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Advancing Sustainable Governance across Two Smart Cities in Indonesia

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Abstract

The rapid advancement of digital technologies has transformed public service delivery by improving efficiency, transparency, accountability, and citizen participation. However, persistent challenges in urban governance and service integration continue to hinder progress towards the Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities) and SDG 16 (Peace, Justice and Strong Institutions). These challenges are closely related to Targets 11.3 and 11.7 on inclusive and sustainable urbanisation and access to public spaces, as well as Targets 16.6 and 16.7 on effective, accountable, transparent, and participatory institutions. In Indonesia, smart governance initiatives have increasingly been adopted to improve public services and address complex urban challenges. This study compares sustainable smart governance in Jogja Smart Service (JSS) and Jakarta Smart City (JSC) while also examining research trends in digital transformation and public services. A qualitative descriptive approach was combined with bibliometric analysis of 393 documents published between 2019 and 2024. VOSviewer was used to identify publication trends, leading countries and authors, and key themes in smart governance research. The findings indicate that Jakarta Smart City demonstrates a more technologically integrated governance model through big data, the Internet of Things (IoT), and real-time decision-making systems, whereas Jogja Smart Service shows particular strengths in service accessibility and citizen engagement through user-centred digital platforms. Both initiatives contribute to sustainable smart governance by supporting institutional effectiveness, participatory governance, and sustainable urban development.

Keywords: *Digital Transformation; Smart Governance; Sustainable Development*

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Introduction

Digital transformation refers to the integration of digital technologies into institutional processes to improve the efficiency, accessibility, and transparency of public services (Goi, 2023; Ruangwicha & Tuamsuk, 2026; Sigurjonsson et al., 2024). Despite the rapid adoption of digital technologies in public administration, many cities in developing countries continue to face challenges related to service integration, citizen participation, institutional transparency, and data-driven decision-making (Sowmiya & Velavan, 2025). Smart governance has consequently emerged as an important component of smart city development by connecting technological innovation with institutional processes and citizen-oriented public services. Nevertheless, the existing literature has largely focused on technological advancement, e-government practices, and individual smart city initiatives, leaving comparatively limited evidence on how different smart governance models contribute to sustainable urban development, particularly in the Global South (Lins & Alves, 2025; Wahyudi et al., 2022).

International experience indicates that digital transformation varies considerably according to institutional and socio-economic contexts. A comparison of Singapore and Vietnam, for example, demonstrates how differences in institutional capacity and technological development shape digital transformation processes (Nguyen-Anh et al., 2023). Evidence from Malaysia also highlights the potential contribution of digital transformation to sustainable development (Abdullah Sani & Jaafar, 2026; Leeraphong et al., 2025), while experiences across developing countries demonstrate substantial differences in digital infrastructure, institutional capacity, and socio-economic conditions. These variations suggest that digital transformation cannot be understood solely as the adoption of new technologies. It also involves organisational processes, institutional adaptation, human resources, strategic capacity, and organisational culture (Benavides et al., 2020; Rodríguez-Abitia & Bribiesca-Correa, 2021).

Similar patterns have been identified in other institutional contexts. In Kazakhstan, digital literacy, digital competencies, and people-centred governance have been identified as important components of digital transformation (Dyussenov et al., 2025). Studies of African institutions likewise emphasise organisational readiness, infrastructure, and institutional capacity (Babalola & Genga, 2024). Digital transformation may therefore support institutional sustainability when technological innovation is accompanied by appropriate organisational and institutional changes (Mohamed Hashim et al., 2022). In the public sector, this relationship is particularly relevant to smart governance, in which digital technologies are integrated into governance processes to strengthen public service delivery, transparency, accountability, participation, and decision-making.

Advances in Information and Communication Technology (ICT) have also changed how governments provide information and interact with citizens (Firman & Rahmawati, 2023; Gumilar, 2019). Technologies such as the Internet of Things (IoT), big data, web-based services, and mobile applications have expanded governments' capacity to integrate services and respond to increasingly complex urban needs. Smart governance

consequently extends beyond technological infrastructure by incorporating governance arrangements that facilitate citizen participation, institutional responsiveness, and public service innovation (Arafah & Winarso, 2020; Jakobsen et al., 2023; Ononiwu et al., 2024). Digital transformation may also strengthen transparency and accountability by providing citizens with more accessible channels for obtaining services and participating in public decision-making (Dhandar, 2024; Prihatmanto et al., 2024). Such developments have become increasingly relevant in Indonesia, where digital transformation has influenced public administration as well as broader developments in telecommunications, education, and the economy (Pratamansyah, 2024). Effective smart governance therefore depends not only on technological capability but also on institutional openness and meaningful citizen involvement (Sarofah, 2023).

In Indonesia, smart city programmes have been implemented through different institutional and technological approaches according to local conditions (Purba & Arman, 2022). Two notable initiatives are Jogja Smart Service (JSS) and Jakarta Smart City (JSC). Both seek to improve public services through digital technologies, but their governance models reflect different priorities and urban contexts. JSS places particular emphasis on integrated and accessible digital public services, whereas JSC places greater emphasis on data integration, technological innovation, and data-driven urban governance (Gumilar, 2019; Ramadhani et al., 2020; Taufiqurokhman et al., 2024; Webber et al., 2024).

Jogja Smart Service provides an integrated digital platform through which residents can access government information and services, including licensing, complaints, and other city-related services (Dewi & Saputro, 2023; Hamdala et al., 2022). The platform also supported continuity of access to public services during the COVID-19 pandemic by reducing dependence on physical interaction for obtaining information and services (Yogar et al., 2023). JSS seeks to simplify interactions between citizens and government by integrating multiple public service functions within a single application (Audytra & Supangkat, 2023). Its services cover sectors including health, education, security, and transportation (Nurauliana et al., 2023), while its broader objectives include improving administrative efficiency and facilitating citizen access to government services (Anggraini & Iqbal, 2020). Within the wider development of smart governance in Yogyakarta, JSS therefore represents a service-oriented approach that prioritises accessibility and the integration of citizen-facing public services (Hamdala et al., 2022; Indriyani et al., 2022; Purba & Arman, 2022).

Jakarta Smart City, by comparison, operates within a larger and more complex metropolitan environment characterised by challenges including congestion, flooding, pollution, waste management, and the coordination of public services (Pakpahan, 2024; Webber et al., 2024). Established in 2014, JSC seeks to use ICT to support more efficient, transparent, and responsive urban services (Taufiqurokhman et al., 2024; Wulandari et al., 2023). Its governance model incorporates city data management, security, transportation, and other urban systems (Firman et al., 2024). The use of big data, IoT, and integrated information systems supports data-driven decision-making and real-time monitoring of urban conditions (Tarissa, 2023; Taufiqurokhman et al., 2024). Collaboration among government, citizens, and private-sector actors also forms part of

this model, illustrating how technological infrastructure can be integrated with broader arrangements for metropolitan governance.

Despite their shared commitment to digital transformation, JSS and JSC illustrate different approaches to smart governance. Citizen engagement remains an important challenge in translating smart governance initiatives into effective governance practices at the operational level (Prayoga & Ramadhan, 2020). Differences in technological capacity, institutional arrangements, urban scale, and local priorities may also shape how similar smart governance objectives are translated into practice (Cantillo-Garcia et al., 2026). Smart governance should therefore be examined not merely in terms of technology adoption but through the interaction between technology and the institutional dimensions that determine how public services are organised, delivered, and evaluated.

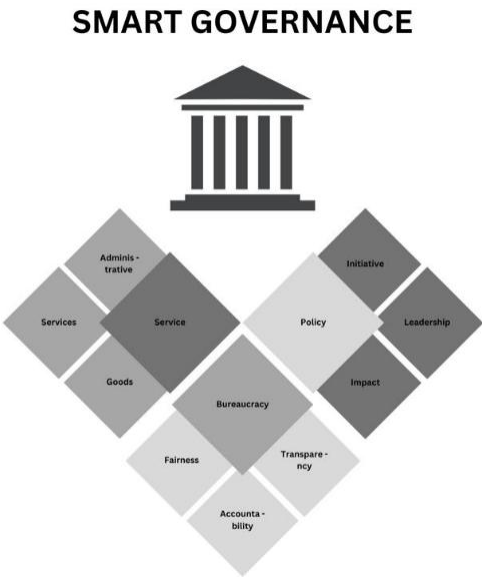


Figure 1. Analytical Dimensions of Smart Governance
Source: Citiasia Center for Smart Nation (2016)

Figure 1 presents the core dimensions of smart governance used to frame this comparison. These dimensions encompass services, administration, policy, leadership, bureaucracy, transparency, accountability, fairness, and policy impact. Together, they illustrate that smart governance extends beyond digitalisation to include the institutional and governance capacities required for transparent, accountable, responsive, and participatory public administration (Chen et al., 2026; Citiasia Center for Smart Nation, 2016). In this study, these dimensions provide an analytical basis for examining similarities and differences between JSS and JSC in supporting sustainable urban governance.

Although research on digital transformation and smart governance has expanded, the literature remains fragmented across technological, institutional, governance, and sustainability perspectives (Vujković et al., 2022). Within this broader literature, comparative attention to different smart governance models in Indonesia remains

limited, particularly regarding the distinction between citizen-oriented digital service models and data-driven urban governance models. Bibliometric analysis can help clarify the evolution, thematic structure, and underexplored areas of smart governance research (Vujković et al., 2022). When complemented by substantive qualitative analysis, bibliometric mapping can provide a broader understanding of research trends while enabling more detailed interpretation of specific governance approaches and practices (Hajek et al., 2022).

This study addresses this gap by comparing Jogja Smart Service and Jakarta Smart City as two cases of smart governance implementation in Indonesia (Kusumastuti et al., 2026). It examines why initiatives pursuing broadly similar digital transformation objectives may exhibit different governance characteristics and outcomes. The analysis also considers how digital transformation may contribute to sustainable urban governance through improved public service accessibility, institutional transparency and accountability, citizen participation, and data-informed decision-making. These dimensions are particularly relevant to Sustainable Development Goal (SDG) 11 on Sustainable Cities and Communities and SDG 16 on Peace, Justice and Strong Institutions. By integrating bibliometric and comparative analyses, this study seeks to identify research trends, compare the governance approaches adopted by JSS and JSC, and derive policy-relevant insights for the development of sustainable smart governance in Indonesia and comparable developing-country contexts.

Research Methods

This study employed a qualitative descriptive approach supported by bibliometric and comparative analyses. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 reporting guideline was used to guide the identification, screening, and selection of relevant literature (Page et al., 2021). PRISMA provides a structured approach to documenting the literature selection process, thereby improving transparency and consistency in reporting how records are identified, screened, assessed for eligibility, and included in the final analysis. In this study, clearly defined screening stages and eligibility criteria were applied to provide a systematic and traceable account of the literature selection process.

Scopus was used as the primary bibliographic database because it provides structured metadata, including publication year, authors, affiliations, countries, abstracts, and keywords, which are suitable for bibliometric analysis. The search strategy focused on terms related to digital transformation, smart service, and smart city. The initial search retrieved 16,345 records. The search covered publications from 2019 to 2024 and applied filters relating to publication year, subject area, source type, language, document type, and publication stage. Social Sciences were prioritised because of the study's focus on governance, public services, policy, and the social dimensions of digital transformation and smart cities. Relevant interdisciplinary publications addressing digital transformation, smart services, urban governance, and smart city development were also considered within the established eligibility criteria.

The retrieved records contained bibliographic information including article titles, abstracts, and keywords. These data were compiled into a structured database and subsequently screened according to the predefined inclusion and exclusion criteria. Records that fell outside the specified publication period, did not meet the relevant document and language criteria, or were unrelated to the thematic scope of the study were excluded. Titles, abstracts, and keywords were assessed during the screening process, and full texts were examined where necessary to determine eligibility.

Following the screening process, 393 documents met the inclusion criteria and were retained for bibliometric analysis. Figure 2 presents the PRISMA-based process of literature identification, screening, eligibility assessment, and final inclusion. The figure provides a transparent account of the progression from the initial 16,345 records to the final dataset used in the analysis.

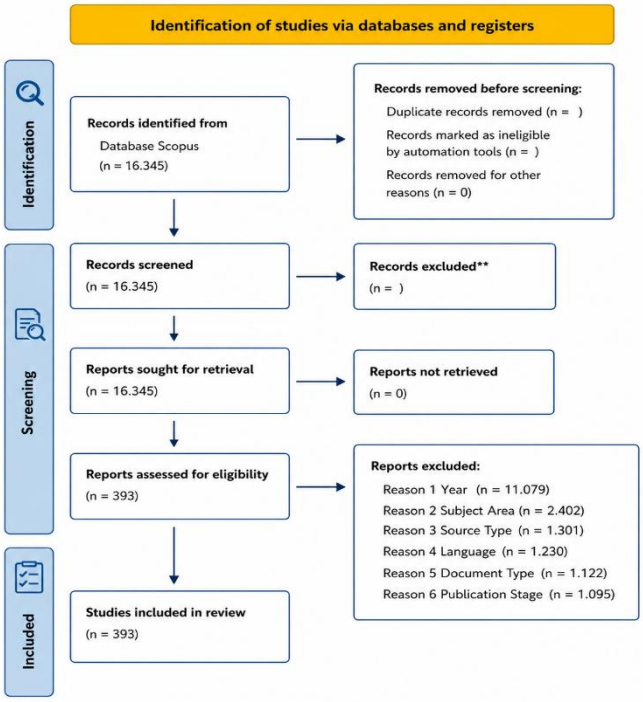


Figure 2. PRISMA Flow Diagram of Literature Identification, Screening, and Inclusion
Source: Processed by the Authors (2025)

The 393 eligible documents were analysed using VOSviewer to identify keyword co-occurrence patterns, thematic clusters, and broader research trends. VOSviewer was used because it enables bibliographic relationships and thematic structures to be mapped visually and systematically, complementing descriptive analysis of the literature. The bibliometric analysis was followed by a comparative analysis of Jogja Smart Service (JSS) and Jakarta Smart City (JSC). This stage examined differences and similarities in their approaches to digital public services, technological integration, citizen engagement, and smart governance. The findings from both analytical components were subsequently

interpreted in relation to sustainable urban governance and the study's analytical framework.

The overall research procedure therefore comprised five main stages: literature identification, screening and data extraction, bibliometric analysis using VOSviewer, comparative analysis of JSS and JSC, and interpretation of the findings. This combined approach enabled broader trends in smart governance research to be examined alongside the institutional and service-delivery characteristics of two Indonesian smart city initiatives.

Results and Discussion

The analysis examined the distribution and characteristics of publications on smart cities and smart services, including publication trends, geographic distribution, leading authors, keyword relationships, and thematic patterns. The final dataset comprised 393 documents retrieved from Scopus and analysed using VOSviewer. The bibliometric findings provide an overview of the development of research in this field, while the subsequent comparative analysis examines how Jogja Smart Service (JSS) and Jakarta Smart City (JSC) reflect different approaches to smart governance.

Publication Trends from 2019 to 2024

Changes in annual publication output provide an initial indication of how scholarly attention to smart cities and smart services developed during the study period. Publication trends are particularly relevant because they reveal periods of increasing or declining research activity and help situate the emergence of specific themes within a broader temporal context. However, publication volume should be interpreted as an indicator of academic attention rather than as a direct measure of progress in smart city implementation. Figure 3 presents the annual distribution of the 393 publications included in the analysis.

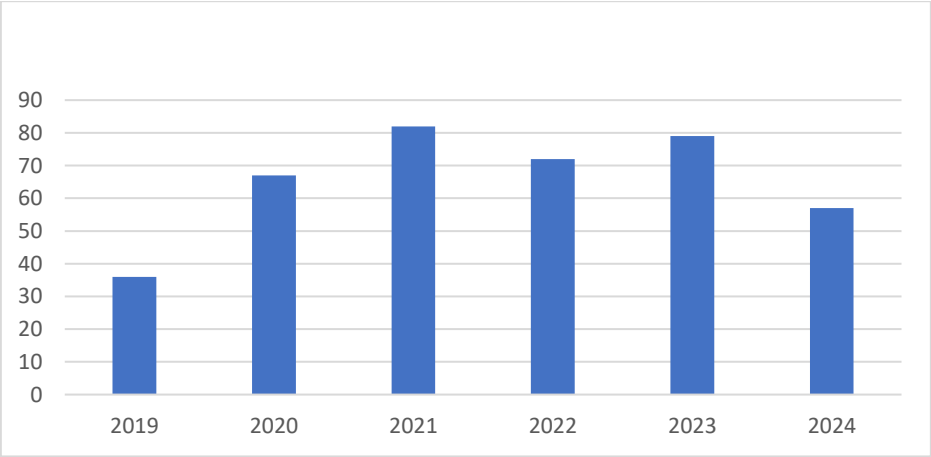


Figure 3. Annual Publication Trends, 2019–2024
Source: Scopus Data (2025)

As shown in Figure 3, publication output increased substantially between 2019 and 2021. Fewer than 40 documents were recorded in 2019, followed by an increase to approximately 70 publications in 2020. Publication activity reached its highest level in 2021, exceeding 80 documents. Although the number declined slightly in 2022, it remained above 70, followed by a recovery in 2023 before declining again in 2024. Overall, the pattern indicates fluctuating but sustained scholarly interest in smart city and smart service research during the six-year period.

The increase in publications up to 2021 can be interpreted in relation to growing scholarly attention to urbanisation, technological innovation, and digitally enabled public services. Smart cities have increasingly been examined as a response to rapid urbanisation, population growth, and demands for improvements in urban quality of life (Deandra et al., 2024; Sarki et al., 2025; Shinde & Tarchi, 2021). Technological innovation has also become central to efforts to improve urban services and strengthen governments' capacity to monitor and respond to changing urban conditions (Shan et al., 2021). The growth in publications therefore suggests increasing academic interest in the relationship between digital technologies, urban governance, public service delivery, and sustainable development. Nevertheless, subsequent fluctuations indicate that publication volume should not be interpreted as a direct measure of progress in smart city implementation, as changes in research priorities and publication patterns may also influence annual output.

Geographic Distribution of Publications

The geographic distribution of publications provides insight into where smart city and smart service research has received substantial academic attention. Differences in publication output across countries may reflect variations in research capacity, technological development, policy priorities, institutional investment, and the extent to which digital urban transformation has become embedded in national or local development agendas. Examining these patterns therefore helps position the Indonesian cases within the broader international research landscape. The countries with the highest publication contributions in the dataset are presented in Figure 4.

Figure 4 indicates that smart city and smart service research has developed into an international and multidisciplinary field. The United Kingdom contributed 45 documents, followed by the United States with 40, China with 33, India with 31, and Saudi Arabia with 28. This distribution reflects widespread academic interest in digital urban transformation, infrastructure, governance, and sustainable development. It should not, however, be interpreted as evidence that countries producing more publications necessarily have more successful smart city systems. Differences in research capacity, technological ecosystems, policy priorities, institutional investment, and funding environments may also influence publication output.

The international distribution of research is consistent with growing attention to the Sustainable Development Goals (SDGs), particularly those concerned with

sustainable urban development and institutional effectiveness (United Nations Department of Economic and Social Affairs, 2023).

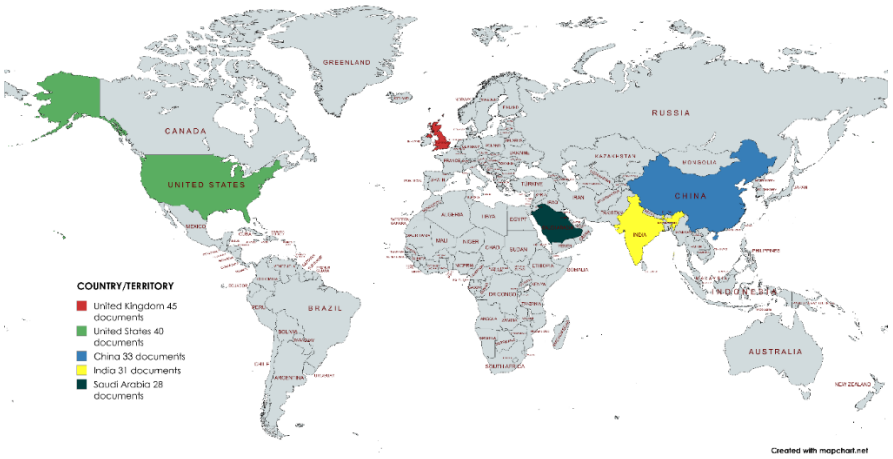


Figure 4. Distribution of Publications by Country
Source: Scopus Data (2025)

Smart city approaches may contribute to SDG Target 11.3 by facilitating more inclusive and sustainable urban planning and management and to Target 11.7 by supporting more accessible and inclusive urban environments (Tantoush et al., 2024). Research in the United States has increasingly examined the application of technologies such as artificial intelligence and the Internet of Things (IoT) to public services and decision-making (Yigitcanlar et al., 2024). Studies associated with China similarly illustrate how technological systems can shape urban dynamics at both city-wide and service-specific levels (Li et al., 2024). Research from India (Dash, 2024; Desai & Manoharan, 2024) and Saudi Arabia (Alanazi, 2023) further demonstrates the international relevance of technological innovation, smart mobility, and digitally enabled public services.

Leading Authors

Author-level analysis helps identify scholars who have contributed repeatedly to the development of smart city and smart service research. Examining leading contributors is useful not only for describing publication productivity but also for identifying the dominant intellectual concerns represented within the literature. In this study, the most productive authors are associated with themes including smart mobility, digital governance, technological innovation, service integration, and sustainable urban development. Figure 5 summarises the authors with the highest publication output within the analysed dataset.

As shown in Figure 5, Turoń contributed the largest number of documents, with five publications. His work highlights shared mobility and service innovation, illustrating that smart mobility involves not only technological applications but also the integration of digital platforms and data-driven services into urban transportation systems. These

themes are relevant to SDG Target 11.2 on accessible and sustainable transport systems and SDG Target 9.1 on sustainable and resilient infrastructure (Turoń, 2024).

Rachmawati and Yigitcanlar each contributed approximately four publications. Their research reinforces the argument that technology alone is insufficient to address complex urban challenges. Effective smart city development also depends on sustainable planning, institutional capacity, and governance arrangements that enable technologies to be incorporated effectively into urban systems (Rachmawati et al., 2024; Yigitcanlar et al., 2024). Related studies suggest that digital technologies can support urban resilience through digital public services, remote interaction, data-informed decision-making, and digital health services. However, their effectiveness appears to depend on adequate infrastructure, institutional capacity, and coordination among relevant stakeholders (Lopez de Haro et al., 2026; Song et al., 2026). Cooperation among government, private-sector actors, and communities therefore remains an important component of smart city development (Mecca et al., 2026; Wolniak et al., 2024).

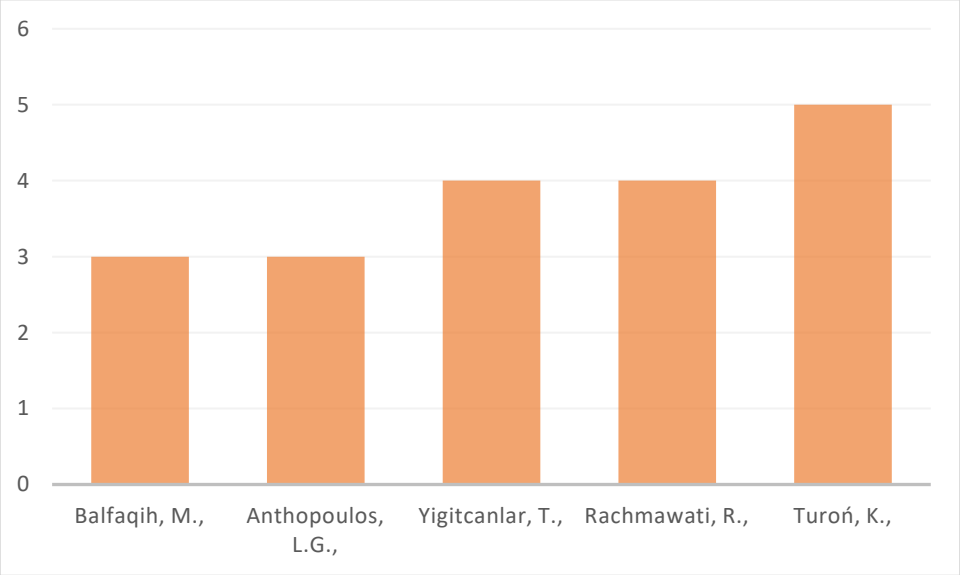


Figure 5. Leading Authors by Number of Publications
Source: Scopus Data (2025)

Anthopoulos and Balfaqih contributed approximately three publications each. Although their publication output was lower than that of the other leading authors shown in Figure 5, their work remains relevant to discussions of technologically enabled urban systems and service integration (Anthopoulos et al., 2022; Balfaqih & Alharbi, 2022). Related research has examined smart cities as environments in which technology supports improvements in quality of life, service efficiency, mobility, and the management of flows of data, services, and people (Mrabet & Sliti, 2026; Peng et al., 2026).

Bibliometric Mapping

Publication counts alone do not explain how concepts within smart city research are intellectually connected. Keyword co-occurrence analysis provides a more detailed view by identifying terms that frequently appear together and by revealing thematic relationships within the literature. This approach is particularly useful for examining whether technological themes are treated independently or are increasingly connected with governance, public services, mobility, sustainability, and institutional capacity.

The VOSviewer analysis of the 393 publications identified several interconnected thematic structures. Rather than representing entirely separate domains, these relationships suggest that contemporary smart governance research increasingly links technological infrastructure with institutional processes and public service outcomes. The subsequent visualisations examine these patterns separately for research associated with Jakarta Smart City and Jogja Smart Service.

Jakarta Smart City Research

Research on Jakarta Smart City reflects the complexity of governing a large metropolitan area in which transportation, public services, infrastructure, environmental management, and digital systems are increasingly interconnected. The literature therefore tends to position JSC not simply as a technological initiative but as part of a broader urban governance system involving data integration, e-government, mobility, and sustainable development. Examining the keyword structure helps identify which aspects of this governance model receive the greatest scholarly attention. The thematic relationships associated with Jakarta Smart City are presented in Figure 6.

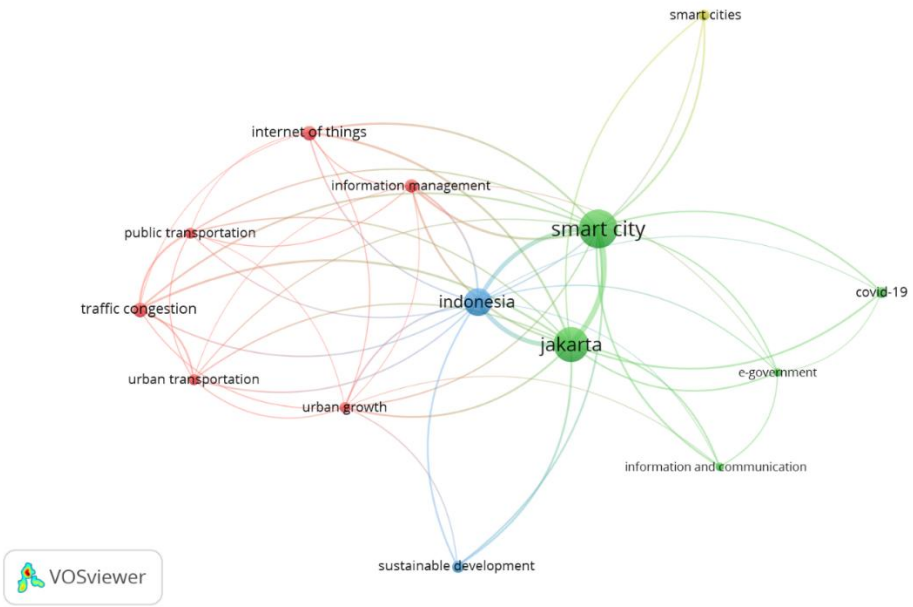


Figure 6. Network Visualisation of Jakarta Smart City Research
Source: Scopus Data Processed Using VOSviewer (2025)

As shown in Figure 6, the terms Jakarta, Indonesia, and smart city occupy prominent positions in the network, indicating their centrality within the mapped literature. The relationships among the keywords suggest that research on Jakarta Smart City is closely connected to transportation, digital governance, e-government, technological infrastructure, and sustainable urban development.

Transportation- and technology-oriented themes include the Internet of Things and congestion management, while other relationships highlight communication, digital governance, urban development, and sustainability. These patterns indicate that Jakarta Smart City research extends beyond technological implementation to encompass broader governance and urban development concerns. The emphasis on integrated infrastructure, data-driven urban management, and digital governance is relevant to SDG Target 11.3 on sustainable urbanisation and SDG Targets 16.6 and 16.7 on institutional effectiveness, transparency, accountability, and participation (Aflah & Abraham, 2025). The overall pattern therefore indicates that research on Jakarta combines technological, governance, transportation, and sustainability perspectives.

These findings can also be interpreted through the perspective of development administration. Development administration emphasises the importance of administrative and bureaucratic capacity in achieving development objectives (Das, 2010). From this perspective, smart governance involves more than the adoption of digital technologies. It also requires governments to strengthen coordination, administrative capacity, decision-making, and service delivery. Technology can therefore be understood as an instrument through which institutional capacity may be strengthened in response to increasingly complex urban challenges.

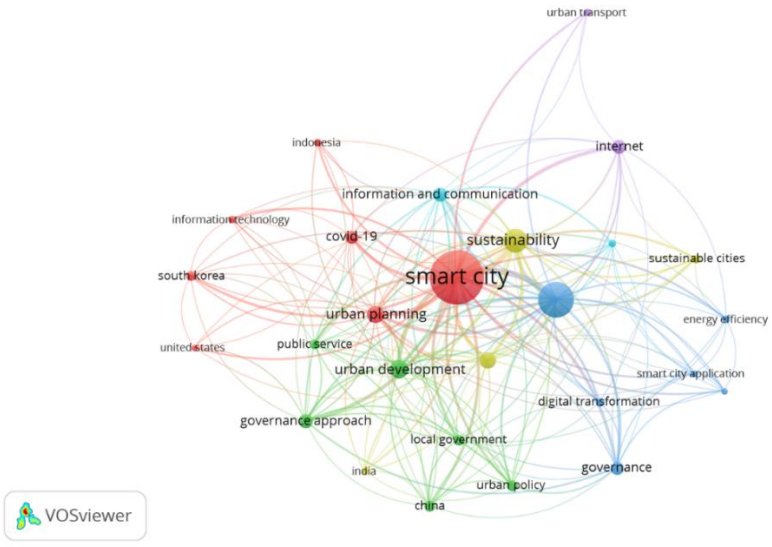


Figure 7. Keyword Co-occurrence Network of Jakarta Smart City Research
Source: Scopus Data Processed Using VOSviewer (2025)

A more detailed examination of keyword relationships provides additional insight into the governance-oriented dimensions of the JSC literature. In particular, the relationships among public services, decision-makers, governance approaches, and

urban areas reveal how technological development is increasingly discussed in conjunction with institutional processes. Figure 7 presents this more focused keyword co-occurrence structure.

Figure 7 identifies interconnected thematic groupings, with smart city occupying a prominent position in the network. Its central position and connections with other keywords indicate the breadth of issues associated with smart city development. One thematic grouping includes governance approaches, public services, perceptions, decision-makers, and urban areas, illustrating the interaction between technological development and governance processes.

Jakarta Smart City has been developed as a digitally enabled urban governance initiative aimed at improving the efficiency and transparency of public services across sectors including transportation, security, health, education, and environmental management (Ilhami et al., 2022). This orientation is consistent with broader understandings of smart cities as integrated approaches to improving urban quality of life and economic development (Tarissa, 2023). Digital platforms such as Qlue and Jakarta Kini (JAKI) provide channels through which residents can report urban problems, including flooding, damaged roads, and waste-management issues (Ilhami et al., 2022).

Open-data mechanisms may also contribute to greater transparency by providing public access to selected information on city statistics, budgets, and development programmes. Such practices are relevant to SDG 16 because they can support institutional transparency, accountability, and citizen participation (Nurauliana et al., 2023). Nevertheless, access to digital services remains uneven. Differences in digital access, literacy, education, and socio-economic conditions may limit the ability of some population groups to benefit equally from technologically mediated public services (Pakpahan, 2024; Varzeshi et al., 2026). These findings therefore indicate that technological sophistication alone does not necessarily result in inclusive smart governance.

Jogja Smart Service Research

Research on Jogja Smart Service reflects a somewhat different orientation from that observed in Jakarta. Whereas JSC research frequently highlights large-scale data integration and metropolitan management, the literature on JSS places greater emphasis on digital public services, e-government, accessibility, and interaction between residents and local government. This orientation is consistent with JSS's role as an integrated platform designed to bring multiple public services into a more accessible digital environment. The principal thematic relationships within JSS research are mapped in Figure 8.

Figure 8 shows that smart city is strongly connected with terms such as city development, electronic government, and Yogyakarta City. These relationships demonstrate the close association between digital public services, e-government, and urban development in research concerning Yogyakarta. The integration of digital services with urban governance is particularly relevant to SDG Target 11.3, which emphasises inclusive and sustainable urbanisation (United Nations, 2015).

The network also reveals thematic differentiation among keywords. Yogyakarta City and e-government, for example, are associated within one thematic grouping, whereas smart services and capacity analysis appear within another. These relationships suggest that JSS research combines institutional, technological, service-delivery, and capacity-related concerns rather than treating smart city development exclusively as a technological issue.

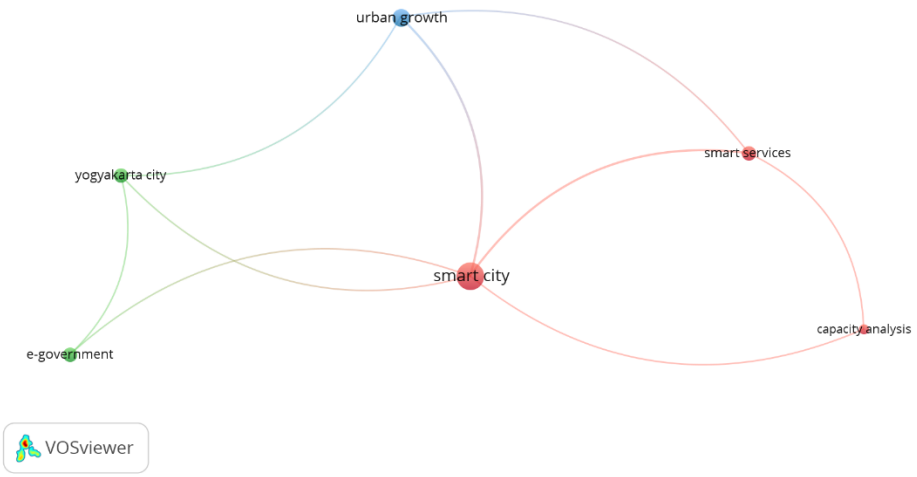


Figure 8. Network Visualisation of Jogja Smart Service Research
Source: Scopus Data Processed Using VOSviewer (2025)

The network structure provides information on connections among concepts, but the relative concentration of research themes can be examined more clearly through density visualisation. This additional perspective helps distinguish highly prominent themes from those that appear less frequently or occupy more peripheral positions in the literature. The density structure of JSS research is presented in Figure 9.

Figure 9 indicates the relative concentration of interconnected keywords within the mapped literature. Areas with greater visual density represent themes that occur more frequently and have stronger relationships within the network, whereas areas with lower density represent less prominent or less interconnected themes. The visualisation therefore helps identify the thematic areas receiving the greatest attention in research on JSS.

The substantive literature indicates that Jogja Smart Service provides an integrated platform through which residents can access a wide range of public services. These include public information, internet access, Land and Building Tax (Pajak Bumi dan Bangunan [PBB]) payments, health-centre queues, employment information, complaints services, cycling-route information, tourism events, open data, geoportals, and government training information (Nurauliana et al., 2023). This breadth of services reflects JSS's citizen-oriented approach to digital public service integration.

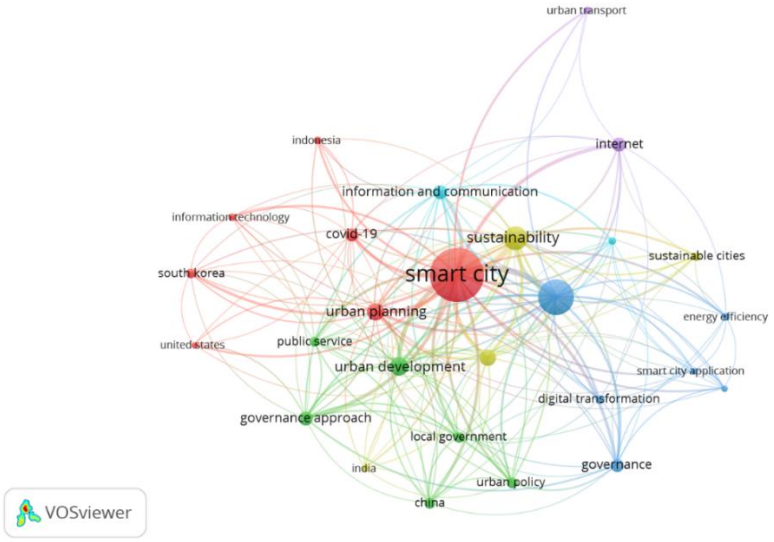


Figure 9. Keyword Density Visualisation of Jogja Smart Service Research
Source: Scopus Data Processed Using VOSviewer (2025)

JSS has also been described as incorporating Single ID, Single Window, and Single Sign-On (SSO) mechanisms to simplify access to public services. Other reported functions include regional promotion, reduced reliance on paper-based administrative processes, easier access to complaints and licensing services, and adaptation to technological developments (Gumilar, 2019). These features indicate an emphasis on simplifying interactions between residents and local government through an integrated digital service environment.

Nevertheless, JSS continues to face operational challenges. System disruptions and server errors, particularly during adjustments in service arrangements such as work-from-home periods, have affected service availability (Prayoga & Ramadhan, 2020). These limitations illustrate that digital transformation requires not only accessible applications but also reliable technological and institutional infrastructure. The development of JSS forms part of the broader digital transformation of governance in Yogyakarta (Yogar et al., 2023), where leadership and administrative innovation are important for incorporating new service mechanisms into government processes. Features such as document downloads, search facilities, language options, multimedia services, and visitor access further demonstrate efforts to make digital services more comprehensive and accessible. These characteristics are relevant to SDG 9 on innovation and infrastructure and SDG 11 on sustainable cities and communities (Ramadhani et al., 2020).

Comparative Analysis of Jakarta Smart City and Jogja Smart Service

The bibliometric and substantive findings indicate that JSC and JSS embody different orientations towards digital transformation and smart governance. Their differences are not limited to the technologies they employ but also reflect variations in urban scale, institutional priorities, service-delivery models, and mechanisms of citizen

interaction. Comparing the two initiatives therefore provides an opportunity to examine how similar smart governance objectives can be pursued through different institutional pathways.

JSS is primarily oriented towards accessible and integrated public services. Its digital platform provides residents with a single point of access to multiple government functions and therefore emphasises usability, service accessibility, and public interaction (Nurauliana et al., 2023). These characteristics are consistent with smart governance principles relating to transparency, accountability, inclusion, and citizen-oriented service delivery (Indriyani et al., 2022). By expanding opportunities for residents to obtain information and interact with local government, JSS may contribute to greater accessibility and responsiveness in public service delivery (Anggraini & Iqbal, 2020).

JSC, by contrast, places greater emphasis on data integration and technologically enabled urban management. Big data and related digital systems are used to support urban planning, cross-sectoral coordination, and infrastructure management (Tarissa, 2023). This model reflects a stronger data-oriented approach in which information generated across urban systems can inform planning and policy processes (Tarissa, 2023). JSC can therefore be characterised as comparatively more data-centric, whereas JSS demonstrates a more user-centred orientation towards digital public services (Ramadhani et al., 2020; Tarissa, 2023).

This distinction should not be interpreted as suggesting that one model is inherently superior to the other. Rather, the two cases illustrate how smart governance may develop differently according to urban scale, institutional priorities, technological capacity, and local service needs. JSC demonstrates how digital technologies and integrated data can support the management of a complex metropolitan environment, whereas JSS illustrates how integrated digital platforms can simplify citizen access to local government services.

From an e-government perspective, both initiatives contribute to the development of more digitally enabled governance systems. Their respective strengths suggest that effective smart governance may require both administrative efficiency and citizen responsiveness. Combining data-informed institutional capacity with accessible citizen-facing services may therefore contribute to e-government systems that are more inclusive, efficient, and responsive to public needs (Wahyu Sulistya et al., 2019).

The comparison also reflects different orientations within development administration. Jakarta demonstrates a more strategic and metropolitan approach characterised by large-scale infrastructure, integrated transportation, digital public services, and data-driven urban management. Yogyakarta places comparatively greater emphasis on community-oriented services, local needs, citizen interaction, and accessible public service delivery. These differences reinforce the argument that smart governance does not necessarily follow a universal model but may need to be adapted to the institutional, social, technological, and developmental characteristics of individual cities (Das, 2010).

Taken together, the bibliometric and comparative findings indicate that research on smart cities and smart services between 2019 and 2024 encompasses technology,

governance, mobility, public services, and sustainability. The two Indonesian cases demonstrate that digital transformation can support sustainable urban governance through distinct but potentially complementary institutional pathways. JSC emphasises big data, IoT, and data-informed urban management, whereas JSS places greater emphasis on accessible and user-centred digital public services. Despite these differences, both initiatives underline the importance of combining technological innovation with institutional capacity, transparency, accountability, and citizen engagement in the development of sustainable smart governance.

Conclusion

This study highlights the role of digital transformation in advancing sustainable smart governance and strengthening digital public service delivery in Indonesian cities. The bibliometric analysis of 393 publications from 2019 to 2024 indicates that research on smart cities, smart services, digital governance, and sustainability has developed into an increasingly multidisciplinary field, reflecting sustained international interest in the use of digital technologies to support urban governance. The comparative analysis further demonstrates that Jakarta Smart City (JSC) and Jogja Smart Service (JSS) represent distinct but potentially complementary approaches to smart governance. JSC adopts a predominantly data-driven model through big data, the Internet of Things (IoT), integrated information systems, and data-informed decision-making, whereas JSS places greater emphasis on accessible and citizen-centred public services delivered through integrated digital platforms. These differences suggest that smart governance is unlikely to follow a uniform model and should instead be adapted to the institutional, technological, social, and developmental characteristics of individual cities.

The findings further indicate that technological advancement alone is insufficient to achieve sustainable smart governance. Its effectiveness depends on the interaction between technological capacity, institutional readiness, reliable digital infrastructure, service integration, transparency, accountability, and meaningful citizen engagement. The comparison between JSC and JSS therefore suggests the potential value of combining data-driven administrative capacity with accessible and citizen-oriented service delivery. Such an approach may strengthen the inclusiveness, responsiveness, and accountability of digital governance while ensuring that technological innovation remains connected to public needs and institutional objectives.

The study also demonstrates the relevance of smart governance to the Sustainable Development Goals (SDGs), particularly SDG 9 Targets 9.1 and 9.c, SDG 11 Targets 11.3 and 11.7, and SDG 16 Targets 16.6 and 16.7. Smart governance may contribute to these goals by supporting reliable digital infrastructure, inclusive and sustainable urbanisation, accessible public services, effective and transparent institutions, and participatory decision-making. Sustainable smart governance should therefore be understood not simply as the adoption of advanced technologies but as an integrated governance process in which technological innovation is aligned with institutional capacity, public accountability, and citizen participation.

From a policy perspective, the comparison of JSC and JSS indicates that Indonesian cities and comparable developing-country contexts may benefit more from context-sensitive strategies than from standardised smart city models. Governments should consider the scale of urban challenges, institutional capabilities, technological resources, service-delivery priorities, and patterns of citizen engagement when designing digital governance initiatives. The study is nevertheless limited by its reliance on Scopus-indexed publications, the specified 2019–2024 period, and its focus on two Indonesian smart governance initiatives. Future research could broaden the bibliographic coverage, examine additional cities, and incorporate primary empirical evidence from government institutions, service users, and other stakeholders. Such research would provide a stronger basis for assessing how different combinations of technological capacity, institutional arrangements, and citizen participation shape sustainable smart governance across diverse urban contexts.

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