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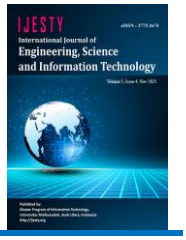

Digital Transformation of Government: An Applied Science Approach to Smart Governance in Urban SDG Frameworks

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Abstract

This study applies an applied science approach to examine digital transformation in regional development, focusing on the Electronic-Based Government System (SPBE) and Smart Governance in Makassar City, Indonesia. The research evaluates the effectiveness, transparency, and contribution of technology-based governance systems toward achieving the Sustainable Development Goals (SDGs), particularly in strengthening urban governance performance. Employing a qualitative design that integrates Triangulation and the Logical Framework Analysis (LFA) method, this study investigates the practical impact of smart government initiatives and their correlation with development-oriented performance indicators. Findings reveal that insufficient interoperability of standards, protocols, and technologies impedes seamless data exchange across platforms, applications, and devices. This technical limitation has constrained Makassar's smart governance outcomes, reflected in weak performance related to competitiveness, service efficiency, employment levels, and life expectancy. The study also identifies inadequate investment in smart infrastructure, research and development, and institutional capacity, which collectively hinder the realization of a data-driven, adaptive governance ecosystem. From an applied science perspective, this research underscores the necessity of strengthening interoperable digital architectures, ICT infrastructure, and human resource competencies to enhance system integration and decision support. By advancing engineering-based solutions for interoperability and data governance, regional governments can achieve higher levels of efficiency, transparency, and sustainability. The proposed framework provides a technological roadmap for aligning local smart city strategies with global development targets, demonstrating how applied digital innovations can bridge governance effectiveness and socio-development resilience in the context of sustainable regional transformation.

Keywords: *Digital Transformation, Smart Cities, Applied Science, SDGs*

1. Introduction

Digital transformation is an inevitability, including for government institutions. However, the data from the 2023 monitoring and evaluation of the Electronic-Based Government System (SPBE) implementation in South Sulawesi has not yet met the target. There are 20 government institutions classified as "adequate," while only four local governments have achieved a "good" rating. Makassar City falls within the "adequate" category with an index score of 2.45 [1][2]. In the context of Smart City achievements, Makassar City has developed 118 innovations across six focus areas: Smart Governance, Smart Branding, Smart Economy, Smart Living, Smart Society, and Smart Environment [3]. Among these, Smart Governance is considered the key factor for Smart City success. However, despite the high number of innovations, they have not yet had a tangible impact on the daily lives of Makassar's citizens.

The adoption of technology in accelerating Smart Governance in Makassar has been largely fragmented. Its impact has not significantly enhanced effectiveness, transparency, or the achievement of SDGs [2]. This is contrary to the perspective of [4], who argues that the application of information and communication technology in governance should enhance data-driven decision-making, public participation, and access to information [5].

Although several programs, such as the Smart Card, have been ceremonially launched [6], they have not been sustained [2]. This is largely due to the insufficient integration of technological infrastructure, human resources, and institutional readiness [7]. The integration

of these three elements is critical for the successful implementation of Smart Governance, aimed at achieving transparent governance, facilitating public participation, providing accessible information, and driving sustainable urban development [8] [9].
The adoption of technology within governance has not yet realized effective, efficient [2], communicative [10], and inclusive public services [11], nor has it fully integrated physical and non-physical systems [12]. Digital platform innovations aimed at implementing Smart Governance remain fragmented and are not sufficiently supported by infrastructure [13], collaborative platforms [9], or partnerships between the government, civil society, and the private sector to realize Smart Governance [14].
The growing urban population naturally brings an increase in social, environmental, and economic challenges [6]. The relationship between Sustainable Development Goals (SDGs) and Smart Governance programs in 128 major cities worldwide was studied, and it was found that traditional production factors such as labor, land, and capital are positively related to economic dimensions [8].
This study underscores the urgent need for research on the value chain of Smart Governance implementation as a key factor [15] in the success of Smart Cities. Measuring input, process, output, and outcome aspects is crucial for evaluating the success of Smart City programs, particularly in the public sector [2]. A Smart City is characterized by evidence-based policymaking [5], while also ensuring the city's alignment with local wisdom [16] and sustainability [8].
The findings of this research will provide in-depth insights into the value chain of Smart City programs, particularly regarding Smart Governance and Smart Economy. It will explore the efficiency of input utilization in the process (policy and program design), as well as its outcomes and impacts [17]. These findings will contribute to the broader discourse on Sustainable Development Goals (SDGs), specifically Goal 11: "Sustainable Cities and Communities," which focuses on urban management systems aimed at improving citizen well-being [8].
In this context, the *smart economy* represents a critical dimension of smart city frameworks. It encompasses economic competitiveness, innovation capacity, entrepreneurship, and labor market performance, all of which are increasingly shaped by the effectiveness of digital governance infrastructure. Cities such as Makassar, Indonesia, have initiated programs under the Electronic-Based Government System (SPBE) to enhance service delivery, promote data-driven policymaking, and foster innovation ecosystems. However, the actual impact of such initiatives on measurable economic outcomes remains insufficiently explored in the academic literature.
This study seeks to bridge that gap by examining how government digitalization, within the framework of smart governance, contributes to achieving a smart economy in line with the SDGs Cities agenda. Specifically, it focuses on Makassar City as a case study to evaluate the effectiveness of digital infrastructure in supporting local economic performance.

2. Literatur Review

2.1. Theories of Smart City

A Smart City is defined as a city that can control and integrate various basic infrastructures such as transportation networks, clean water systems, energy networks, telecommunications networks, and so on, which are capable of optimizing resources, planning maintenance activities, ensuring safety aspects, and continually striving to provide maximum services to the community [18]. The term Smart City is used to represent a city's ability to provide services to individuals or communities to explore the digital world with the environmental speed necessary to deliver the required information about the city [19]. Furthermore, It is argued that a city is considered smart when human and social resources interact with infrastructure and technology to foster urban economic growth in a livable environment.
There is no single definition of a Smart City, whether from the perspective of individuals or organizations. Each viewpoint focuses on specific aspects. [20] identify four components of a Smart City: industry, education, participation, and physical infrastructure. According to [21], the main components of a Smart City are technology, people (creativity, diversity, and education), and institutions (government and policy). The strong relationship between the latter two components, namely people and institutions, can lead to a truly smart city when investments in human capital and social capital, combined with the strengthening of ICT infrastructure, can drive sustainable growth and improve quality of life. Meanwhile, [15] relate Smart City to six components of urban life, as shown in the table below. Smart economy is associated with the presence of industries in the ICT sector or the use of ICT in production processes.

2.2. Sustainable Development

The term sustainable development now generates a huge literature on meanings and interpretation. This chapter will not expand on this topic further apart from linking it to entrepreneurship. In the late 1980s, the World Commission on Environment and Development [22], led by Gro Brundtland, developed the concept of sustainable development in an attempt to reconcile economic growth with environmental and social issues.
This is the century of the 'urban revolution'. In the 35 years since 1950, the number of people living in cities almost tripled, increasing by 1.25 billion. In the more developed regions, the urban population nearly doubled, from 447 million to 838 million. In the less developed world, it quadrupled, growing from 286 million to 1.14 billion [22].
The Sustainable Development Goals (SDGs) are a continuation of the Millennium Development Goals (MDGs), which concluded in 2015. The SDGs are expected to build upon the successes of the MDGs in addressing social, economic, and environmental issues globally. These global and local efforts should provide motivation to accelerate the reduction of poverty and inequality while promoting community well-being from the central to regional levels. [23] explains that the fundamental concept of sustainable development is to harmonize economic, social, environmental, and good governance or institutional objectives.

2.3. Technology Organization Environment

The Resource-Based View (RBV) positions interoperable SPBE (Sistem Pemerintahan Berbasis Elektronik) systems as strategic resources that generate efficiency, coordination, and innovation across government functions. When interoperability is absent, the strategic value of these systems diminishes, creating inefficiencies that increase transaction costs for businesses and reduce firm-level performance, as reflected in lower Return on Assets (ROA) [24].
From the perspective of Transaction Cost Economics (TCE), non-interoperable systems elevate coordination and compliance costs by duplicating processes and delaying service delivery. These inefficiencies constrain firms' operational capacity, limit competitiveness, and reduce their ability to expand employment opportunities [25]. Together, RBV and TCE highlight the direct economic consequences of interoperability gaps on profitability and labor absorption.

At a broader level, Institutional Theory and the Technology–Organization–Environment (TOE) framework explain how fragmented systems weaken governance and socio-economic development. Institutional misalignment fosters bureaucratic silos, inconsistent service delivery, and declining public trust, which in turn hinder economic growth and exacerbate unemployment [26]. Meanwhile, the TOE framework shows that overcoming interoperability barriers requires not only technological integration but also organizational readiness and supportive institutional environments to realize smart governance and smart economy objectives [27].

2.4. Previous Studies and Novelty

The state of the art comprises several studies conducted in various cities and countries regarding Smart Governance aimed at achieving Smart Economy within the framework of the Sustainable Development Goals (SDGs). For instance, efforts to attain Smart Economy to develop the economy in Semarang City [28], the effectiveness of the public sector based on Smart Government in Bukit Raya, Pekanbaru City [29], the framework for digital transformation through Smart Governance to achieve SDG targets in Ceará, Brazil [15], discovering smart sustainability, and the role of Smart Governance in achieving SDG Cities [8]. Additionally, information technology in Smart City initiatives in Makassar [16]. Based on these studies, the researcher notes that none have investigated the impact of implementing Smart Governance and its effects on achieving Smart Economy within the framework of SDG Cities. The novelty of this research lies in examining several aspects related to Smart Governance, including the consistency of development planning documents, technological aspects, human resources, and institutions, as well as their impact on the economic sector (Smart Economy dimension).

3. Methods

The complex digital transformation in governance through the Smart City program in Makassar, characterized by Sombere' and Smart City initiatives, aims to achieve the Sustainable Development Goals (SDGs) for cities. Smart Governance is key to the successful attainment of these objectives. The problem-solving approach includes: (1) A consistent analysis of development planning in alignment with Smart Governance and Smart Economy programs through a triangulation method. (2) The Logic Framework Analysis (LFA) approach serves to evaluate government programs that impact the socio-economic conditions of the community. By employing these two approaches, we can effectively address the issues.

3.1. Research Subject

The focus of the study is on smart governance and its indicators, as well as smart economy and its indicators Smart City Makassar, based on the Logical Framework Analysis (LFA) model.

A consistent analysis of development planning in alignment with Smart Governance and Smart Economy programs through a triangulation method. Input indicators refer to everything needed to implement activities in the economic, social, and environmental sectors to achieve outputs. Process indicators measure the efficiency of a program in achieving outputs. These indicators are related to the accuracy of economic, social, and environmental theories, as well as the procedures and principles within them. Output indicators demonstrate the form and quantity of the direct products resulting from the activities carried out. These may be physical and/or non-physical in nature, stemming from economic, social, and environmental activities. Outcome indicators reflect the functioning of the outputs in the medium term (direct effects). These indicators describe the tangible results of the program's outputs. Impact indicators provide an overview of the achievement of the program's strategic objectives.

3.2. Research Method Analysis

The following presents the procedures and research methods illustrated in the diagram below.

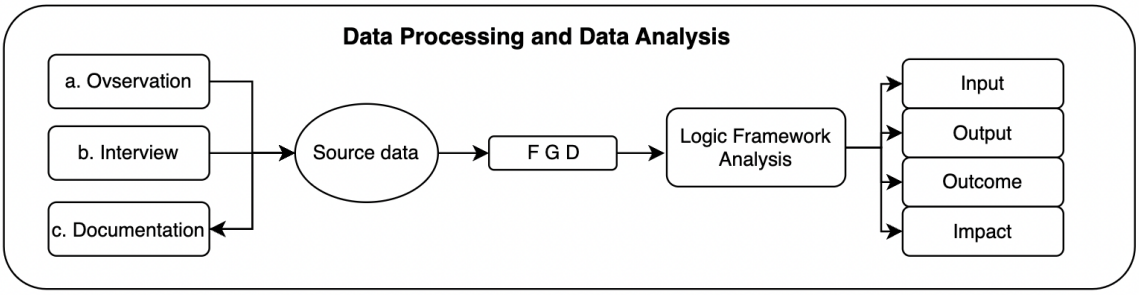

Fig 1. Method Analysis

Based on the analysis methods mentioned above, utilizing both primary and secondary data as outlined in Table 1. Meanwhile, primary data is obtained through platform observation, interviews, and Focus Group Discussions (FGDs) involving 22 participants representing government officials, private sector actors, academics, and community leaders, as well as the application of rigorous source triangulation, the analysis indicates that several key economic indicators outlined in the Medium-Term Development Plan (RPJMD) and embedded in the Mayor's political commitments have not been fully achieved. The use of triangulation across document analysis, stakeholder interviews, and statistical data validation ensured the robustness and credibility of the findings.

Smart Governance Metrics have indicators such as transparency, public participation, efficiency of government services, decision-making processes, and the use of data in policymaking. Smart Economy Metrics have indicators might include economic growth rates, employment rates, innovation levels (e.g., startup activity), investment in research and development (R&D), and digital infrastructure's contribution to the local economy.

Table 1. Document Secondary data

No.	Data / Documents	Institution
1	RPJPD of Makassar	Development Planning Agency of Makassar
2	RPJMD of Makassar 2021-2026	Development Planning Agency of Makassar

3	Road Map Sombere' and Smart City	Development Planning Agency of Makassar
4	RKPD OPD focus	Information and Documentation Official
5	APBD Realisation	DJPK of Ministry of Finance
6	Smart Governance dan Smart Economy application	Department of Communication and Information
7	SMEs of Makassar	Statistics Indonesia of Makasar
8	Data Tourism	Department of Tourism of Makssar
9	New Business, Start-up	Department of Cooperatives and UMKM

4. Result and Discussion

Detailed submission guidelines can be found on the journal web pages. All authors are responsible for understanding these guidelines before submitting their manuscript.

4.1. Theories of Smart City

Smart Governance Maturity is measured using three dimensions: technology, human resources, and institutions. The smart city maturity level is used to assess the quality and performance of smart governance implementation.

Table 2. Smart Governance Maturity

Dimensions	Level 0	Level 1	Level 2	Level 3	Level 4
Technology					
Human Resources					
Institutions					

Source: Smart Governance Makassar City Analysis, 2023

Table 3. Objectives and indictors smart governance

Objectives	Goal Indicators	Targets	Target Indicators
Improving Public Health and Social Mitigation	Health Index	• Target Indicators Life Expectancy and Poverty Rate • Increased Protection for the Poor	• Expectancy • Poverty Rate
Increasing Income Equitably	Economic Growth	• Availability of Easy Access to Job Opportunities and New Business Opportunities • Realization of Community Movement to Strengthen Economic Resilience	• Open Unemployment Rate (TPT) • Labor Force Participation Rate (TPAK) • Gross Regional Domestic Product (GDP) per Capita Gini Ratio

The life expectancy data for Makassar City shows an upward trend, but the increase is very minimal as show in Table 3. It would take several decades for Makassar City to raise its life expectancy by just one year, from 71 years to 72 years (data from 2013-2023). According to the BPS IPM report in 2022, several variables significantly influence the life expectancy of a region, including Makassar City. From 2013 to 2023, the unemployment rate in Makassar City has been relatively higher compared to other cities. This indicates that the labor market has not been able to create a balance between the supply of labor and the demand for labor. In 2023, Makassar's unemployment rate stood at a double-digit level of 10.6%, compared to Bandung (8.83%), Surabaya (6.76%), Medan (8.82%), and Semarang (6.05%).

Based on perspective of the contribution of each component of expenditure, household consumption continues to dominate the formation of Makassar City's GDP in 2023, although it has decreased compared to 2013. In 2013, household consumption contributed 58.16% to the total GDP, whereas in 2023, it decreased to 50.02%.

Smart Governance serves as the key driver of a smart city. Makassar City, aspiring to become a city with digital application services, remains mindful of the digital transformation process. In this transformation, the first stage is digitization, where data is digitalized and synchronized. The second stage is digitalization, in which government-managed data such as financial data, statistical data, and spatial data can be shared among regional government offices (OPD). Finally, the last stage is digital transformation or automation.

The objectives of Smart Governance outlined in the Makassar City Medium-Term Development Plan (RPJMD) are to revolutionize human resources (HR) and accelerate bureaucratic reform towards achieving superior human resources, providing world-class public services that are free from indications of corruption.

Several key factors that may cause a Digital Transformation Project to fail include weak coordination, lack of cooperation and collaboration, suboptimal use of infrastructure (both hardware and software), poor performance measurement, and insufficient human resources to support smart governance. The increase in online services rose from 11 to 29 between 2019 and 2023. In 2023, there were 16 integrated online services. However, the integration of applications in Makassar City is not yet optimal (Primary Data, 2024).

The applications developed by regional offices do not meet interoperability standards for integration. Support for interoperability systems, which include standards, protocols, and technologies that facilitate effective data exchange between various platforms, applications, or devices, is lacking. This issue arises from the absence of coordination between regional offices that develop applications and the Department of Communication and Information. Generally, applications are developed by different vendors with varying standards. Additionally, from a sustainability perspective, weaknesses persist due to the reliance on vendors for application management. The suboptimal integration of services has resulted in limited access for the public, as well as risks of data inconsistency between different systems, leading to inefficiencies in costs and time.

4.2. Performance of Smart Economy

The objective of Smart Economy in the Makassar City Medium-Term Development Plan (RPJMD) 2021-2026 is to reconstruct health, economy, social aspects, and culture towards a prosperous society with strong economic and health immunity for all.

Table 4. Objectives and indictors smart economy

Objectives	Goal Indicators	Targets	Target Indicators
Improving Public Health and Social Mitigation	Health Index	• Target Indicators Life Expectancy and Poverty Rate • Increased Protection for the Poor	• Expectancy • Poverty Rate
Increasing Income Equitably	Economic Growth	• Availability of Easy Access to Job Opportunities and New Business Opportunities • Realization of Community Movement to Strengthen Economic Resilience	• Open Unemployment Rate (TPT) • Labor Force Participation Rate (TPAK) • Gross Regional Domestic Product (GDP) per Capita Gini Ratio

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In terms of technology, the digitalization of public services in Makassar still demonstrates significant fragmentation. By 2023, only 16 out of 29 online services were integrated, while applications developed by different vendors failed to comply with the ISO/IEC 25010 interoperability standards. This lack of standardization created data silos and inefficiencies, exemplified by the overlap between SIDATU MICIKO and Explore Makassar in promoting local MSMEs. Such duplication not only undermines service effectiveness but also weakens the strategic value of government digital platforms.

From a human resource perspective, progress has been uneven. Although public satisfaction, as measured by the IKM index, improved by 1.8% annually, the digital literacy of civil servants remained below the national average. This competency gap limited their ability to fully leverage digital platforms, reducing the overall quality and responsiveness of public service delivery. The mismatch between rising public expectations and limited digital capacity among civil servants underscores the importance of sustained investment in human capital.

At the institutional level, weak inter-agency coordination continues to constrain the effectiveness of SPBE (*Sistem Pemerintahan Berbasis Elektronik*). Poor alignment between the Department of Communication and other OPDs has resulted in redundant systems, such as SEMBAKOTA and Halo Makassar, both of which collect and manage similar market data. These fragmented efforts indicate institutional misalignment, leading to resource inefficiencies and reduced policy coherence. Strengthening institutional coordination is therefore critical to avoid duplication, optimize resources, and ensure digital governance contributes effectively to broader socio-economic development goals. The achievement of smart economy target indicators depends on the optimization of smart economy applications developed by local government organizations (OPD) in Makassar City, as shown in Table 5.

Based on the results obtained through the Logical Framework Approach (LFA), supported by Focus Group Discussions (FGDs) involving 22 participants representing government officials, private sector actors, academics, and community leaders, as well as the application of rigorous source triangulation, the analysis indicates that several key economic indicators outlined in the Medium-Term Development Plan (RPJMD) and embedded in the Mayor's political commitments have not been fully achieved. The use of triangulation across document analysis, stakeholder interviews, and statistical data validation ensured the robustness and credibility of the findings.

The increase in the Human Development Index (HDI) from 82.25 to 83.67 was driven primarily by steady gains in the Education Index (0.818 → 0.856), while improvements in the Health Index (0.800 → 0.808) and life expectancy (72.09 → 72.30 years) were more modest. This pattern reflects the central premise of human capital theory [23], which emphasizes the role of education in enhancing productivity and long-term growth. The stronger performance in education compared to health also suggests differentiated institutional capacities across sectors. While education has benefited from digital transformation and expanded access, health outcomes remain constrained by service delivery bottlenecks and resource allocation. This indicates that human capital formation is advancing unevenly, with implications for sustaining inclusive growth. Based on the Focus Group Discussion (FGD) and logic model analysis in the development planning documents and the performance of the 10 main indicators of Smart Governance and Smart Economy, as summarized in the Table 6.

Table 5. Finding Smart Economy Application

No	Application	Existing	Outcome Analysis
1.	SIDATU MICIKO https://sidatu.online/	This is an internal application for the Department of Cooperatives and MSMEs.	The application needs to cover and record MSMEs that have not yet been registered in Makassar City.

No	Application	Existing	Outcome Analysis
			It requires further development to include an MSME app that displays profiles, needs, and facilitates interaction between potential investors and government programs.
2.	EXPLORE MAKASSAR https://explore.makassar.go.id/	The information provided is quite informative regarding the destinations and local products available in Makassar City.	The application needs to feature prominent MSME products, which have not yet been displayed in the current version of the app.
3.	Investment and Integrated One-Stop Services https://dpmptsp.makassarkota.go.id/portal	It has been running very effectively for business licensing services, with a remarkably high level of visits.	This application can be developed into a stock of knowledge.
4.	SEMBAKOTA' https://sembakota.disdagmakassar.com/	This application is user-friendly and can be accessed at any time. However, its features are not yet comprehensive, and the quality of the information presented is somewhat outdated.	• The development of features could include adding Google Maps for market locations. • The application would become even more attractive and beneficial with a feature for transactions related to specific essential goods.
5.	HALO MAKASSAR https://halo.makassarkota.go.id/	It only displays a small portion of macroeconomic data, whereas it should provide a wealth of macro and micro-sectoral information related to the latest economic developments in Makassar City.	It would be advisable to present more varied data, including both macro and micro-sectoral information, that would be beneficial for potential investors.
6.	Biasamata https://projects.upanastudio.com/biasamata.com/	Biasamata aims to ensure the availability of accurate and up-to-date data related to employment conditions in the tourism sector to be used in the formulation of policies for developing human resources in tourism in Makassar City.	• The presentation of information in the application could be more varied, comprehensive, and up-to-date. The application bears similarities to the information provided by the Explore Makassar app, making it possible for integration or to serve as an additional feature. • The web-based application can be accessed well; however, the information presented is still limited and not current (not updated), such as job vacancy information that is outdated. The mobile-based application can be installed but is not accessible.

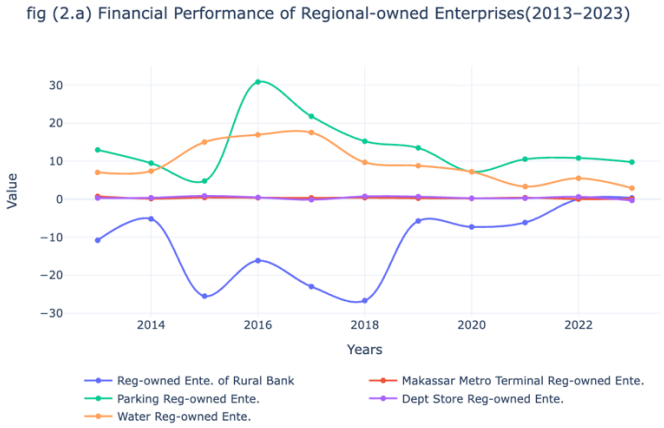
Governance indicators display incremental improvement. The Bureaucratic Reform Index rose from 63.23 to 65.80, while the Public Satisfaction Index increased from 77.66 to 80.50. These findings point to the impact of administrative reforms and the gradual adoption of smart governance practices, such as digital service platforms, in enhancing public trust and responsiveness. However, the moderate pace of improvement signals persistent institutional rigidities, consistent with theories of institutional reform [15], [25]. Fragmented bureaucratic structures and limited interoperability of digital systems continue to generate inefficiencies, reducing the full potential of smart governance. Strengthening institutional coordination and aligning digital innovations with governance reforms are thus critical for achieving transformative outcomes.

The economic dimension shows the most dynamic shifts. Following a contraction in 2020 (–1.27%), the economy rebounded to a growth rate of 5.80% by 2023. Rising per capita expenditure (16.89 → 18.58 million) and GDPR per capita (116.87 → 137.3 million) illustrate improving welfare. At the same time, poverty declined slightly (4.54% → 4.20%) and inequality narrowed (Gini 0.40 → 0.39), suggesting that recovery has been broadly inclusive. Yet, persistently high unemployment (15.92% → 11.00%) despite increasing labor force participation (58.05% → 61.04%) indicates structural rigidities in the labor market. This is consistent with debates on the smart economy, where technological and structural transformation creates new opportunities but also challenges in labor absorption [30]. While digital innovation and economic diversification foster growth, they must be accompanied by labor market policies that ensure equitable participation.

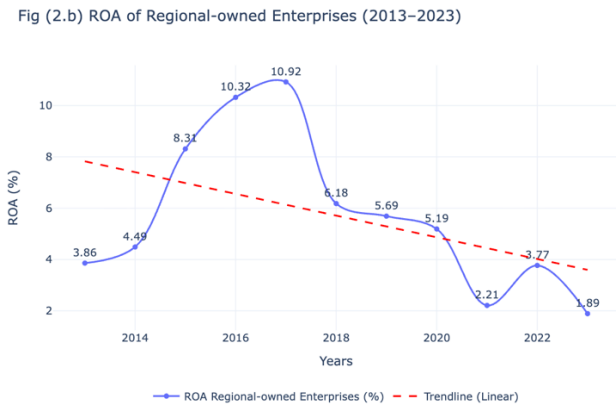
Table 6. Performance of 10 Target Indicators outcome

Performance Indicator	2020	2022	2023	2024
HDI	82,25	82,95	83,3	83,67
Education Index	0,818	0,837	0,847	0,856
Per Capita Expenditure (billion)	16,89	17,94	18,26	18,58
Bureaucratic Reform Index	63,23	64,33	64,71	65,80
Public Satisfaction Index (IKM)	77,66	79,5	80	80,5
Health Index	0,800	0,804	0,806	0,808
Life Expectancy (Years)	72.09	72.1	72.2	72.3
Poverty	4,54%	4,40%	4,43%	4,20%
Economic Growth	-1,27%	4,00%	4,90%	5,80%
Unemployment Rate (%)	15,92%	12,50%	11,50%	11,00%
Labor Force Participation Rate	58,05%	59,52%	60,28%	61,04%
GDPR per Capita (billion)	116,87	125,4	131,3	137,3
Gini Index	0,40	0,395	0,392	0,39

Source: RPJMD, BPS, Profile of Makassar, FGD



Performance of BUMD Based on Business Type
Source: Bidang Ekonomi Setda Kota Makassar, 2024



Growth of ROA Performance of BUMD Makassar City
Source: Bidang Ekonomi Setda Kota Makassar, 2024

Fig 2 (a,b). Performance of BUMD Makassar City

Taken together, the findings highlight the interplay between human capital development, institutional reform, and smart development strategies. Education-led improvements in human capital are contributing to social progress, while governance reforms are fostering public trust. Economic recovery has been strong and increasingly inclusive yet constrained by labor market challenges. The transition toward a smart governance framework can enhance institutional efficiency, while the smart economy paradigm offers pathways for innovation-driven growth. However, the persistence of sectoral imbalances underscores the need for a more integrated strategy that links human capital investments with institutional reform and digital transformation. Specifically, the performance related to regional-owned enterprises can be illustrated in the Figure 2.

The ROA performance of regional-owned enterprises (BUMD) in Makassar City from 2013 to 2023 shows a declining trend. Although there was a notably progressive increase during the period from 2013 to 2017, the ROA performance of BUMD in Makassar City has tended to decline each year thereafter, indicating a decrease in the productivity of the assets owned in generating profit.

MICE (Meeting, Incentive, Convention, Exhibition) activities, as part of the smart city branding program, can contribute between 45% and 50% to the growth of the accommodation sector in Makassar City. Additionally, the number of eateries and restaurants has significantly increased from 281 units in 2020 to 3,443 units in 2023. However, Makassar's competitive position is lower compared to several other cities in Indonesia. In 2023, Bandung scored 3.94, Surabaya 3.62, and both Medan and Semarang scored 3.96, while Makassar scored only 2.64 points.

Over the next four years, this proportion continued to decrease, starting from 0.25 percent in 2018, then 0.30 percent in 2019, and further dropping to 0.25 percent and 0.17 percent in 2020 and 2021, respectively. In 2022 and 2023, there was a slight increase in the proportion to 0.25 percent and 0.27 percent, with budget realizations of IDR 11.75 billion and IDR 15.42 billion, respectively.

The decline in BUMD ROA (Fig. 2) correlates with poor interoperability: fragmented data systems reduced transparency in asset management, increasing operational costs by 15–20% [3]. A counterfactual analysis comparing Makassar with Surabaya—a city with standardized API protocols—reveals Surabaya's BUMD ROA grew by 8% annually post-2019, versus Makassar's 5% decline. This suggests institutional and technical coherence, rather than exogenous shocks, drove divergent outcomes.

5. Conclusion

The Logical Framework Analysis (LFA) model provides a consistent approach to development planning that aligns with Smart Governance and Smart Economy programs through triangulation methods. In Makassar City, the maturity of Smart Governance is comparatively stronger in the dimensions of technology and institutions than in human capital. However, the integration of applications remains suboptimal. The applications developed by regional agencies do not meet interoperability standards, which are critical for effective integration. The lack of interoperability support, including standards, protocols, and technologies necessary for effective data exchange among various platforms, applications, and devices, has resulted in suboptimal performance in smart governance. Consequently, key performance indicators have not been met as per established plans. Several indicators, such as the Return on Assets (ROA) of regional-owned enterprises (BUMD), competitiveness, unemployment rates, and life expectancy, have fallen below their targets. Moreover, the input dimension reflects that the budget allocated for smart city initiatives and research remains low and has yet to reach optimal levels. This lack of investment not only hampers the efficiency and effectiveness of governance but also impacts the achievement of the Sustainable Development Goals (SDGs). Enhancing budgetary allocations and improving interoperability could significantly contribute to the advancement of both Smart Governance and Smart Economy, ultimately leading to greater economic resilience and social equity in Makassar City.

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References

[1] M. Jamil, S. Alam, M. Asdaq, and M. Taufik, *Transformasi Digital Smart City dalam Meningkatkan Pendapatan Asli Daerah Kota Makassar (Studi Kasus Kontribusi UMKM)*. 2021.

[2] M. H. Alam, "Role of the Governance and Good Governance to Build a Smart Economic and Smart City – A Case Study of Bangladesh," in *Technology and Talent Strategies for Sustainable Smart Cities*, S. S. Dadwal, H. Jahankhani, G. Bowen, and I. Y. Nawaz, Eds., Emerald Publishing Limited, 2023, pp. 103–115. doi: 10.1108/978-1-83753-022-920231005.

[3] Bappeda Kota Makassar, "Executive Summary Masterplan Smart City Daerah Buku III Masterplan Makassar Sombere & Smart City," Makassar, 2021. [Online]. Available: https://diskominfo.makassarkota.go.id/download/buku-3-master-plan-smart-city/

[4] G. Hoetker and J. E. Fountain, "Building the Virtual State: Information Technology and Institutional Change," *The Academy of* Management *Review*, vol. 27, no. 4, p. 619, 2023. doi: 10.2307/4134407.

[5] D. Mills, S. Pudney, P. Pevcin, and J. Dvorak, "Evidence-based public policy decision-making in smart cities: Does extant theory support achievement of city sustainability objectives?," *Sustain.*, vol. 14, no. 1, Jan. 2022, doi: 10.3390/su14010003.

[6] I. Nastjuk, S. Trang, and E. I. Papageorgiou, "Smart cities and smart governance models for future cities: Current research and future directions," *Electronic Markets*, vol. 32, no. 4. Springer Science and Business Media Deutschland GmbH, pp. 1917–1924, Dec. 2022. doi: 10.1007/s12525-022-00609-0.

[7] I. A. Ulya, A. Tarigan, and P. Hasnur, "Mengukur Kesiapan Kota Dalam Menerapkan Konsep Smart City Inisiatif," CDROM.

[8] A. Giuliodori, P. Berrone, and J. E. Ricart, "Where smart meets sustainability: The role of Smart Governance in achieving the Sustainable Development Goals in cities," *BRQ Bus. Res. Q.*, vol. 26, no. 1, pp. 27–44, Jan. 2023, doi: 10.1177/23409444221091281.

[9] R. Mu, M. Haershan, and P. Wu, "What organizational conditions, in combination, drive technology enactment in government-led smart city projects?," *Technol. Forecast. Soc. Change*, vol. 174, Jan. 2022, doi: 10.1016/j.techfore.2021.121220.

[10] R. Apanaviciene, A. Vanagas, and P. A. Fokaides, "Smart Building Integration into a Smart City (SBISC): Development of a New Evaluation Framework," *Energies*, vol. 13, no. 9, p. 2190, May 2020, doi: 10.3390/en13092190.

[11] I. Mergel, "Study on The Impact of Digital Transformation on Democracy and Good Governance," Germany, 2021.

[12] J. E. Fountain, "The Moon, The Ghetto and Artificial Intelligence: Reducing Systemic Racism In Computational Algorithms," *Gov. Inf. Q.*, vol. 39, no. 2, 2022.

[13] B. Noveriyanto, L. C. Nisa, A. S. Bahtiar, S. Sahri, and I. Irwansyah, "E-GOVERNMENT SEBAGAI LAYANAN KOMUNIKASI PEMERINTAH KOTA SURABAYA (Studi Kematangan e-government Sebagai Layanan Komunikasi Government to Government, Government to Citizen, Government to Business)," *Profetik J. Komun.*, vol. 11, no. 1, p. 37, 2018, doi: 10.14421/pjk.v11i1.1371.

[14] B. Simone Noveck, "SOLVING PUBLIC PROBLEMS," 2021.

[15] L. Sucupira Furtado, T. L. C. da Silva, M. G. F. Ferreira, J. A. F. de Macedo, and J. K. de Melo Lima Cavalcanti Moreira, "A framework for Digital Transformation towards Smart Governance: using big data tools to target SDGs in Ceará, Brazil," *J. Urban Manag.*, vol. 12, no. 1, pp. 74–87, Mar. 2023, doi: 10.1016/j.jum.2023.01.003.

[16] M. Alfian and S. A. Margono, "Local Wisdom in Smart City Development Policy: Case Study of Makassar's Sombere Smart City," vol. 27, no. 1, pp. 65–79, 2023.

[17] D. E. Uwizeyimana, "The logframe as a monitoring and evaluation tool for government interventions in a chaotic and complex environment," *Africa's Public Serv. Deliv. Perform. Rev.*, vol. 8, no. 1, Jan. 2020, doi: 10.4102/apsdpr.v8i1.328.

[18] U. Berardi, M. D'Agostino, and G. Alaimo, "Smart cities: A new concept of urban transformation. In Proceedings of the International Conference on Sustainable Urban Development," in *Springer*, 2012, pp. 95–106. doi: https://doi.org/10.1007/978-3-642-36770-3_9.

[19] W. Zhu, "Artificial Intelligence and Urban Governance: Risk Conflict and Strategy Choice," *Open J. Soc. Sci.*, vol. 09, no. 04, pp. 250–261, 2021, doi: 10.4236/jss.2021.94019.

[20] R. Giffinger, T. U. Wien, C. Fertner, R. Kalasek, and N. P. Milanović, "Smart cities-Ranking of European medium-sized cities," 2007.
[21] T. Nam and T. A. Pardo, "Conceptualizing smart city with dimensions of technology, people, and institutions," in *ACM* International *Conference Proceeding Series*, 2011, pp. 282–291. doi: 10.1145/2037556.2037602.
[22] B. R. Keeble, "The Brundtland Report: 'Our Common Future,'" *Med. War*, vol. 4, no. 1, pp. 17–25, 1988, doi: 10.1080/07488008808408783.
[23] A. I. Almulhim and T. Yigitcanlar, "Understanding Smart Governance of Sustainable Cities: A Review and Multidimensional Framework," *Smart Cities*, vol. 8, no. 4, p. 113, Jul. 2025, doi: 10.3390/smartcities8040113.
[24] Jay Barney, "Firm Resources and Sustained Competitive Advantage," *J. Manage.*, vol. 17, no. 1, pp. 99–120, Mar. 1991, doi: 10.1177/014920639101700108.
[25] D. Triyanto, Kismartini, H. Purnaweni, and Y. Luqman, "The Impact of Smart Governance Implementation on Sustainable Development Goals in Indonesia," *J. Lifestyle SDGs Rev.*, vol. 5, no. 3, p. e04592, Mar. 2025, doi: 10.47172/2965-730X.SDGsReview.v5.n03.pe04592.
[26] W. R. Scott, *Institutions and Organizations - Ideas, Interests, and Identities*, vol. 32, no. 2. Sage, 2015. [Online]. Available: https://rauli.cbs.dk/index.php/cjas
[27] J. Eveland and L. G. Tornatzky, "Technological Innovation as a Process," Lexington Books, 1990, pp. 27–50.
[28] D. Hilda Aditya, P. Anas Ashari, K. Kunci, and K. penulis, "Upaya Mencapai Smart Economy untuk Mengembangkan Perekonomian di Kota Semarang."
[29] H. T. R. Freddy, W. Achmad, and M. S. Nasution, "The Effectivity Of Public Services Based On Smart Goverment In Bukit Raya Distric Pekanbaru City," *J. Gov.*, vol. 7, no. 1, Apr. 2022, doi: 10.31506/jog.v7i1.14557.
[30] Komninos, "Report on Intelligent Cities and Smart Governance," Thessaloniki, Greece, 2020.