengthen government capacity in managing the dynamics of urbanization, while simultaneously encouraging increased transparency, accountability, and inclusiveness in public services (Nam & Pardo, 2011).

Nevertheless, smart city development also presents its own challenges, particularly those related to the digital divide, data protection, and social justice. Only a portion of society has equal access to and ability to utilize digital-based services. This situation demands that smart city policies be designed within an inclusive development framework, so that digital transformation does not create new forms of inequality in urban areas, particularly in developing countries with varying levels of digital literacy (UN Habitat, 2022).

From a public policy perspective, the differences in governance approaches between Indonesia and Singapore offer important analytical opportunities. Indonesia implements a decentralized system of government, granting regional governments broad autonomy in city management and smart city implementation. In contrast, Singapore adopts a more centralized governance model with strong cross-sectoral coordination through the Smart Nation framework. These differences raise questions about the effectiveness of different smart city models in different governance contexts, as well as the potential for adapting best practices from Singapore to Indonesia.

In the context of governance, the author also uses the concept of urban governance to map how government and stakeholders plan urban areas. Urban governance itself refers to how the government and stakeholders decide to plan, allocate, and manage urban areas (United Nations Department of Economic and Social Affairs, 2023). This concept involves a continuous process of negotiation and competition over material and social resources, as well as political power. Primarily, urban governance is used to consider the decision-making processes to plan, manage, build, finance, and provide public and private goods and services in cities. Furthermore, this concept also encompasses the relationships between various actors, such as governments, institutions, and community interest groups, in providing and using these services.

Specifically, the goal of urban governance is to support the implementation of more efficient and sustainable urban development and management. Therefore, with the growing urban population driven by urbanization, the capacity to manage these areas becomes more challenging. This is because, despite being exposed to modernization, urban areas also face various risks such as climate change, pollution, refugees, reduced availability of housing, infrastructure, and social services, and even pandemics. As a result, a city requires more relevant and competent urban governance to ensure the best service for the community.

The author sees the differences between these two countries as a necessity for a comparative study. This comparison is crucial to understand the extent to which smart city strategies can be adapted as policy instruments for managing urbanization in developing countries with high social and institutional complexity. Therefore, this study aims to examine Indonesia's smart city strategy in facilitating urbanization through a comparative study with Singapore's Smart Nation policy. Using a comparative approach, this research seeks to identify the strategies of the two countries in addressing the challenges of urbanization. It is

hoped that this research will contribute to the development of academic studies on smart cities and urban governance, while also generating relevant policy recommendations for the sustainable management of urbanization.

METHODS

This research uses a qualitative-descriptive approach method which attempts to explore and understand a phenomenon in accordance with the factual context so that objective and scientific conclusions are reached. Furthermore, this research employed a systematic approach, namely a Systematic Literature Review (SLR). This approach involves identifying, selecting, and critically evaluating literature, extracting and synthesizing data to answer the research questions. Data collection was conducted through literature review, which yielded secondary data. This data came from books, scientific reports, academic journals, articles on credible websites, and other sources.

The literature used was analyzed using a qualitative descriptive approach. The analysis was conducted by classifying research based on the main themes: smart cities, urban governance, institutional capacity, and comparative studies between smart cities in Indonesia and Singapore. The resultant analyses are then synthesized to identify models, tendencies, and remaining research gaps. Through these steps, the SLR method is expected to provide a comprehensive and systematic understanding of the comparison of smart city implementation in Indonesia and Singapore.

RESULT AND DISCUSSIONS

Between Urbanization and Digitalization: Urban Governance Strategies in Indonesia

Smart city development in Indonesia began to grow and expand during the pandemic, or more simply, when the capacity of various smart city platforms was implemented in many cities. A review of policy documents and academic literature indicates that smart city development in Indonesia is being directed as part of the government's efforts to address the increasing pressures of urbanization in urban areas. From an urban governance perspective, smart cities serve as a supporting tool for local governments to enhance their city management capacity through the use of digital technology and information systems (Pierre, 2011). This strategy is reflected in the implementation of electronic-based government systems, the digitization of public services, and the provision of online media aimed at fulfilling the growing needs of urban communities (Nam et al., 2011). The author views the relevance of an electronic-based government system as being manifested in the work from home (WFH) system, which had been implemented long before the pandemic broke out.

The urgency of digitalization has become unavoidable, given the country's demands for dynamic development. In this regard, preparedness is essential, considering that certain situations, such as the COVID-19 pandemic, require governments to regulate work system policies for the benefit of the public. The implementation of WFH regulates remote working patterns and the adoption of virtual technology. In Indonesia, the government issued Government Regulation Number 21 of 2020 concerning Large-Scale Social Restrictions in the Context of Accelerating the Handling of Corona Virus Disease (COVID-19), which resulted in the closure of workplaces and restrictions on activities in public places (Hendriyaldi, Erida, & Yanti, 2022).

Furthermore, the Indonesian government's latest policy is the National Urban Policy (KPN) 2045, launched in September 2025 (BAPPENAS, 2025). This policy aims to create balanced, inclusive, advanced, green, and resilient cities in response to the challenges of urbanization in Indonesia. BAPPENAS Minister, Rachmat Pambudy, stated that the KPN

document demonstrates the urgency of an urban development roadmap. Although already released, this document is dynamic, collaborative, and open to updates, allowing for transformative changes by governments as cities become not only the centers of economic growth, but also valuable living spaces for future generations.

However, the use of smart cities as a strategy to facilitate urbanization in Indonesia still presents several limitations. This is because, in many regions, smart city policies focus more on technical and administrative aspects, while their integration with urban development planning has not yet been fully realized. As a result, the role of smart cities as a governance instrument in responding to urbanization issues—such as increasing population density, urban mobility, and unequal access to services—has not been optimally implemented (UN DESA, 2019). Perhaps the implementation of smart city infrastructure in Indonesia is not yet projected to meet the challenges when the country is faced with disasters or massive phenomena, such as pandemic.

Assessing Institutional Capacity in Indonesia's Smart City Governance

According to El-Taliawi and Van der Wal (2019), capacity is the ability to develop programs; attract, absorb, and manage resources; deploy activities; and apply lessons learned to future activities. In this way, research findings indicate that institutional capacity across regions in Indonesia remains relatively diverse, both in terms of human resource quality, financial management capabilities, and the readiness of supporting infrastructure (Grindle, 1996). This variation directly impacts the ability of local governments to utilize smart cities to effectively manage the impacts of urbanization.

One of the institutional capacity dimensions is the fiscal capacity, which is defined as the extent to which a government can collect taxes based on the country's existing tax system and law enforcement capabilities. An adequate fiscal capacity enables a country to collect sufficient taxes to finance its policies (Besley and Persson, 2013; Johnson and Koyama, 2017). For Indonesia, this dimension is essential because the decentralized system aims to advance regional independence, strengthen its accountability in public financial management, and encourage local governments to be more innovative and responsive in meeting community needs (Pertiwi et al., 2026).

However, fiscal capacity is one of the ongoing main problems in Indonesia, which is defined as the high dependence of local governments on transfers from the central government. The disparity of fiscal capacity between regions is a crucial factor in determining the success of smart city implementation in Indonesia. Regions with high Regional Original Revenue (PAD) possess stronger financial capacity to improve the quality of their human resources, advancing innovation in public services, and improving outdated service infrastructure. Conversely, regions with low regional original revenue face difficulties in funding development and providing public services. Their dependence on transfers from the central government also makes it difficult for regions with low regional original revenue to develop services independently. This imbalance in fiscal capacity widens the gap between regions in Indonesia, which also impacts the quality of public services, which also varies (Pertiwi et al., 2026; Zahira et al., 2025).

Moreover, the lack of inter-agency coordination between regional governments along with the suboptimal integration of cross-sector data are major obstacles to smart city implementation. Consequently, various smart city initiatives operate separately, followed by lack of a connection to the overall urban policy formulation process. In the context of rapid urbanization, these limited institutional capacity limits the ability of local governments to

make data-driven decisions that are responsive to the needs of urban communities (Fukuyama, 2013; Meijer & Bolívar, 2016).

For instance, smart city implementation in several cities across Sumatra, Bandar Lampung for example, remains at an early stage and continues to encounter substantial challenges. According to Gunawan (2023), main constraints include insufficient governmental support, the lack of citizen participation, and inadequate human resource capacity. In Bandar Lampung itself, many regional officials are not yet proficient in operating information technology. Furthermore, infrastructure development often misses targets because it fails to prioritize basic community needs such as education and healthcare (Handayani et al., 2021).

Singapore's Smart Nation Model for Governing Urban Transformation

Unlike Indonesia, Singapore has developed Smart Nation as a national strategy designed in an integrated manner to address the challenges of urbanization. Within the framework of urban governance, Smart Nation links digital transformation with integrated city planning and public service delivery, enabling more targeted, information technology-based management of urban population growth (Meijer & Bolívar, 2016).

The Smart Nation initiative focuses on five key sectors: public services, home and environment, transportation, business productivity, and active health. It is also generally consists of three key components called the "Three Pillars of Smart Nation": Digital Government, Digital Economy, and Digital Society. Digital Government continues to invest in infrastructure and creates/acquires a shared open platform for citizens and businesses to learn and grow; Digital Economy encourages businesses to invest in technology and talent to grow beyond national borders; and Digital Society which enables and empowers people to develop their talents and equip themselves with the latest digital technologies to understand their greatest inspirations and live a better life together.

Fundamentally, the Smart Nation initiative was established into stages, projecting the Singapore government's previous efforts to digitize public services or "e-government" (Sipahi & Saayi, 2024). However, due to its limited territory and resources, Singapore has consistently relied on strong state capacity and a technocratic bureaucracy to manage the pressures of urbanization in a planned manner. Therefore, the Singapore government is developing smart cities in an institutionalized manner through Smart Nation as a national development strategy, rather than as a sectoral or experimental policy innovation. This approach reflects the logic of a developmental state that places digital technology, urban planning, and governance within a single, centralized vision to ensure sustainable economic growth, social stability, and improved quality of life for urban residents.

The advancement of the Smart Nation 2.0 agenda demonstrates that digital transformation in Singapore is supported by relatively strong institutional capacity. The presence of a centralized governance, policy coherence, and cross-sectoral data management system enable the government to respond to the impacts of urbanization faster and in a coordinated manner. In this context, Smart Nation serves as a strategic policy instrument to strengthen urban governance and improve the quality of life for urban residents (Fukuyama, 2013; Nam & Pardo, 2011).

Despite its rapid progress, Singapore still faces numerous challenges and shortcomings that require further evaluation, particularly in the application of technology to smart city governance. According to Sun & Pacquiao (2023) it is stated that Singapore has developed technology applications in various fields, such as banking (DSB Bank), online transportation (Grab), and e-commerce (Shopee). However, they also noted several

shortcomings and challenges that must be addressed, including cybersecurity, privacy data protection, and the urgency to continually hone technological skills.

Not only its technological advancement implementation, Singapore still has shortcomings in its democratic dynamics. Tan & Preece (2024) revealed that although Singapore's democracy index has been known to be good for decades, its democratic decline is reflected in its hybrid system, which combines democracy and autocracy. In other words, the combination of democracy, which prioritizes sovereignty in the hands of the people, with autocracy, which recognizes absolute power, makes Singapore's democracy sometimes unstable and indecisive. This presents a challenge for Singapore in implementing the Smart Nation concept. Not only that, it also correlates with concerns about the increasing prevalence of limited participatory politics.

Institutional and Strategic Comparison of Indonesia's Smart City and Singapore's Smart Nation Programs

Based on the comparative analysis, it shows that the differences between smart city strategies in Indonesia and Singapore are significantly influenced by the governance models and institutional capacity of each country. While in Indonesia, the decentralized government system allows for regional innovation, but at the same time presents challenges in maintaining policy consistency and integration across regions (Pierre, 2011). This situation causes the ability of smart cities to facilitate urbanization to vary between cities.

In this way, the authors identify several aspects of Singapore's success through its Smart Nation initiative which makes it a role model for smart city development in Indonesia. First, Singapore emphasizes public policies focused on user needs and inclusivity. Second, it improves digital literacy. Third, it accelerates technology adoption through public-private partnerships. The last aspect is that it eventually supports digital inclusion.

In this regard, Singapore has implemented a more centralized and coordinated approach to smart city development, enabling national policy and technology integration. This approach has been shown to support more consistent and sustainable urbanization management. However, differences in social, political, and geographic contexts mean that Singapore's strategy cannot be directly applied in Indonesia without adaptations that take local conditions into account (Healey, 2006).

Strategic Implications for Strengthening Smart Cities in Indonesia

Based on these research findings, it can be concluded that strengthening smart city strategies in Indonesia needs to be directed at increasing institutional capacity and improving the quality of urban governance. Smart cities should be positioned as policy instruments to support urbanization management, not merely as technological innovations (Meijer & Bolívar, 2016). Therefore, strengthening cross-sector coordination, integrating data systems, and increasing the capacity of local government officials are essential prerequisites for smart cities to have a real impact on city management (Wu et al., 2015).

In this context, the central government plays a strategic role in formulating a comprehensive national policy framework and coordination mechanisms that support smart city development while preserving the authority of local governments. Through this approach, smart cities are expected to contribute more effectively to supporting adaptive, inclusive, and sustainable urbanization management in Indonesia (UN DESA, 2019).

CONCLUSION

In response to the dynamics of urbanization, smart city development in Indonesia has yet to be fully integrated into a comprehensive urban governance framework. In this way, various technology-based initiatives have been implemented which generally focus on improving service efficiency. However, these initiatives have not been optimally integrated into urban planning and policymaking processes. This situation indicates that smart cities in Indonesia are still understood only as a digitalization agenda, rather than as a strategic urbanization management tool.

Within the urban governance framework, this study indicates that inadequate policy integration and inter-agency coordination are the main inhibiting factors in maximizing the role of smart cities. These limitations are exacerbated by the uneven institutional capacity of local governments, particularly in data management, cross-sectoral information utilization, and the ability to translate digital innovation into policies responsive to the needs of urban communities. Consequently, the capacity of smart cities to mitigate the impacts of urbanization, such as population density and unequal access to services, remains partial.

A comparative analysis with Singapore presents a contrasting illustration of how smart cities can operate effectively within an urbanizing environment. Through its Smart Nation framework, Singapore has successfully embedded technology as an integral component of its governance architecture and decision-making processes. These findings underscore that the effectiveness of smart city initiatives is determined less by technological sophistication and more by the strength of governance structures and institutional capacity. Nevertheless, Indonesia must critically address the structural limitations and contextual challenges inherent in Singapore's smart city model should it seek to adapt or replicate it.

Based on these findings, this study concludes that strengthening smart cities in Indonesia requires a paradigm shift from a technocratic approach to a governance approach. Smart cities need to be designed as policy instruments that support increased institutional capacity, cross-sector integration, and sustainable urbanization management. Thus, smart cities serve not only as a means of digital innovation but also as a strategic mechanism to strengthen city governments' capabilities in facing the complexities of future urbanization.

Penulis juga meyakini bahwa kemajuan infrastruktur di Indonesia ternyata tidak sejalan dengan kecakapan sumber daya manusia. Sebab, teknologi selanjutnya hanya akan berdampak optimal jika diintegrasikan dalam sistem kelembagaan yang mendukung, disertai prosedur yang jelas, serta dioperasikan oleh individu yang memiliki kompetensi yang memadai. Dalam hal ini, tantangan utama di Indonesia tidak terletak pada ketersediaan teknologi, melainkan pada kesenjangan antara laju adopsi teknologi dengan kesiapan infrastruktur pendukung dan kualitas sumber daya manusia. Alhasil, situasi tersebut menunjukkan bahwa transformasi digital tidak dimaknai sebagai proses teknologisasi semata, karena proses transformasi sistemik juga mencakup penguatan kapasitas manusia, pembenahan tata kelola, dan pembangunan ekosistem yang adaptif. Oleh karena itu, penulis merekomendasikan perlunya kajian konstruktif mengenai arah pembangunan *smart city* yang relevan dengan kondisi lokal terkini.

The authors further argue that infrastructure progress in Indonesia has not progressed in parallel with the capacity of its human resources. This reflects the reality that technology can only generate optimal outcomes when embedded within a supportive institutional framework, guided by clear operational procedures, and managed by individuals possessing adequate competencies. In this regard, the main challenge in Indonesia lies not in the availability of technology infrastructure per se. Instead, it lies in the gap between the rate of technology adoption and the readiness of supporting infrastructure and the quality of

human resources. Consequently, this situation highlights that digital transformation is not merely a process of technologization, encompassing broader systemic changes such as strengthening human capital, enhancing governance quality, and fostering an adaptive and resilient institutional ecosystem. Therefore, the authors recommend the importance of further constructive studies in order to inform the direction of smart city development that are relevant to current local conditions in Indonesia.

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