

# Strengthening Policy Capacity and Human-Centric Approaches Drives Successful Smart Governance Implementation

*Policy Capacity in  
Implementation of  
Smart Governance*

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## **ABSTRACT**

*Smart governance is a key pillar in smart city development, requiring not only technological advancement but also sufficient policy capacity and supportive organizational factors such as innovation culture, human-centric approaches, and collaboration. This study analyzes policy capacity and success factors of smart governance implementation in Tangerang City. Using a qualitative case study approach, this research applies the policy capacity framework and the smart governance success factor. The findings indicate that while the Tangerang City Government demonstrates relatively strong operational capacity and innovation performance, analytical capacity remains constrained by data quality and limited analytical human resources. Moreover, human-centric design, digital culture sustainability, and collaborative governance have not yet been fully institutionalized. This study concludes that strengthening policy capacity in conjunction with innovation culture, digital literacy, and collaborative governance is essential to achieving transformative and sustainable smart governance. The findings imply that local governments should invest strategically in human resource development, improve data governance and analytical capabilities, and prioritize user-centric digital services to enhance the effectiveness, responsiveness, and inclusiveness of smart governance initiatives.*

**Keywords:** *Human-Centric Design, Local Government, Policy Capacity, Public Innovation, Smart Governance.*

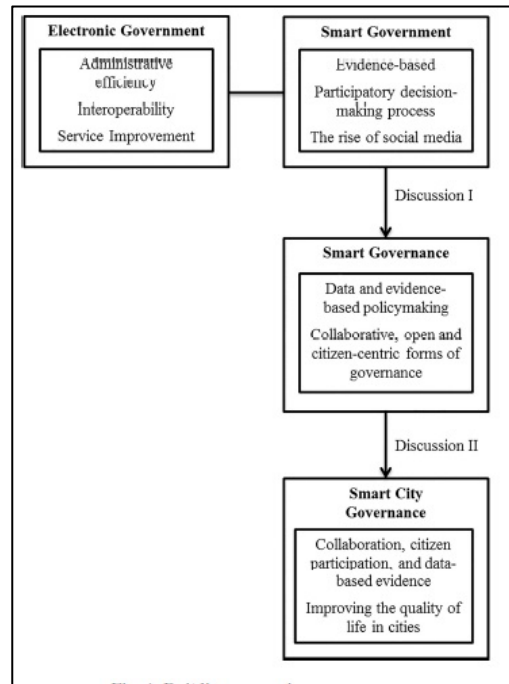
## **INTRODUCTION**

The increasing population size and density have intensified urban problems, requiring more effective, intelligent, and sustainable policy approaches and governance methods. The United Nations projects global population growth from 7.55 billion in 2017 to 9.772 billion in 2045, with 55% living in urban areas in 2018, a trend mirrored in Indonesia, where 82.37% of the population is expected to reside in cities by 2045. Rapid population growth has led to challenges such as low living standards, pollution and environmental degradation, gentrification, and suboptimal public service delivery, prompting the development of new concepts, methods, and indicators within policy frameworks to manage urban complexity (Cao et al., 2017). One emerging approach is the smart city concept, which evolves from earlier urban models like the inclusive, green, and competitive city that emphasized environmental aspects over technology and Information and Communication Technology (ICT). Smart cities can be viewed from urban planning, focusing on ICT-driven solutions for efficiency and sustainability, and economic perspectives, emphasizing high-quality human resources to enhance societal economic welfare (Winters, 2011; Angelidou, 2015; Dameri et al., 2016). Advanced technology is widely recognized for improving administrative efficiency and supporting GDP growth through investment facilitation (Glasmeier & Nebiolo, 2016; Allam & Dhunny, 2019; Yigitcanlar et al., 2019; Bibri, 2019). Pereira et al. (2018) explain that within this

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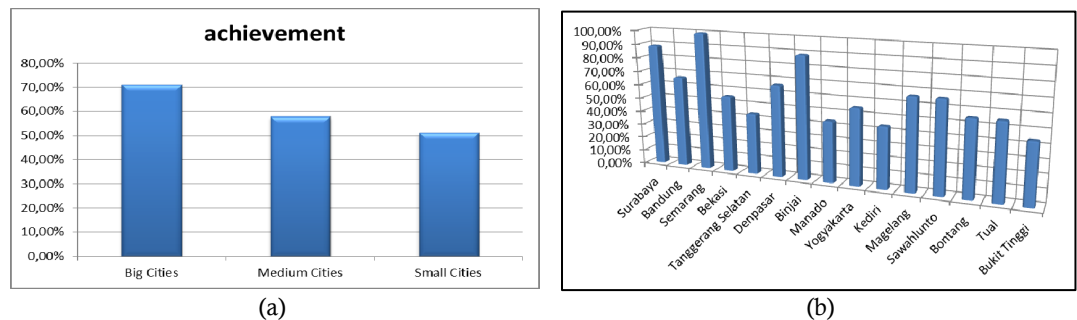
framework, smart governance has emerged by integrating concepts of good governance, e-government, open government, and citizen engagement, with its evolution traced from e-government to a broader role in urban governance.



Source: Pereira et al. (2018)

Figure 1. Evolution of the Smart Governance Concept

Based on Figure 1 above, smart governance is closely related to e-government, representing an advanced form of intelligent e-government that emphasizes collaboration between policymakers and non-governmental actors in evidence-based policymaking, beyond merely improving public services. Consequently, evaluating e-government usage is critical for assessing smart governance success. In Indonesia, e-government is implemented as the Electronic-Based Government System (*Sistem Pemerintahan Berbasis Elektronik/SPBE*), regulated under Presidential Regulation Number 95 of 2018 and Ministerial Regulation Number 59 of 2020 on monitoring and evaluation. Research by Anindra et al. (2018) indicates that 15 Indonesian cities that achieved Smart City targets shared a key success factor, over 51% of their governance activities were conducted through the e-government evaluation system, highlighting that consistent e-government implementation is essential for smart city program success (Figure 2), with (a) showing results based on population groups and (b) by city.



Source: Anindra et al. (2018)

Figure 2. Governance Achievement Level through e-Government in 15 Cities in Indonesia (a) based on Population Groups (b) by City

The consistent application of e-government in Tangerang City, reflected in the Public Satisfaction Index (*Indeks Kepuasan Masyarakat/IKM*) for information technology and SPBE services, which received a “Good” or B rating (76.61–88.30) over the past four years, with most elements averaging above 80 and peaking at 86 in 2024, except for service implementer competence and service product specifications. Despite these achievements, low digital literacy among the public and limited organizational capabilities in data and information management highlight that smart governance extends beyond digital infrastructure. To optimize performance, governments must address both technological and non-technological enabling factors (Chatfield et al., 2015). Guenduez et al. (2018) identify key success factors for smart governance, including institutional and external factors such as political commitment, clear governance, legal understanding, digital awareness, and ICT infrastructure and standards, organizational and internal factors such as structure and processes, organizational capabilities, values, and human resources, and leadership and strategy factors.

Wu et al. (2018) highlight that political commitment, organizational structure, human resources, digital awareness, ICT infrastructure, and organizational capabilities are central to policy capacity, encompassing analytical, operational, and political dimensions. Analytical capacity applies technical knowledge for efficient policy design, operational capacity aligns resources for effective execution, and political capacity secures stakeholder support. Enabling factors such as high digital awareness and digitally skilled communities enhance political capacity, promote two-way communication, and improve smart governance effectiveness by ensuring policies respond to community needs (Burstein, 2014). Political capacity, particularly effective communication with stakeholders, is crucial for building strong political commitment essential to smart governance (Guenduez et al., 2018). In Tangerang City, the Communications and Informatics Office’s contribution to the regional budget is very low, under 1% annually, declining from IDR 35.39 billion in 2021 to IDR 21.28 billion in 2024, showing smart governance is not a major budgetary priority. To optimize outcomes, the agency must strengthen political capacity by improving communication with the city council, mayor, and other stakeholders, highlighting the need to analyze political capacity factors within the policy capacity framework to support successful smart governance implementation.

In addition to political capacity, analytical capacity is crucial for successful smart governance implementation in smart city projects. Organizational capabilities with multi-sectoral management skills, including ICT, data, and business support, enable effective policy analysis and decision-making. In Tangerang City, many employees in Regional Apparatus Organizations (*Organisasi Perangkat Daerah/OPDs*) lack the skills to operationalize data-based indicators, resulting in incomplete analyses and suboptimal decisions, highlighting the importance of analytical skills at the organizational level (Wu et al., 2018). Human resource policies, such as targeted recruitment and ongoing training, and investment in ICT infrastructure with simple, interoperable, and modular standards, further enhance data collection, analysis, and information sharing across policymakers (Kwaterski & Alliance, 2010; Guenduez et al., 2018). Addressing these enablers shows that optimizing analytical capacity is essential for improving both outputs and outcomes of smart governance policies.

In policy capacity theory, optimizing operational capacity improves smart governance implementation by ensuring resources are efficiently coordinated across sectors, while flexible structures with appropriate centralization foster innovation (Wu et al., 2018; Guenduez et al., 2018). This study applies the policy capacity perspective to examine how local governments can strengthen analytical, operational, and political capabilities by addressing key success factors and enablers. Unlike governance capacity, which focuses on formal structures, or state capacity, which emphasizes resilience in policymaking, policy capacity incorporates active participation from non-governmental actors, including the private sector, academia, and communities (Christensen et al., 2018; Meckling & Nahm, 2018). The study aims to identify factors that enhance Tangerang City

Government's capacity to achieve optimal smart governance performance beyond the stagnant "sufficient/good" rating observed over the past eight years.

## LITERATURE REVIEW

### Influencing Factors of Analytical Capacity in Smart Governance

Analytical capacity is influenced by SPBE/ICT architecture, accurate information systems, data analysis expertise, and institutional commitment. Robust IT infrastructure and interoperable, modular systems support smart city success in Switzerland, structured databases enhance public service in Semarang, and strong ICT ecosystems foster innovation and analytical capabilities, supported by government incentives across 13 countries (Guenduez et al., 2018; Tan et al., 2021; Triyanto et al., 2024).

Martin (2019) studied innovations arising from robust ICT infrastructure and open standards in the Helsinki Smart City through the Software Development Kit (SDK). The Helsinki government provides free access to an integrated data system, enabling citizens and organizations to actively participate in urban services and policy development. However, establishing effective ICT infrastructure is challenging, cities in Indonesia, such as Jambi (*Sistem Informasi Kota Jambi/SIKOJA*) and Jakarta (*Jakarta Kini/JAKI*), face difficulties integrating data across government agencies and the private sector (Andisa & Rachmawati, 2023; Dewi et al., 2023). Data quality, accuracy, security, and updates must also be optimized to support successful smart governance, as seen in Medellin (Colombia), Guimarães (Portugal), and Tomohon (Indonesia) (Lopes, 2017; Mandagi et al., 2020).

Human capital is a key aspect of analytical capacity, as public employees must develop ICT and data analytics skills, including data management, cybersecurity, UX, and cross-sectoral management, to support smart governance (Guenduez et al., 2018; Mandić & Kennell, 2021). Routine recruitment and training ensure competence, as seen in DKI Jakarta's JAKI policy with over 200 experts, whereas Jambi City has only 14 ICT-skilled employees, limiting data analysis despite university support (Dewi et al., 2023; Andisa & Rachmawati, 2023). Enhancing technical skills and business acumen strengthens networks and policy evaluation, while South African secondary cities and Turin, Italy, show that large datasets are underutilized without adequate human capacity and data visualization skills (Ranchod, 2020; Tan et al., 2021). These findings highlight the need for city governments to foster evidence-based policy skills and a culture of data literacy among human resources (Broccardo et al., 2019).

### Influencing Factors of Operational Capacity in Smart Governance

Operational capacity refers to an organization's ability and resources to implement policies effectively, including financial and administrative resources, role clarity, coordination, and organizational commitment. Political and organizational commitment is crucial for long-term smart city projects, as insufficient support hampers implementation, as seen in Curitiba, Medellin, Guimarães, Bogotá, and Montevideo, and in secondary municipalities in South Africa where collaboration and information sharing are limited (Lopes, 2017; Ranchod, 2020). Consistent commitment, as in Surakarta (2018–2020), supports ICT development, monitoring, and public service improvement, emphasizing the need for continuous funding and adaptive, innovative learning organizations to enhance operational outcomes and public sector performance (Imtiyas & Roychansyah, 2023).

Coordination is another critical aspect of operational capacity. Effective internal and external collaboration, horizontal structures, and flexibility are key to overcoming silo mentality, which impedes data flow and integration, as observed in Swiss smart governance initiatives and South African cities (Guenduez et al., 2018; Ranchod, 2020). Silo effects can arise from concerns about overlapping duties and a lack of awareness of interdepartmental dependencies, reducing efficiency and resource utilization (Manda & Backhouse, 2019). Similar coordination challenges occur in Tomohon (Indonesia), Turin (Italy), and Bogotá (Colombia), while restrictive national regulations in Barcelona and

Turin hinder public-private partnerships (Broccardo et al., 2019; Mandagi et al., 2020; Nesti, 2020).

Clear governance and systematic planning can mitigate coordination challenges by establishing well-defined roles, regulations, and procedures. This is exemplified by Jakarta's JAKI platform, which integrates Regional Work Units (*Satuan Kerja Perangkat Daerah/SKPDs*) and simplifies bureaucratic processes through MoUs to facilitate internal and external coordination (Dewi et al., 2023). Similarly, Vienna's Smart City Wien project demonstrates strong operational capacity through interoperability, standards, and infrastructure that clarify roles and responsibilities across organizational boundaries (Martin, 2019). These cases illustrate that robust operational capacity through commitment, resources, and coordination is essential for effective smart governance implementation.

### **Influencing Factors of Political Capacity in Smart Governance Implementation**

Political capacity in smart governance relates to the ability to gain political support for policies, which depends on the active participation of stakeholders, the public, and institutions, as well as trust in government, policy entrepreneurs, leaders' negotiating skills, and access to policymakers. High digital awareness and active public participation are essential for success, as evidenced in Switzerland (Guenduez et al., 2018). Public participation can enhance city performance by encouraging governments to implement effective digital tools and integrate citizen feedback into scorecards and performance evaluations (Tan et al., 2021). In Indonesia, Surakarta has successfully engaged communities, private sectors, and non-governmental actors, increasing smart governance outcomes by 6.13%, while the DKI Jakarta government enables participation through the JAKI application and Electronic Development Planning Consultation (*Elektronik Musyawarah Perencanaan Pembangunan/e-musrenbang* system (Dewi et al., 2023; Imtiyas & Roychansyah, 2023). Low participation often results from limited digital literacy, as seen in Jambi City's SIKOJA app, highlighting the need for simplified and well-socialized platforms (Andisa & Rachmawati, 2023).

Socioeconomic conditions and distrust in government also affect political capacity. In South Africa, lower-middle-class communities with limited education underutilize digital ecosystems, and skepticism toward policies like the e-toll project in Gauteng reduces public collaboration (Ranchod, 2020). This underscores the importance of addressing public awareness and trust to foster meaningful participation and support for smart governance policies. Leadership through policy entrepreneurs is critical for mobilizing political support and enabling participatory policy implementation. Effective leaders integrate diverse actors, form alliances, and provide platforms for dialogue, as demonstrated in Amsterdam's Smart City program, where public-private collaboration and regular evaluation foster innovation and transparency (Martin, 2019). In Indonesia, Jakarta leaders engage directly with stakeholders to identify challenges in using the JAKI app and improve policies (Dewi et al., 2023). Conversely, leaders lacking policy entrepreneurship skills, such as in South Africa's GITOC, fail to attract investment or mobilize resources, hindering smart governance transformation (Manda & Backhouse, 2019). Leadership capacity, therefore, is essential to securing political support and enabling effective smart governance.

### **Organizational Policy Capacity for Effective Smart Governance Implementation**

The policy capacity type consists of two components: the dimensions of ability and competence, and the level of resources and capabilities. Within the ability and competence dimension, there are three types, namely, analytical capacity, ensuring that policy actions are technically sound and achieve objectives, operational capacity, aligning resources to support policy implementation, and political capacity, securing and maintaining political support for policies. Policy capacity operates across micro, organizational, and macro levels, as individual skills, policy knowledge, analytical ability, managerial expertise, and political acumen interact with organizational and systemic

support such as information infrastructure, resource management, and political legitimacy. Organizations that constrain decision-making or weaken employee motivation can undermine overall policy performance (Tiernan & Wanna, 2006). In Tangerang City, weak organizational capabilities hinder smart governance implementation, evidenced by suboptimal data management, limited collective capacity among OPDs, low political lobbying, restricted access to decision-makers, and consistently low budget allocation for smart governance and digitalization, emphasizing the importance of strengthening organizational-level policy capacity.



Source: Wu et al. (2018)

Figure 3. Operationalization of Policy Capacity at the Organizational Level

Figure 3 illustrates organizational-level policy capacity. Analytical capacity refers to an organization's ability to acquire, process, and use data for evidence-based policymaking, supported by effective information systems and e-government platforms that facilitate collaboration and citizen engagement (Cohen & Levinthal, 1990; Ouimet et al., 2010; Akeroyd, 2009; Kwaterski, 2010; Moon, 2014). Operational capacity concerns resource allocation and utilization for policy implementation, including coordination, funding, staffing, and communication, with clear objectives and professional autonomy fostering innovation while maintaining accountability (Matland, 1995; Kuipers et al., 2014; Peters, 2018).

Political Capacity is inseparable from analytical and operational capacities, as multidimensional policies require political support. Organizational Political Capacity (OPC) depends on political legitimacy, access to key policymakers, and effective communication with stakeholders and the public (Dunlop, 2015). Legitimacy ensures support for policy implementation, while direct access to decision-makers improves efficiency and professionalism. Two-way communication mechanisms, including lobbying, coalition-building, and measuring public opinion, enhance stakeholder understanding and support. By identifying and analyzing these three policy capacity types, governments can move beyond general assessments of capacity to targeted evaluations, enabling informed decision-making, effective policy implementation, and identification of gaps for optimal performance.

### Policy Capacity and Smart Governance Success at the Organizational Level

This research is based on the main theory of Policy Capacity at the organizational level by Wu et al. (2018) and smart governance success factors by Guenduez et al. (2018). The Policy Capacity theory was chosen because it is able to explain the determinants of success (enablers) of smart governance policy implementation while capturing the factual problems that occur in Tangerang City. The success factors of smart governance include institutional, organizational, and leadership/strategic factors. These factors essentially reflect a set of capabilities, competencies, and resources that the city government as a public organization must have to realize effective policy implementation (CommGap, 2007). This is in line with the policy capacity framework, which defines policy capacity as a combination of capabilities, competencies, and resources that enable policy functions to run optimally.

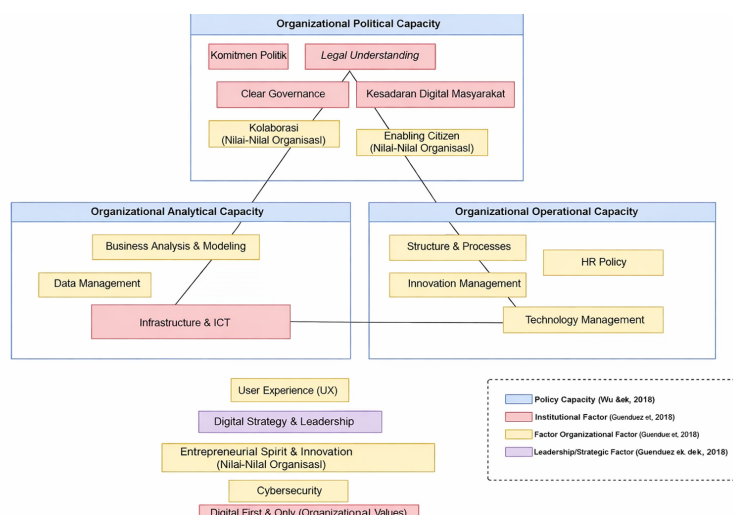


Figure 4. Comparison of Policy Capacity and Smart Governance Success Factors

Figure 4 illustrates how organizational analytical, operational, and political capacities intersect with smart governance success factors. Analytical capacity includes data management, business analysis and modeling, and ICT infrastructure, enabling evidence-based policy formulation, where limited digital integration can risk misdirected policies. Operational capacity covers organizational structure and processes, innovation and technology management, and HR policies, ensuring effective resource use, cross-departmental coordination, and policy implementation (Hingorani & Swami, 2025). Political capacity involves political commitment, clear governance, legal understanding, public digital awareness, and citizen engagement, reflecting legitimacy, stakeholder support, and public participation, crucial for regulatory backing and successful Smart governance.

## RESEARCH METHODS

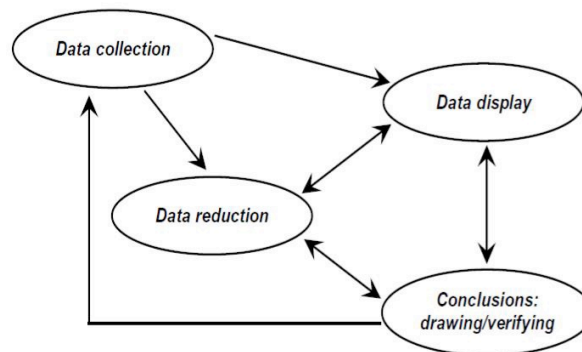
This research adopts a post-positivist paradigm, which combines elements of positivism and interpretivism. Unlike strict positivism, it recognizes that social realities, human behaviors, and institutions are complex, subjective, and value-laden, and that empirical evidence is imperfect and evolving. Thus, theories such as Guenduez et al. (2018) and Wu et al. (2018) policy capacity model are not tested but serve as analytical guides to identify and explain factors that enhance smart governance policy capacity in Tangerang City.

This research employs a qualitative case study to examine organizations and phenomena in their natural context using in-depth interviews with government officials, academics, and consultants, alongside document analysis of regulations, reports, and planning documents (Priya, 2021). Data are analyzed through the frameworks of Guenduez et al. (2018) and Wu et al. (2018) to identify factors that enhance Smart governance policy capacity in Tangerang City.

The selection of the research location is relevant to the research topic of Smart governance in Tangerang City, based on Mayor's Decree Number 800/Kep.480-Kominfo/2021, which includes the Regional Development Planning Agency (*Badan Perencanaan Pembangunan Daerah/Bappeda*) and the Communications and Informatics Department of Tangerang City. These two locations were chosen because their organizations play an active role in the implementation of cross-sectoral smart governance policies within the Tangerang City Government, both in planning and executing smart city projects.

This research primarily uses semi-structured in-depth interviews with government officials, academics, and consultants, conducted face-to-face or via WhatsApp and Zoom,

allowing flexible dialogue to explore insights on Smart governance policy capacity in Tangerang City. Secondary data is collected through document analysis of regulations, reports, research articles, performance evaluations, and institutional documents to complement interviews, minimize bias, and strengthen credibility. This research processes and analyzes data collected through interviews and document studies, then presents and analyzes it descriptively. The data analysis technique used is the interactive data analysis technique (interactive model) from Miles and Huberman (1984), as shown in Figure 5.



Source: Miles and Huberman (1984)

Figure 5. Stages of Interactive Data Analysis

Figure 5 illustrates that data analysis in this research is conducted interactively and continuously until completion, following three main stages: data reduction, which involves grouping, filtering, and organizing information for preliminary conclusions; data display, where the reduced data is presented in text, tables, or interview quotations to facilitate understanding and decision-making; and data verification, where conclusions are drawn and tested for credibility through triangulation. Triangulation, as a validity strategy, compares information from multiple sources, including interviews, observations, and documents (Carter et al., 2014). According to Creswell and Creswell (2017), this involves four steps: collecting data from multiple sources, organizing it thematically, comparing information across sources to identify patterns or differences, and interpreting the triangulated results to derive accurate and comprehensive conclusions aligned with the theoretical framework.

## RESULTS

### Factors Influencing the Implementation of Smart Governance Policies

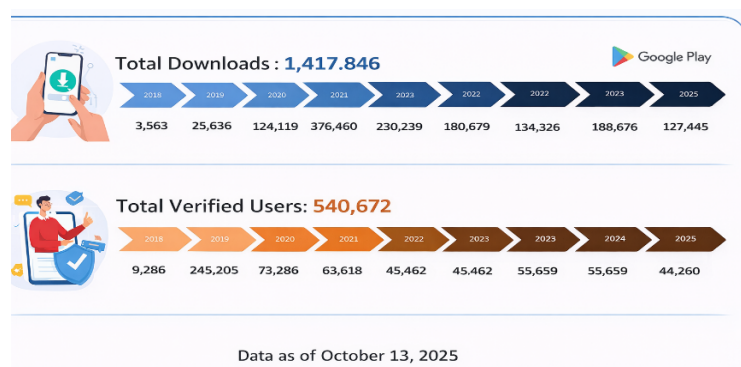
The successful implementation of Smart governance policies is not only determined by the analytical, operational, and political capacity of the organization, but is also influenced by various capacities and other supporting factors inherent in the structure and dynamics of local government organizations. These factors include organizational culture, innovation capacity, user experience, digital maturity, information security, and leadership commitment to digital transformation. In the context of the Tangerang City Government, these factors play a crucial role in shaping the readiness of apparatus and institutions to adopt, internalize, and optimize the use of digital technology in governance. Therefore, this sub-chapter discusses research findings related to capacity and other factors influencing the implementation of Smart governance policies in Tangerang City, in order to provide a more comprehensive understanding of organizational conditions in supporting smart, adaptive, and community-oriented governance.

The success of smart governance in Tangerang City does not rely solely on technology, as its implementation spans multiple interrelated sectors (Guenduez et al., 2018). A critical factor is the organization's ability to provide an adequate User Experience (UX) and ensure cybersecurity. Feedback from residents on their interactions with government

services is essential for identifying and responding to public needs. The Tangerang City Government has systematically collected this feedback through online complaint channels, social media, and annual Public Satisfaction Surveys (Criado et al., 2013). Interviews with officials from the Technology, Information, and Communication Governance Team revealed that these mechanisms help capture both public input and frontline staff insights, which are then used to create innovations such as digital queue systems in the Civil Registration Office (Bonsón et al., 2015). These efforts demonstrate the city’s commitment to continuously improving services based on user experience and practical operational knowledge.

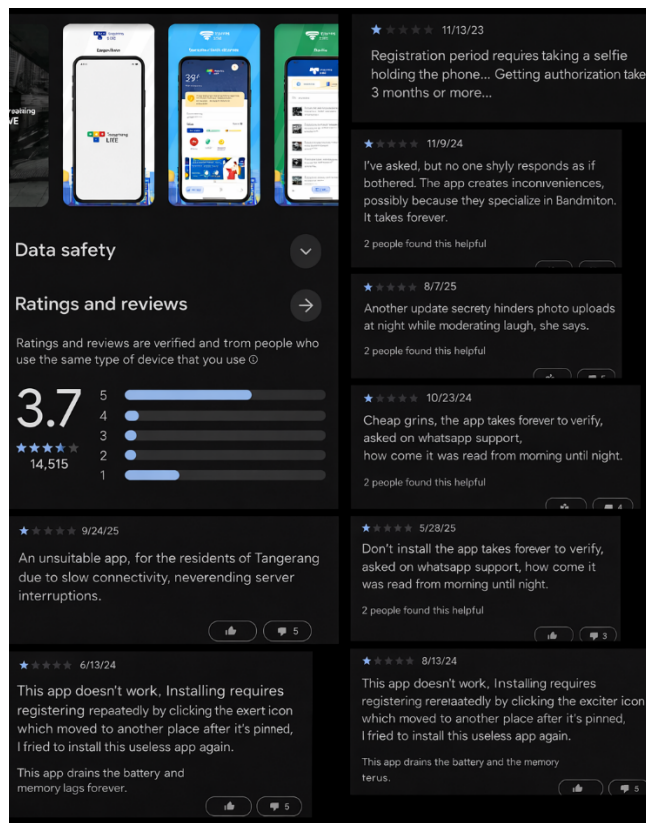
**Table 1.** Proportion of Tangerang LIVE Users to Tangerang City Population

Category	Amount	Proportion of Tangerang LIVE Users Towards the Residents of Tangerang City
Total Population of Tangerang City of Productive Age (15-65 Years) in 2024	1,369,168	<ul style="list-style-type: none"> <li>• 36.26% of the productive age population in Tangerang City were recorded as users of the Tangerang LIVE application in 2024.</li> </ul>
Total Population of Tangerang City in 2024	1,927,815	<ul style="list-style-type: none"> <li>• 25.7% of the total population of Tangerang City were recorded as users of the Tangerang LIVE application in 2024.</li> </ul>
Total Verified Tangerang LIVE Users in 2024	496,412	



Source: Data from BPS and Internal Records of the Tangerang City Communications and Information Service  
**Figure 6.** Total Downloads and Verified Users of Tangerang LIVE Application

The Tangerang City Government’s efforts to leverage user experience to identify urban community needs through integrated digital channels, such as the Tangerang LIVE Superapp, still require improvement. The app’s user penetration remains relatively low compared to the productive-age population (15–64 years old). As shown in Table 1, only 36.26% of this population were registered as Tangerang LIVE users in 2024, while Figure 6 illustrates the trend of total downloads and verified users from 2016 to 2025. This low penetration indicates that many community needs and aspirations have not been fully captured or addressed through the available digital mechanisms. Second, the low number of Tangerang LIVE app users is not solely caused by the digital divide or low digital literacy, but is also influenced by inadequate user experience in using the app. Contributing factors include bugs and errors in the app, digital service procedures that complicate administrative processes, inaccurate information between the app and conditions in the field, and delays in helpdesk responses to user complaints (Di Sutarni et al., 2024). These conditions directly impact public perception of the app’s quality, as reflected in Tangerang LIVE’s rating of only 3.7 out of 5 (last updated December 15, 2025, in Figure 7).



Source: Processed by the author

Figure 7. Ratings and Reviews of Tangerang LIVE on Google Play

Public expression through digital channels is hindered when platforms are inconvenient, complex, error-prone, or when government helpdesks are unresponsive, prompting communities to prefer face-to-face participation. According to the Chairperson of Tangerang City FK-KIM, the Tangerang LIVE app, intended to simplify public service access, often underperforms. Its many features can overload devices and make specific services hard to access, while notifications (e.g., facility availability) frequently misalign with reality. Effective digital services should reduce queuing, streamline processes, and meet community needs, yet current systems still reflect inefficiencies (Andisa & Rachmawati, 2023).

Effective public participation via digital applications requires a human-centric approach, observing user interactions, perceptions, and understanding of service processes beyond surveys. Ethical considerations, such as fairness, data privacy, accountability, and avoiding harm, are crucial, as tools like surveillance cameras may capture sensitive situations (Carter et al., 2014). Digital services should address real societal needs, assess whether digitization suits each service (e.g., ID cards), and provide context-specific solutions. Innovation is not just creating apps but solving community problems efficiently, learning from practical examples like Gojek or Halodoc. Solutions must be tailored locally; copying other cities' approaches may fail if they ignore regional needs, ensuring services remain effective, ethical, and citizen-centered.

Interview excerpts highlight that Smart governance services must adopt a human-centric approach, analyzing user experience from device interactions to understanding service processes (Mandagi et al., 2020). Ethical principles of data justice, fairness, and accountability are essential to prevent harm and ensure responsible digital services. Human-centric design also adapts services to local social contexts, integrates proven practices from daily life, and streamlines procedures. Ultimately, successful Smart governance depends on understanding user needs and social context while maintaining security, transparency, and accountability. The effectiveness of Smart governance in Tangerang City depends on a human-centric user experience. Despite digital channels

and surveys, low app usage, interaction difficulties, and limited responsiveness show that public needs are not fully met (Dewi et al., 2023). Prioritizing social context, relevant processes, and ethical principles, data justice, fairness, and accountability ensure digital services are targeted, impactful, and accountable. Considering these factors allows digital innovations to make governance more responsive and inclusive.

### **Cybersecurity Management and Risk Mitigation in Supporting Smart Governance**

The success of smart governance is also determined by an organization's capacity to protect users' personal data. In an increasingly digitalized environment, particularly with the widespread use of the Internet of Things (IoT), the potential for cybersecurity threats is increasing significantly, requiring local governments to invest in strengthening cybersecurity infrastructure, procedures, and capabilities to ensure the integrity, confidentiality, and sustainability of public digital services (Allam et al., 2019).

The Tangerang City Government has demonstrated a relatively adequate capacity in managing cybersecurity, even though cybersecurity policies and personal data protection are still relatively new agendas in Indonesia. According to the Head of the Technology, Information, and Communication Governance Team, the government implements comprehensive preventive measures that start from the application development process. Each application undergoes strict procedures, including security testing conducted twice, once during development and once during publication, to ensure vulnerabilities are addressed before deployment (Christensen et al., 2018). Beyond development, daily monitoring is carried out to detect potential hacking activities, including checking whether applications interact with "edge zone sites" where hackers share information about vulnerabilities or defaced websites. Applications that have been in use for a long time and may not fully comply with procedures are still subject to these checks to prevent them from being exploited. This approach allows the government to identify and respond to security threats proactively, ensuring that all applications are continuously assessed and maintained. By combining rigorous development protocols with ongoing operational oversight, Tangerang City demonstrates a comprehensive cybersecurity strategy that covers both upstream development and downstream monitoring, reflecting a commitment to secure and reliable public digital services.

In addition to preventive measures, the Tangerang City Government has established comprehensive response protocols to address hacking incidents, reflecting institutional preparedness in cybersecurity. According to the Head of the Technology, Information, and Communication Governance Team, when an attack occurs, forensics are conducted to determine the origin, impact, and cause of the incident. Based on these findings, appropriate actions are taken, such as asking developers to close identified vulnerabilities, isolating the application, restricting public access via local login or VPN, or deactivating the application entirely if it cannot be secured. Incident management also includes monitoring the implementation of recommendations, ensuring that vulnerabilities are properly addressed, and taking additional measures when necessary. This structured approach ensures that applications are secured and that any potential threats are managed promptly to prevent escalation within the government's digital ecosystem (Makkar et al., 2018).

The Tangerang City Government has implemented a comprehensive risk mitigation policy complemented by ongoing efforts to strengthen human resource capacity in cybersecurity and maintain adequate data center security certification. According to the Head of the Technology, Information, and Communication Governance Team, the city operates a data center certified under ISO 27001-2002 and adheres to standards set by the National Cyber Security Agency (*Badan Siber dan Sandi Negara/BSSN*). Cybersecurity personnel include internationally certified professionals, such as ethical hackers and ISO 27001 lead auditors, supported by ongoing training programs on risk management conducted by both internal units and the National Agency for Human Resources Development (*Badan Kepegawaian, Pendidikan, dan Sumber Daya Manusia/BKPSDM*) (Broccardo et al., 2019). These programs extend to employees across all Regional

Apparatus Organizations (OPDs), enabling the city to independently identify, register, and manage SPBE risks annually. Continuous professional development and compliance strategies ensure that both internal and external human resources are equipped to sustain secure, reliable, and standards-compliant digital public services.

### Organizational Analytical Capacity in Implementation of Smart Governance Policies

Organizational analytical capacity refers to the ability of local government organizations to generate, manage, and utilize data, information, and knowledge as a basis for formulating and making smart governance policy decisions (Salvador & Sancho, 2021). This capacity includes the ability to analyze policies, utilize data and information technology, and use evidence (evidence-based policy) in program planning and evaluation. In the context of the Tangerang City Government, organizational analytical capacity is crucial given the complexity of cross-OPD data management and the demands of information integration within the Smart City ecosystem. Therefore, this sub-chapter will examine the condition of Organizational Analytical Capacity in the Tangerang City Government based on research findings, in order to assess the extent to which Smart governance policies are supported by a systematic, data-based analysis process that is oriented towards improving the quality of decision-making.

**Table 2.** Findings of Organizational Analytical Capacity

Indicators / Subdimensions	Tangerang City Government Informant	External Informant / Data / Regulation	Researcher's Interpretation
Organizational Commitment to Evidence-Based Policy	SDI enables data sharing & integration; some OPD data is still below standard	Regulatory framework exists; SDI implementation scored 3 (defined)	Tangerang City demonstrates a strong commitment to evidence-based policy through unified platforms, inter-agency data integration, and regulatory guidance
Data Collection & Analysis Processes	Digitization of memos, meetings, and knowledge management; data updates are irregular	Data Quality: 2.23; Actuality & timeliness: 1 (poor)	While committed to digital policy, improvements in data quality, timeliness, and integration are needed
Availability of Employees with Analytical Skills	HR training for data analysis is ongoing; it is not fully implemented	HR competencies score 2 (sufficient/uneven)	Limited HR skills affect data accuracy, but capacity-building through training and competitions continues.

Table 2 presents the findings on the analytical capacity of the Tangerang City Government as a public organization. The government demonstrates a strong organizational commitment to evidence-based policy, as reflected in its adoption of the One Data Indonesia (SDI) principles and the development of integrated platforms for data interoperability across Regional Apparatus Organizations (OPDs). Interviews with internal informants highlighted that data sharing and integration are actively taking place to support regional development planning, although not all OPD data yet meet standardized quality requirements. This commitment is further supported by regulatory frameworks and assessments, such as the 2024 EPSS Report, which scores the implementation of SDI principles as “defined” (score 3) (Cao et al., 2017). Regarding data collection and analysis processes, Table 2 indicates that while digitization of knowledge management, including official memos, meeting minutes, and technical documentation, has begun, challenges remain in ensuring regular updates and completeness of data. The 2024 EPSS Report assigns a value of 2.23 for the Data Quality Domain and a level of 1 for actuality and timeliness, reflecting the need for more integrated, comprehensive, and timely data management practices.

In terms of human resources with analytical skills, the Tangerang City Government continues to invest in developing its staff's capacity in statistics and data management. Internal and external training programs, supported by institutions such as STIS and local

universities, aim to strengthen analytical competencies, although current capabilities remain uneven, as indicated by a maturity level of 2 in the 2024 EPSS Report. This suboptimal capacity can affect data accuracy, but the government demonstrates ongoing efforts to improve through digital training, participation in scientific competitions, and structured capacity-building initiatives (Kiosia et al., 2024).

## **DISCUSSION**

The findings reveal that Tangerang City Government's smart governance implementation demonstrates both progress and persistent capacity gaps across analytical, operational, and political dimensions. This aligns with Wu et al.'s (2018) policy capacity framework, which posits that successful policy implementation requires balanced development across all three competency types: analytical, operational, and political, supported by adequate organizational resources and capabilities. The study found that while Tangerang City has established a regulatory framework supporting the One Data Indonesia (SDI) principles and achieved a "defined" maturity level (score 3), significant challenges remain in data quality, timeliness, and human resource competencies in statistics and data management. This finding resonates with Howlett's (2009) assertion that governments require substantial policy analytical capacity, defined as the ability to access and apply technical knowledge and analytical techniques, to implement evidence-based policymaking effectively. The 2024 EPSS Report's low scores for data quality (2.23) and actuality/timeliness (level 1) suggest that Tangerang City faces what Hossin et al. (2023) describe as common barriers to data-driven governance: inadequate data infrastructure, limited analytical skills, and insufficient mechanisms for transforming raw data into actionable policy insights.

The uneven distribution of analytical competencies across Regional Apparatus Organizations (OPDs) mirrors findings from international contexts. Similar to research on evidence-based policymaking in federal agencies, where only one-third to half of managers reported adequate capacity in evidence-building skills, Tangerang City's analytical capacity maturity level of 2 (sufficient/uneven) indicates significant room for improvement. This capacity deficit can lead to what Makkar et al. (2018) identified as systematic barriers to evidence integration: poorly standardized frameworks, limited organizational capabilities, and data inaccuracies that undermine policy effectiveness. A critical finding concerns the low penetration rate of the Tangerang LIVE application (36.26% of the productive-age population), which contradicts the principles of citizen-centered smart governance advocated by Pereira et al. (2018). The application's modest 3.7/5 rating and user complaints about bugs, complex procedures, and unresponsive helpdesks suggest that technological infrastructure alone is insufficient without adequate user experience design. This aligns with Yigitcanlar et al.'s (2019), which emphasizes that smart cities cannot succeed without being sustainable and citizen-responsive. The research highlights that effective smart governance requires what Nesti (2020) terms "transformational capacity," the ability to shift from technology-centric to human-centric service design that prioritizes accessibility, usability, and genuine public participation.

The declining budget allocation for the Communications and Informatics Office (from IDR 35.39 billion in 2021 to IDR 21.28 billion in 2024) reflects weak political capacity, particularly in securing sustained political commitment identified by Guenduez et al. (2018) as a critical success factor for smart governance. This finding supports Tan et al.'s (2021) research across 13 countries, which found that insufficient political commitment and inadequate resource allocation severely limit smart governance outcomes. The budget trend suggests that despite technical achievements, Tangerang City lacks what Dunlop (2015) defines as organizational political capacity: effective communication mechanisms with decision-makers, coalition-building capabilities, and the political legitimacy necessary to secure resources for digital transformation.

These findings highlight key implications for smart governance in Indonesian cities. Local governments should systematically develop analytical capacity through recruitment, training, and partnerships to enhance data literacy and evidence-based

policymaking. Effective smart governance also requires human-centric design that prioritizes user experience, digital inclusion, and responsive feedback. Agencies must strengthen political capacity via strategic communication with legislative and executive bodies to ensure sustained commitment and resources. Policy capacity building should address analytical, operational, and political dimensions holistically, as focusing solely on technology risks maintains the “sufficient” performance plateau observed in Tangerang City.

## **CONCLUSION**

This research underscores the critical importance of policy capacity in the effective implementation of Smart governance in Tangerang City, highlighting the necessity of a balanced combination of operational, analytical, and political capacities. The findings indicate that while Tangerang City’s government demonstrates strong operational performance and a notable capacity for innovation, persistent challenges remain in strengthening analytical capacity, particularly regarding the quality, timeliness, and integration of data, as well as the development of human resources with adequate statistical and data management skills. In addition, although progress has been made in fostering a human-centric approach and cultivating a digital culture within the government apparatus, these practices are not yet fully institutionalized across all Regional Apparatus Organizations (OPDs). The study suggests that achieving a transformative and sustainable smart governance model requires a deliberate integration of policy capacity with innovation culture, digital literacy, ethical data practices, and collaborative governance mechanisms. Such integration is essential for overcoming structural and operational barriers and ensuring that digital public services are responsive, inclusive, and aligned with the evolving needs of the community.

The implications of these findings emphasize the need for targeted capacity-building initiatives, strategic human resource development, and continuous monitoring of digital service performance to support evidence-based policymaking. Limitations of this study include its focus on a single city context and reliance on qualitative interviews and secondary data, which may constrain the generalizability of the results. Future research should explore longitudinal impacts of Smart governance implementation, conduct comparative studies across multiple cities, and investigate more deeply the development of analytical skills, data governance frameworks, and human-centric digital service design to inform the creation of more sustainable and transferable Smart governance models in diverse urban contexts.

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