ISSN Print 2615-5648
ISSN Online 2615-174X

Volksgeist

Editorial Office: Faculty of Sharia, Universitas Islam Negeri Profesor Kiai Haji Saifuddin Zuhri Purwokerto, Indonesia, Jalan Jend. A. Yani No. 40 A Purwokerto Jawa Tengah 531226 Indonesia
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Enhancing Sustainable Development Efficiency Through a Single Smart City Platform: A Cost-Benefit Policy Perspective from Indonesia

Article

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Data:
Received: Nov 19, 2024;
Accepted: May 21, 2025
Published: May 26, 2025

DOI:
10.24090/volksgeist.v8i1.12584

Abstract

The issue of "application fatigue" among government agencies has led to a reluctance among user to download or engage with existing applications. The intent behind these applications is to digitalize government functions, particularly in enhancing public services. This article explores the application of cost-benefit analysis (CBA) regarding the development of smart city policies in Indonesia. Historically, smart city initiatives have often translated into the creation of new applications by both central and regional government entities. This study employs normative legal research, utilizing both a statutory and cost-benefit analysis approach to investigate smart city implementation. The findings that the current conditions for smart city development in Indonesia are regressing, primarily due to lack of central government regulations that serve as guidelines for these initiatives. The involvement of stakeholders is examined based on their authority and interests, which significantly influence the implementation of the single smart city platform. Furthermore, the cost-benefit analysis demonstrates the importance of establishing and implementing this single smart city platform as a means to enhance decision-making efficiency within government agencies. It is hoped that this article will serve as a recommendation for policymakers to conduct through analysis prior to program development to ensure feasibility and effectiveness.

Keywords: *Cost-benefit analysis; single smart city platform; public policy.*

INTRODUCTION

The concept of Smart City represents an innovative approach to urban management, integrating qualified human resources and the effective deployment of technological infrastructure. This synergy fosters an intelligent society and encourages innovation in the creative business sector, ultimately supporting sustainable development. In Indonesia, the implementation of smart cities encompasses several key aspects: Smart Economy, Smart Government, Smart Society, Smart Life

and Environment, and Smart Branding.[1] Key areas of digital application development within Smart Cities focus on: Smart Government—Enhancing public services, infrastructure and governance; Smart Economy—Promoting economic development and sustainable practices among micro, small, and medium enterprises (MSMEs); Smart Environment—Implementing environmental governance with a global perspective; Smart People—Encouraging involving community participation, improving education, and developing human resources; Smart Living—Addressing security and health culture; and Smart Branding—Celebrating the unique characteristics of each region.

In 2020, a field evaluation was conducted to assess the achievement of smart city indicators across 48 sample regions, selected from the 100 cities identified for accelerated Smart City implementation. An official report was compiled, reflecting the overall performance of these 100 regencies/cities in their smart city initiatives. The evaluation based on six Smart City indicators revealed varied outcomes concerning local government performance. Specifically, 36 regencies and cities demonstrated improvement, 1 remained stagnant, while 63 experienced a decline in performance.[2] An analysis of the data indicates a large proportion of regions are witnessing a decrease rather than an increase in smart city effectiveness. In recent years, ranking have fluctuated significantly, highlighting the dynamic landscape of smart city implementation and innovation throughout the country.[3] Notable cities such as Jakarta, Medan and Makassar, currently ranked 142nd globally, have experience a decline in their standings. Several factors contribute to this drop in ranking, including budget constraints, stakeholder engagement, and the legal framework that underpins smart city policies in Indonesia.[4]

Stakeholder involvement is a critical factor in the successful implementation of smart cities in Indonesia, alongside budget and regulatory considerations. When stakeholders are engaged and supportive, programs are more likely to receive serious backing and are easier to execute. Key stakeholders in smart city development include regional leaders, various regional government work units (SKPD), local communities, and external parties such as investors, the private sector, and the media. Strong and synergistic collaboration among these groups is essential for the success of smart city initiatives. If regional leaders are responsive to smart city challenges, these programs are likely to thrive; conversely, if smart city development is not prioritized, regional leaders may struggle to make progress.[5]

Smart city initiatives, as a facet of public policy linked to both central and regional government institutions, have various pathways for improvement based on existing evaluations. One option is to adopt a "Do Nothing" approach, which, while a valid public policy choice, typically results in stagnation. Under the scenario, the current state of smart city implementation would continue unchanged, leading to no advancements or improvements in global city rankings. Another alternative involves centralizing policies, as regulatory factors are essential for standardizing smart city practices across Indonesia. Historically, smart city policies and developments have been left to individual regions, resulting in ranking that may reflect only select components of smart cities,

[1] Sinung Suakanto et al., "Smart City Dashboard for Integrating Various Data of Sensor Networks," in *International Conference on ICT for Smart Society* (IEEE, 2013), 1–5, https://doi.org/10.1109/ICTSS.2013.6588063.

[2] Direktorat Jenderal Aplikasi dan Pemerintahan, "Gerakan Menuju 100 Kota Smart City," Kominfo RI, 2020.

[3] International Institute for Management Development, "Smart City Ranking Out Of 142 Cities," 2024.

[4] Khrisna Handipani Kominfo RI, "Faktor Peningkatan Dan Penurunan Improvement Smart City" (2024).

[5] Firman Anindra, Suhono H. Supangkat, and Raymondus Raumond Kosala, "Smart Governance as Smart City Critical Success Factor (Case in 15 Cities in Indonesia)," in *2018 International Conference on ICT for Smart Society (ICISS)* (IEEE, 2018), 1–6, https://doi.org/10.1109/ICTSS.2018.8549923.

rather than offering a comprehensive view. A third option for advancing smart city initiatives is to utilize a single smart city platform, which can enhance the effectiveness and efficiency of these efforts.[6] The Single Smart City Platform is designed to leverage technology to quickly gather and process data in real-time, resulting in faster and more efficient decision-making. The following research studies explore themes related to Smart City Policy Analysis:

Rahman Asima from Halu Oeleo University conducted a study titled "Application of the Regulatory Impact Assessment Method in Preparing Regional Regulations in Kendari City." The key findings suggest that several factors contribute to delays in the formation of regional regulations. As a solution, the researcher proposed a new methodological approach based on a regulatory impact assessment model, organized into six steps: problem formulation, identification of objectives, exploration of alternative actions, analysis of costs and benefits, and selection of options and strategies for policy implementation in Kendari.[7] Dian Agung Wicaksono investigated the topic "Quo Vadis Regulatory Impact Analysis (RIA) Regulations in the Formation of Legislative Regulations." He noted that the RIA method is explicitly included in Law Number 13 of 2022, indicating a new phase of RIA implementation in Indonesia. His findings highlight that RIA is a component of the Good Regulatory Practice (GRP) method, which focuses on enhancing regulatory standards ex ante and offers flexibility in regulatory formation according to specific needs.[8]

Further research Ke Liang Wang, Su Qin Pang, Fu Qin Zhang, Zhuang Miao and Hua Ping Sun conducted research titled "Assessment of the Impact of Smart City Policies on Total Urban Green Factor Productivity: Evidence from China." Their study emphasizes evaluating how smart city policies affect green urban productivity. They concluded that this model hold significant theoretical and practical relevance for the Chinese government and can facilitate a transition away from extensive urban development towards achieving high-quality development.[9] Xin Neg Xia, Ruo xiu, and Sheng Zhang authored a study titled "Evaluating the Impact of Smart City Policy on Carbon Emission Efficiency." Their research illustrates that the evaluation framework based on Smart City policy assessments contributes to measuring the effectiveness of climate change strategies and promoting sustainable urban planning.[10]

Several analyzes of the variations in smart city implementation outcomes are influenced by several factors, including participation from all levels of society, the development of operational governance that lacks efficiency, the management of organizations, human resources, and infrastructure, the integration of publicly accessible database systems, the use of advanced technology, and effective coordination between stakeholders.[11]

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6 Siti Zulaichah Rayno Dwi Adityo, Sheila Kusuma Wardani, "Regulatory Impact Assessment Dalam Menganalisis Kebijakan Smart City Untuk Mewujudkan Pembangunan Kota Berkelanjutan" (Malang, 2024).

7 Rahman Hasima, "Penerapan Metode Regulatory Impact Assessment Dalam Penyusunan Peraturan Daerah Di Kota Kendari," *Halu Oleo Law Review* 4, no. 1 (March 2020): 54, https://doi.org/10.33561/holrev.v4i1.9258.

8 Dian Agung Wicaksono, "Quo Vadis Pengaturan Regulatory Impact Analysis (Ria) Dalam Pembentukan Peraturan Perundang-Undangan," *Jurnal Legislasi Indonesia* 20, no. 2 (2023): 60, https://doi.org/10.54629/jli.v20i2.1012.

9 Ke-Liang Wang et al., "The Impact Assessment of Smart City Policy on Urban Green Total-Factor Productivity: Evidence from China," *Environmental Impact Assessment Review* 94 (May 2022): 106756, https://doi.org/10.1016/j.eiar.2022.106756.

10 Xingneng Xia, Ruoxi Yu, and Sheng Zhang, "Evaluating the Impact of Smart City Policy on Carbon Emission Efficiency," *Land* 12, no. 7 (June 2023): 1292, https://doi.org/10.3390/land12071292.

11 Anindra, Supangkat, and Kosala, "Smart Governance as Smart City Critical Success Factor (Case in 15 Cities in Indonesia)."

From 2021 to 2025, the focus of smart city implementation will support the development of ten priority tourist destinations and the National Capital Region (IKN).[12] This represents a significant challenge for regional governments, which have yet to demonstrate meaningful improvements in smart city initiatives. The central government has primarily adopted a top-down approach, establishing a focus on smart cities starting in 2021. To foster a community-oriented policy framework, it is essential to explore alternative strategies that genuinely reflects the aspirations and needs of the community. One alternative to avoid bureaucratic hurdles and a top-down paradigm is the use of the Regulatory Impact Assessment (RIA) method combined with a Cost Benefit Analysis (CBA) approach. The CBA method evaluates both existing and proposed policies by utilizing a wide array of empirical data, enabling decision-makers to understand the impacts of policies in terms of costs and benefits. Conducting a CBA is crucial as it helps prevent the implementation of effective policies that could negatively affect society.

Implementing Cost-Benefit Analysis (CBA) to evaluate the Single Smart Platform policy in Indonesia provides a thorough and systematic assessment of the potential positive and negative impacts of these policies. The CBA framework is designed to assess the likelihood of undesirable outcomes. Typically, this concept involves collaboration among various stakeholders, each contributing their expertise. In developed countries, the CBA framework is widely utilized in regulatory adoption. Overall, the goal of the CBA in regulatory drafting is to identify and minimize avoidable negative impacts.

The implementation of Cost-Benefit Analysis (CBA) as a foundation for policymaking is a vital scientific approach in decision-making processes, particularly regarding smart city policies and the development of a unified smart city platform. CBA allows policymakers to systematically evaluate the economic efficiency of initiatives by comparing total benefits—such as improved public service efficiency, data integration, and enhanced quality of life—with total costs, which include infrastructure investments, cybersecurity risks, and social impacts. In formulating smart city policies, CBA is essential for preventing the misallocation of public funds and ensuring that adopted technologies deliver substantial value to society. Furthermore, creating a consolidated platform that integrates various urban services into a single digital system requires careful consideration, as technical complexities, potential functional overlaps, and risks of data monopolization could lead to long-term adverse effects if not thoroughly analyzed from the beginning.

RESEARCH METHODS

This study employs normative legal research[13] to examine the application of Cost-Benefit Analysis in the formation of the Single Smart City Platform policy in Indonesia. Following the collection of relevant data, the research proceeds to identify problems and ultimately aims to solve these issues by analyzing the costs and benefits associated with the single smart city initiative. This research utilizes both a statutory approach and a conceptual approach due to the nature of the issues

[12] Direktorat Jenderal Aplikasi dan Pemerintahan, "Gerakan Menuju 100 Kota Smart City."

[13] Sheila Kusuma Wardani Amnesti et al., "Higher Education with Disabilities Policy: Ensuring Equality Inclusive Education in Indonesia, Singapore and United States," *Journal of Human Rights, Culture and Legal System* 3, no. 3 (November 2023): 412–40, https://doi.org/10.53955/jhcls.v3i3.135.

being discussed. The data are secondary, comprising primary legal materials such as legislation, including ministerial regulations and regional regulations related to smart cities.[14]

ANALYSIS AND DISCUSSION

Condition of Existing Smart Cities in Indonesia

The development of national smart cities is intrinsically linked to evaluating the current conditions associated with smart city implementation. In a rule-of-law state (recthstaat), the role of law is crucial as it is enshrined in the Indonesian constitution;[15] the advancement of smart city initiatives relies on a clear legal foundation. The sustainability of smart city programs can be assessed by analyzing the vision, mission, and RPJMN (National Medium-Term Development Plan) documents. Additionally, an analytical identification of the current and ideal conditions for smart cities in Indonesia has been conducted. The discussion concluded with a prioritization analysis of initiatives that will serve as the framework and blueprint for national smart city development.

According to the International Institute for Management Development (IMD), which ranked 142 global cities implementing smart city initiatives, there major cities in Indonesia—Jakarta, Medan and Makassar—are included in this assessment.[16] Currently, Jakarta ranks 103rd in the world, a decline of 22 places since 2020. Medan is positioned at 112th, having dropped 18 spots since 2020, while Makassar has fallen to 115th from its previous rank of 90th in 2020.[17] The existing conditions of smart city implementations in various Indonesian cities require optimization and guidance from the central government, which plays a crucial role in the success of regional initiatives. So far, the smart city programs have been developed based on each regional government's interpretation of local potential, rather than following the direction set by the central government.[18] In this context, the Ministry of Communication and Information serves as a consultant to local governments in their smart city development efforts.[19]

The Special Region of Jakarta has been a pioneer of smart city initiatives in Indonesia, launching its first efforts in 2014. The legal framework for implementing smart cities in DKI Jakarta Province is encapsulated in Governor Regulation Number 280 of 2014, officially enacted in December 2014. DKI Jakarta Province introduced the first innovations related to smart city development before the Ministry of Communication and Information embraced the concept nationwide. The success of smart city initiatives in DKI Jakarta is heavily influenced by strong leadership, particularly the Governor, who tailors the vision and mission that guide the preparation of the provincial government's work program. The development of the smart city in DKI Jakarta

[14] Hariyanto Hariyanto, Mabarroh Azizah, and Nurhidayatuloh Nurhidayatuloh, "Does the Government's Regulations in Land Ownership Empower the Protection of Human Rights?," *Journal of Human Rights, Culture and Legal System* 4, no. 2 (May 2024): 391–421, https://doi.org/10.53955/jhcls.v4i2.222.

[15] Rayno Dwi Adityo, "Interpretation of Public Figures in Indonesian Law Number 7 Of 2012 Concerning Handling Social Conflicts in The Perspective of Legal Certainty," *Volksgeist: Jurnal Ilmu Hukum Dan Konstitusi* 5, no. 1 (June 2022): 13–25, https://doi.org/10.24090/volksgeist.v5i1.6402.

[16] International Institute for Management Development, "Smart City Ranking Out Of 142 Cities."

[17] International Institute for Management Development, "Smart City Index," 2024.

[18] Hariyanto Hariyanto, Ahmad Rezy Meidina, and Mabarroh Azizah, "Decentralization and the Fulfilments of Children's Rights: Challenges and Opportunities for Local Government in Indonesia," *Lex Scientia Law Review* 8, no. 2 (November 30, 2024): 677–706, https://doi.org/10.15294/LSLR.V8I2.14373.

[19] Khrisna Handipani Kominfo RI, "Faktor Peningkatan Dan Penurunan Improvement Smart City."

is managed by the Regional Public Service Agency (BLUD) under the DKI Jakarta Provincial Communication, Information and Statistics Service. The Jakarta Smart City initiative aims to enhance the city's technological and public service capabilities to meet the needs of the residents of Jakarta Province.[20] The Jakarta Smart City Unit employs seven indicators to establish a smart city ecosystem, including: smart environment, smart economy, smart people, smart mobility, smart governance, smart living, and smart branding.

West Java Province is one of the participants in the smart province pilot project, focusing on developing smart cities in 24 out of its 27 regencies/cities.[21] Each regency and city in West Java has established a blueprint for a digital city to support the overall smart province initiative. The Ministry of Communication and Informatics recognized West Java and the Special Region of Yogyakarta with awards for achieving an 80% implementation rate of smart city initiatives across their cities and regencies. As part of the smart city pilot project, West Java Province collaborates with each regency to implement smart city solutions. This includes various application developments to enhance public services, such as SapaWarga, Bandung Command Center, Bekasi Smart City, and Depok Single Window.[22] However, a significant challenge remains, as many of these applications are not integrated, leading to difficulties in data management and processing at the provincial level.

Makassar is among three Indonesian cities included in the global smart city ranking. The city leverages e-government systems, such as e-puskesmas and e-sibuntulu, to facilitate electronic-based government administration system and process public complaints,[23] showcasing the Makassar City Government's commitment to smart initiatives. However, one of the key challenges in implementing smart city strategies in Makassar lies in the fragmented interpretation of "smart city" through the development of various digital government programs. Numerous applications have been created by different departments without integration, resulting in some government-owned applications being abandoned by users due to their impracticality and inflexibility. [24]

The following is an explanation of the achievements of smart cities in several cities in Indonesia, based on the categorization of indicators: Smart Governance, Smart Living, Smart Economy, Smart Society, Smart Environment, and Smart Branding:

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[20] Sheila Kusuma Wardani Amnesti, Siti Zulaichah, and Nurul Istiqomah, "Legal Protection of Personal Data Security in Indonesian Local Government Apps: Al Farabi's Perspective," *Legality : Jurnal Ilmiah Hukum* 33, no. 1 (October 2024): 1–19, https://doi.org/10.22219/ljih.v33i1.34623.

[21] Ditjen APTIKA Kominfo RI, "Smart Province Di Jawa Barat," 2023.

[22] Agit Amrullah, "Smart City Dynamic Dashboard: Alternatif Kolaborasi Multi Aplikasi Pada Smart City Menggunakan Metode User-Driven Collaboration (Udc)," *Jurnal Teknoinfo*, 2019.

[23] Andi Tika Wulandari Annisa Nurdiassa, Achmad Zulfikar, Fatmawati Rasyid, "Smart City Policy Implementation in Realizing Makassar a World City," *Journal of Public Administration and Government* 3, no. 1 (2021): 37–46, https://doi.org/https://doi.org/10.22487/jpag/ v3i1.114.

[24] Li Hongyi, "No Body Download Apps!" (2024).

Table.1
Achievement of smart city indicators

No	Kota	Indikator					
		Smart Governance	**Smart Living**	**Smart Economic**	**Smart Society**	**Smart Environment**	**Smart Branding**
1	Jakarta	JAKI Super Apps, Cepat Respon Masyarakat, Peta Jakarta Kini, Privacy by Default (whistleblowing)	Future City-Hub, Citizen 360, CCTV Jakarta, Corona.go.id	Jakpreneur	Digital Xperience, Free Wifi, Future City-Hub, JSC Goes to School	Flood Control System (IoT in Flood Control), Air Quality Detector, Early WarningSystem	Jakarta festival
2	Bandung	Bandung Command Center, Aplikasi Bandung Smart City	Smart transportation,		Wi-fi public, Smart lighting	Waste Management System, Smart Agriculture	
3	Bekasi	Aplikasi Bekasi Smart City	Online Traffic, Smart Parking		Wi-fi publik	Digital Waste Management	
4	Depok	DSW Apps (*Depok Single Window*) aplikasi Hi-Depok Smart Healhty City[25]					
5	Cimahi[26]			Development of the area (technopark) economic strategy		Function of Water Absorption Conservation, Pollution control monitoring system, green building	
6	Bogor[27]	@pemkotabogor	Public Transportation system	Creative economy system (credit application for SMEs)	CCTV, free WiFi at dozens of public locations integrated with data across agencies through a Data Center	smart energy	Regional-national scale cultural heritage exhibition
7	Semarang[27]	Website http://smartcity.semarangkota.go.id/ (Call Center 112), I-Jus Melon, dan E-Kinerja	JAGA Apps, Kampung Pelangi, dan Kartu Semarang Hebat	Carry credit: unsecured loans for SMEs	Public Street Lighting (PJU) using wireless networks, public WiFi access, Smart Lighting System, or Light Emitting Diode Smart System (LED SS)	Smart Park, Household energy usage from waste	

[25] Nazwa Izhatul Maula et al., "Analisis Kesiapan Kota Depok Dalam Mengaplikasikan Depok Single Window (DSW) Guna Mewujudkan Smart City Di Indonesia" (n.d.).

[26] Adi Riyanto1, Haris Mustopa2, "Implementasi Konsep Smart City Dalam Aspek Lingkungan Studi Kasus: Kota Cimahi," in *Seminar Nasional Tahunan Matematika, Sains Dan Teknologi 2017* (Universitas Terbuka, 2017), 23.

[27] Ilham Gemiharto, "Strategi Branding Biro Humas Kota Bogor Dalam Pelaksanaan Program Bogor Smart City," *Jurnal Politikom Indonesiana* 3, no. 1 (2018): 106, https://journal.unsika.ac.id/politikomindonesiana/article/view/1415/1170.

[28] Irfan Setiawan and Elfrida Tri Farah Aindita, "Penerapan Konsep Smart City Dalam Tata Kelola Pemerintahan Kota Semarang," *Jurnal Ilmiah Administrasi Pemerintahan Daerah* 14, no. 1 (2022): 103, https://doi.org/10.33701/jiapd.v13i2.

No	Kota	Indikator					
		Smart Governance	Smart Living	Smart Economic	Smart Society	Smart Environment	Smart Branding
8	Makassar	E-Pemerintahan e-Sibuntulu (The Inspiration and Aspiration Site for Makassar Residents) portalwww.makassartidakrantasa.com[28]	e-Puskesmas	Online licensing	Udoctor		e-Galeri (Makassar City Gallery Site), GIS Smart City,dan e-Wisata (Makassar City Tourism Application).

Source: Processed based on various research sources

Mapping Regulations Related to the Single Smart City Platform Policy in Indonesia

To support the implementation of smart cities in Indonesia, several regulations have been established to ensure governance across all stages, from planning and construction to operation and development. While some central regulations do not explicitly mention "smart cities" in their titles, they refer to the concepts within their articles. These regulations include: Law Number 26 of 2007 on Spatial Planning, Law Number 11 of 2008 on Electronic Information and Transactions, Law Number 14 of 2008 on Public Information Disclosure, Law Number 25 of 2009 on Public Services, Government Regulation Number 71 of 2019 on the Implementation of Electronic Systems and Transactions, Government Regulation Number 59 of 2022 on Urban Areas, Presidential Regulation Number 95 of 2018 on the Electronic-Based Government System, Presidential Regulation Number 39 of 2019 on One Data Indonesia, Presidential Regulation Number 18 of 2020 on the National Medium-Term Development Plan for 2020-2024, Presidential Instruction Number 3 of 2003 on the National Policy and Strategy for e-Government Development, Minister of Communication and Information Regulation Number 41/PER/MEN.KOMINFO/11/2007 on General Guidelines for National Information and Communication Technology Governance, Minister of Communication and Information Decree Number 55 of 2003 on Guidelines for Government Portal Infrastructure Development, Minister of Communication and Information Decree Number 57 of 2003 on Guidelines for Developing e-Government Master Plan. In addition, various Regional Regulations and/or Mayor Regulations have been enacted in regions implementing smart city initiatives, including: (1) Regional Regulation of Depok City Number 2 of 2019 on the Implementation of Smart City in Depok City; (2) Regional Regulation of Bekasi City Number 2 of 2020 on the Implementation of Smart City in Bekasi City; (3) Regional Regulation of Cirebon City Number 14 of 2021 on the Implementation of Smart City; (4) Regional Regulation of Singkawang City Number 3 of 2024 on the Implementation of Singkawang Smart City; (5) Governor Regulation of DKI Jakarta Number 151 of 2018 on the Regional Management Information System; (6) Mayor Regulation of Semarang Number 26 of 2018 on the Master Plan for Semarang Smart City; (7) Mayor Regulation of Medan Number 28 of 2018 on Medan Smart City; (8) Mayor Regulation of Bandung Number 1470 of 2018 on the Master Plan for Bandung Smart City; (9) Mayor Regulation of Malang Number 43 of 2020 on the Master Plan for Malang Smart City; (10) Mayor Regulation of Surakarta Number 8.6

[29] Annisa Nurdiassa et al., "Implementasi Kebijakan Smart City Dalam Mewujudkan Makassar Kota Dunia," *Journal of Public Administration and Goverment*, 2021, 39, https://doi.org/10.22487/jpag/v3i1.114.

of 2022 on the Surakarta Smart City Masterplan; and (11) Mayor Regulation of Padang Number 9 of 2023 on the Implementation of Smart City.

Table.2
Mapping Regulations Related to the Smart City Policy in Indonesia

No	Regulations	Type of Regulation	Applicability	Smart City Payload
1	Law Number 26 of 2007 concerning Spatial Planning	Law	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
2	Law Number 11 of 2008 concerning Electronic Information and Transactions	Law	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
3	Law Number 14 of 2008 concerning Openness of Public Information	Law	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
4	Law Number 25 of 2009 concerning Public Services	Law	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
5	PP Number 71 of 2019 concerning Implementation of Electronic Systems and Transactions	Government Regulations	National	Relates to governance and digitalization of national and regional governments but does not specifically regulate Smart City Implementation
6	Presidential Regulations Number 95 of 2018 concerning Electronic-Based Government Systems	Presidential Reguations	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
7	Presidential Regulation Number 39 of 2019 concerning One Indonesian Data	Presidential Reguations	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
8	Presidential Regulation Number 18 of 2020 concerning National Medium Term Development Plan 2020-2024	Presidential Reguations	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation

No	Regulations	Type of Regulation	Applicability	Smart City Payload
9	Presidential Instruction Number 3 of 2003 concerning National Policy and Strategy for e-governement Development	Presidential Instruction	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
10	Minister of Communication and Information Regulation Number 41 of 2007 concerning General Guidelines for National Information and Communication Technology Governance concerning General Guidelines for National Information and Communication Technology Governance	Minister of Communication and Information Regulation	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
11	Minister of Communication and Information Decree Number 55 of 2003 concerning Guidelines for Development of Government Portal Infrastructure	Minister of Communication and Information Decree	National	Relates to national and regional city governance but does not specifically regulate Smart City Implementation
12	Minister of Communication and Information Decree Number 57 of 2003 concerning Guidelines for Preparing Master Plans for Institutional e-Governement Development	Minister of Communication and Information Decree	National	Relates to national and regional e-government governance but does not specifically regulate Smart City Implementation
13	Depok City Regional Regulation Number 2 of 2019 concerning Implementation of the Depok City Smart City	Regional Regulation	Depok City	Specifics of Managing Smart City Implementation
14	Bekasi City Regional Regulation Number 2 of 2020 concerning Implementation of the Bekasi City Smart City	Regional Regulation	Bekasi City	Specifics of Managing Smart City Implementation

No	Regulations	Type of Regulation	Applicability	Smart City Payload
15	Cirebon City Regional Regulation Number 14 of 2021 concerning Implementation of Smart Cities	Regional Regulation	Cirebon City	Specifics of Managing Smart City Implementation
16	Singkawang City Regional Regulation Number 3 of 2024 concerning the Implementation of Singkawang Smart City	Regional Regulation	Singkawang City	Specifics of Managing Smart City Implementation
17	DKI Jakarta Governor Regulation Number 151 of 2018 concerning Regional Management Information Systems	Governor Regulation	DKI Jakarta Province	Specifics of Managing Smart City Implementation
18	Semarang Mayor Regulation Number 26 of 2018 concerning the Smart City Semarang Master Plan	Mayor Regulation	Semarang City	Specifics of Managing Smart City Implementation
19	Medan Mayor Regulation Number 28 of 2018 concerning Medan City SmartCity	Mayor Regulation	Medan City	Specifics of Managing Smart City Implementation
20	Bandung Mayor Regulation Number 1470 of 2018 concerning the Smart City Bandung Master Plan	Mayor Regulation	Bandung City	Specifics of Managing Smart City Implementation
21	Malang Mayor Regulation Number 43 of 2020 concerning the Smart City Malang Master Plan	Mayor Regulation	Malang City	Specifics of Managing Smart City Implementation
22	Surakarta Mayor Regulation Number 8.6 of 2022 concerning Surakarta City SmartCity Masterplan	Mayor Regulation	Surakarta City	Specifics of Managing Smart City Implementation
23	Padang Mayor Regulation Number 9 of 2023 concerning the Implementation of Smart Cities	Mayor Regulation	Padang City	Specifics of Managing Smart City Implementation

Source: Processed based on various research sources

Based on table 2 mentioned above, while several regulations specifically address smart cities, others do not directly govern them but instead focus on enhancing government management

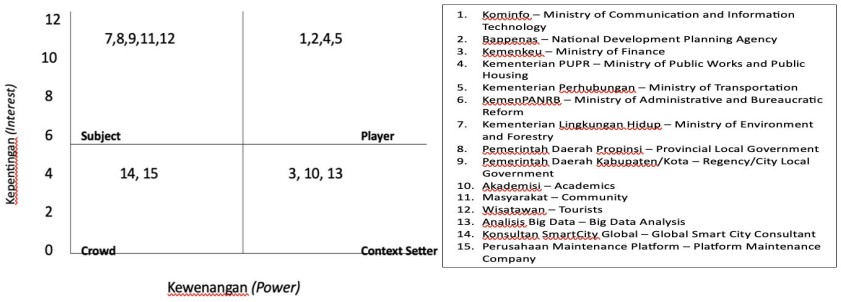
through existing urban planning frameworks. Ideally, provincial governments should formulate policies that incorporate national policy adaptation, ensure synchronization and coordination, and establish reporting mechanisms for the implementation of smart city initiatives.[30] Consequently, there is an urgent need to establish smart city regulations at the central government level to address the inconsistencies of regulatory practices across regions. This effort aims to prevent unilateral interpretations by regional governments in the development of smart cities in their respective areas,[31] ewhich has been a common issue thus far. The creation of a unified smart city platform policy could provide a foundation for developing new legal frameworks and serve as an alternative policy instrument from the central government to regional governments, potentially taking the form of Government Regulations or Laws.

Stakeholder Mapping Related to the Single Smart City Platform Policy in Indonesia

Stakeholders play a crucial role, along with budget and technology development, driving improvements to smart city programs in Indonesian cities. The Single Smart City Platform Policy Option is a collaborative policy alternative that engages stakeholders to enhance the effectiveness and efficiency of smart city implementation. Each stakeholder has distinct role, functions, and authorities that can significantly impact the success of the smart city program. According to Bryson (2011), stakeholder mapping can be conducted using a power versus interest diagram.[32] This diagram categorizes stakeholder groups into four categories: players, context setters, subjects, and crowd. Here we see the mapping of stakeholders in the formation of a single smart city platform:

Figure 1.

Stakeholder Mapping for Single SmartCity Platform Development



Based on Figure 1, the stakeholder mapping image, the first quadrant, consists of groups with low authority and low interest, including SmartCity Global Consultants and Platform Maintenance Companies. Subject, the second quadrant, includes actors with low authority but high interest, such as the Ministry of the Environment and provincial and local governments.[33] Context Setters, the

[30] Netty Naiborhu et al., "Blue Carbon Policy Direction in Optimizing the Potential of Coastal Areas," *Jurnal IUS Kajian Hukum Dan Keadilan* 13, no. 1 (April 2025): 242–58, https://doi.org/10.29303/ius.v13i1.1585.

[31] Riris Ardhanariswari et al., "Enhancing SDGs Desa Implementation for Human Right Fulfillment in Banyumas Regency: An Empirical Judicial Analysis," *Journal of Indonesian Legal Studies* 9, no. 1 (May 8, 2024): 279–316, https://doi.org/10.15294/JILS.VOL9I1.4581.

[32] Jhon M Bryson, *What Do When Stakeholders Matter: Stakeholder Identification and Analysis Techniques* (Humphrey Institute of Public Affairs, 2011).

[33] Ampuan Situmeang et al., "The Solving Indonesian Intellectual Property Rights Transfer Issue," *Al-Risalah: Forum Kajian Hukum Dan Sosial Kemasyarakatan* 23, no. 1 (June 24, 2023): 59–74, https://doi.org/10.30631/ALRISALAH.V23I1.1341.

third quadrant, is filled with groups that possess high authority but low interest, which includes the Ministry of Finance, academics, and big data analysts. Finally, Players, the fourth quadrant, comprises groups with both high authority and high interests, including the Ministry of Communication and Information (Kominfo), the National Development Planning Agency (Bappenas), the Ministry of Public Works and Public Housing (KemenPUPR), and the Ministry of Transportation (Kemenhub).

Cost Benefit Analysis (CBA) Regarding the Single Smart City Platform Policy in Indonesia

Based on the various smart city conditions observed in several Indonesian cities, it is clear that the indicators for smart city development differ significantly from one region to another. Although smart cities are generally assessed using six standard indicators, these benchmarks cannot be uniformly applied across all areas. Therefore, by implementing the Regulatory Impact Assessment (RIA) concept, it is essential that the drafting of regulations takes into account both the positive and negative impacts of these laws when implemented. The RIA concept offers several advantages, including:[34] (1) Informed Decision-Making: As a policy-making tool, RIA provides a methodological approach, resulting in policies that are accountable, transparent, and consistent; (2) Identification of Better Alternatives: Focusing on efficiency can lead to the development of effective policies.[35] Efficiency is achieved when the benefits of a policy outweigh the costs incurred. Effectiveness is enhanced through stakeholder involvement from the initial problem formulation stage; (3) Avoidance of Adverse Impacts: Utilizing the RIA method allows for an early assessment of the potential positive and negative impacts associated with a policy, especially when considering budget analysis; and (4) Engagement of Stakeholders: Involving all relevant parties ensures that the problems addressed align with community needs, leading to more comprehensive policies.

A key step in implementing CBA within the smart city framework is evaluating policy impacts. This aspect of CBA focuses in assessing whether the benefits derived from a policy significantly exceed the costs incurred. Proper implementation of these policies is crucial to ensure that investments made in technology and infrastructure yield substantial benefits. Research conducted in several major cities in Indonesia, including DKI Jakarta and various locations in West Java, highlights the necessity of a comprehensive Grand Design for implementing the CBA concept. This includes identifying key smart city policy issues and setting priorities for major urban areas. Despite these similarities, each of these large cities faces unique challenges in implementing smart city initiatives. Common issues include energy availability, pollution, waste management, and traffic congestion, all of which can affect societal resilience and sustainability. Mapping smart city policy priorities across various aspects is necessary. This impact evaluation will facilitate comparisons based on costs, socio-economic impacts, and environmental benefits.

In urban environments, the structure of natural ecosystems has undergone significant changes, with green spaces being increasingly replaced by buildings and facilities. Major cities are often characterized by high-rise structures and densely populated residential areas, leading to higher energy demands and negative consequences for the surrounding environment.[36] Currently, green

[34] Teguh Kurniawan et all, "Regulatory Impact Assessment and Its Challenges: An Empirical Analysis from Indonesia," *Kasetsart Journal of Social Sciences* 39, no. 1 (2018).

[35] Sukamto Satoto et al., "Revitalization of Village-Owned Enterprises to Strengthen the Community Economy in Indonesia: Between Policy and Prosperity," *Jambe Law Journal* 7, no. 2 (December 2024): 509–37, https://doi.org/10.22437/home.v7i2.364.

[36] F.C Susila Adiyanta, "Urgensi Ketersediaan Ruang Terbuka Hijau Sebagai Ruang Publik dalam Tata Kota Berwawasan Lingkungan Hidup," *Gema Keadilan Edisi Jurnal* 5, no. 1 (2018).

open spaces are declining due to land conversion for economic purposes, as individuals prioritize land use that maximizes profits. This often manifests in the development of housing, commercial enterprises, or factories that generate profits.[37] Given the various environmental impacts, it is crucial to prioritize environmental protection in the urban planning process. Unfortunately, widespread violations of spatial planning regulations often involve both the private sector, which receives permits, and local governments, which issue those permits.

Urbanization and the growing population in large cities have heightened the demand for public facilities and infrastructure, including housing, electricity, transportation, healthcare, markets, and education.[38] Therefore, the government must strive for improvement in order to enhance the well-being of its citizens through smart city policy planning that utilizes the Cost-Benefit Analysis (CBA) method to create effective and efficient policy designs. Although the CBA concept is not explicitly detailed regarding its mandatory application in policy formulation, Law Number 13 of 2022 provides a framework for using CBA in decision-making processes. However, the involvement of the Regulatory Impact Assessment (RIA) concept by each stakeholder is largely dependent on individual regional policies. This reliance on regional discretion is one reason RIA is not widely implemented; there is a lack of explicit support from policymakers requiring its use. In some cases, the CBA concept also needs to be tailored to fit Indonesian contexts.[39] Despite the necessity for long-term adjustments, the adoption of a more effective policy will yield significant benefits for society as a whole. The RIA concept can assist in identifying issues through strong evidence and verified data, which are critical for analyzing impacts and providing reliable information.

The establishment of a single smart city platform aims to connect the government the community by integrating existing public service applications with external platforms, such as social media. This initiative also leverages technologies like Artificial Intelligence (AI), the Internet of Things (IoT), and Big Data Analysis to enhance policy management and improve decision-making. The application of CBA in analyzing a single smartcity platform is illustrated in the following table:

Table 3

Application of Cost Benefit Analysis in the Single Smartcity Platform Policy

No	Activity Program	Element	Cost	Benefit
1	Formation of Government Regulations	President, Bappenas, Kominfo, Ministry of Finance, Ministry of Transportation, Ministry of Environment, Ministry of Administrative and Bureaucratic Reform	- Verification budget and smartcity proposal as PSN - Budget for the formation of national regulations, academic studies in NA	- Reduced traffic jams - Reduced road maintenance - Increase in investors - Increased tourism visits

[37] F.C Susila Adiyanta.

[38] F.C Susila Adiyanta.

[39] Teguh Kurniawan et all, "Regulatory Impact Assessment and Its Challenges: An Empirical Analysis from Indonesia."

No	Activity Program	Element	Cost	Benefit
2	Preparation of a national blueprint	President, Kominfo Bappenas	Blueprint formation budget	- Reduced e-government applications that are not widely used - Efficiency of smartcity implementation - Reduced application maintenance costs
3	Providing infrastructure	President, Kominfo, Ministry of Transportation, Ministry of Environment, Ministry of Finance, Regional Government	Cost of building physical and digital facilities Cost of maintaining physical and digital facilities	- Reduce air pollution - Mitigation of the risk of natural disasters - Facilitate data processing in policy making
4	Utilization	Local people, tourists	Socialization costs	- increased investment from investors - increase in tourists
5	Maintenance	Smart City *Consultant, Big Data Analyst*	Maintenance fees, Consultant fees	- Big Data analysis is easy to do - Efficient in policy processing and decision making

Source: Processed by researchers from various sources

The application integration led by the central government provides a practical solution to streamline the various applications already in use. Developing a unified smart city platform necessitates collaboration between the government and the community to eliminate separate applications representing smart city innovations in different departments across Indonesian cities. This platform is designed to enhance collaborative capabilities by utilizing IoT devices and sensors, such as CCTV, which are mapped through Geographic Information Systems to gather updated real-time data about the city. By doing so, the government can conduct data analysis and address public complaints more efficiently, leading to quicker and more effective decision-making. Additionally, central coordination simplifies application maintenance, as everything falls under one governmental authority. To optimize the development of the Single Smart City Platform program in Indonesia, cooperation with third parties will be essential.

The central government's integration of applications into a unified smart city platform reflects the principles outlined in several key legislative instruments. Government Regulation No. 39 of 2006, concerning Procedures for Preparing the Government Work Plan, highlights the importance of crafting work plans based on comprehensive studies that consider efficiency and effectiveness in public service delivery. The integration is a strategic effort by the government to prevent functional duplication among agencies and improve cross-sectoral coordination, aligning with the regulation's aim of developing efficient and measurable work plans. By adopting a single smart city platform,

a balanced approach is promoted among policymakers and stakeholders, fostering an effective and efficient digital government prepared to thrive in an increasingly interconnected and digital world.[40]

Moreover, Minister of Finance Regulation No. 53/PMK.02/2012, which provides Guidelines for Cost-Benefit Analysis (CBA) in Government Investment Management, establishes a critical framework for evaluating the development of smart city platforms. Employing cost-benefit analysis ensures that investments in application integration are economically accountable by weighing the benefits—such as improved government responsiveness and enhanced public service quality—against costs associated with infrastructure development and system maintenance. This approach also promotes transparency in evidence-based decision-making, a fundamental principle of effective governance.

Additionally, Presidential Regulation No. 39 of 2019 regarding One Data Indonesia highlights the critical need for data integration within the smart city framework. By establishing a unified platform that consolidates data from various IoT devices and sensors through Geographic Information Systems, the government operationalizes the concept of standardized, accurate, and real-time accessible data. This integration is essential for facilitating accurate data analysis, expedite decision-making, and providing responsive, targeted public services. The regulation also mandates data openness and encourages collaboration among agencies, requiring transparent and accountable mechanisms for cooperation between the central government, regional authorities, communities, and third-party stakeholders. While centralizing application management under the coordination of the central government enhances maintenance efficiency and oversight, it raises challenges related to authority distribution and regional capacity. Therefore, it is crucial for supporting regulations and complementary policies to allow for active participation from regions and communities to prevent resistance or disparities in service delivery. The readiness of technological infrastructure and the enhancement of human resource capabilities are key factors in the successful implementation of this smart city platform.

In summary, integrating smart city applications into a unified platform represents a significant advancement in line with national regulations designed to enhance the quality of public services through digital transformation. This policy reform is anticipated to promote efficiency and transparency in public service delivery.[41] The success of this initiative largely depends on strong regulatory support, effective data governance following the One Data Indonesia principles, and inclusive, sustainable collaboration across sectors.

CONCLUSIONS

The implementation of smart cities in Indonesia is often hindered by a lack of consolidation from the central ministry in the form of national regulations that would serve as a legal framework for regional governments. without these regulations, regional governments have been left to interpret the concept of a smart city based on their own. Many regions have opted to implement smart city initiatives by developing various applications for public services, with the number of applications

[40] M. Ikhsan, Sutji Rochaminah, and Ayu Mastura, "The Development of Geo-Math Application by Integrating Geo-Gebra Applets to Improve Students' Spatial Ability," *Jurnal Ilmiah Peuradeun* 12, no. 3 (September 2024): 1129, https://doi.org/10.26811/peuradeun.v12i3.1492.

[41] Ronald Hasudungan Sianturi, "Optimizing the Recovery of Corrupt Assets from the Perspective of Economic Rights and Human Security in Indonesia," *Khazanah Hukum* 7, no. 2 (2025), https://doi.org/10.15575/kh.v7i2.44974.

large depends on available budgets. However, this approach has led to an overload of applications in many regions, resulting in inefficiencies and increased maintenance costs. Therefore, it is crucial to harmonize regulations among regional governments, guided by directives from central government policies. According to the Regulatory Impact Assessment, smart city policies in Indonesia present several policy options moving forward. The first option is to do nothing, which would mean refraining from enacting any policies related to smart city implementation. This approach would likely to cause further decline in the smart city concept. The second option involves creating regulations at the central government level to establish a framework that encourages consistent performance in the implementation of smart cities across different regions. The final option is to develop a unified smart city platform that connects the government and the community. This platform would integrate existing public service applications and leverage AI, IoT, and Big Data Analysis to enhance decision-making and policy management.

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