

# Innovation and Challenges in the Digital Transformation of Government in the City of Surabaya

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**Abstract.** Digital transformation in government is crucial for enhancing efficiency, transparency, and the quality of public services. Surabaya, as one of Indonesia's largest cities, has committed to implementing various digital innovations to achieve a modern and responsive governance system. This paper examines the innovations implemented in the digital transformation of government in Surabaya, along with the challenges encountered during this process. A qualitative approach was used, analyzing case studies of key digital initiatives such as the implementation of the Electronic Government System (SPBE), e-Government services, and smart city technologies across various sectors. The findings reveal that while Surabaya has successfully implemented several significant innovations, such as the digitization of public services and administrative processes, there are still considerable challenges, including infrastructure limitations, the need for enhanced digital skills among government personnel, and disparities in digital access among citizens. Therefore, it is essential for the city government to continue investing in technology development, training programs for public servants, and strengthening citizen engagement in the digital transformation process. This paper also provides recommendations for other local governments looking to adopt similar digital transformation models, emphasizing the importance of local context and infrastructure readiness.

**Keywords:** Digital transformation, government innovation, challenges, Surabaya, smart city, SPBE, e-Government.

## 1 Introduction

Digital transformation has become a necessity for the government sector to improve the quality of public services, administrative efficiency, and transparency [1]. The Surabaya City Government, one of Indonesia's largest cities, has utilized digital technology to optimize services to the community. This digital transformation process includes the development of e-government, the implementation of smart city initiatives, and various other digital innovations in the public sector [2].

Digital transformation in Surabaya began with a vision to improve the quality of life for the community through the utilization of technology [3]. The use of digital technology in Surabaya started with the implementation of the e-Government system in the early 2010s, aimed at improving the administration and public service systems, as well as enhancing transparency and

accountability [4]. Over time, Surabaya developed the smart city concept, which integrates various advanced technologies such as the Internet of Things (IoT), big data, and web/mobile-based applications to support city management more effectively and efficiently [5].

Surabaya has made significant progress in adopting digital technology, in infrastructure, public service applications, and city management systems [6]. The applications developed so far to support digital transformation in Surabaya include Surabaya Single Window (SSW), E-Controlling, PEKEN Surabaya, Wargaku, jogo suroboyo, Surabaya Intelligent Transport System, E-PBB, Go Bis, etc. In general, it can be seen in Table 1:

**Table 1.** Achievements of Surabaya's Digital Transformation

Aspect		Description	Statistics/Data
Smart City Index		The smart city achievement index in Surabaya is based on national assessment.	8.22/10 (2022)
Surabaya Single Window		A public service application that integrates more than 40 administrative services.	1,5 million users (2023)
Suroboyo Bus		Public transportation application for city bus routes and schedules.	500.000 users (2023)
SIKPD System		Digital management of regional finances.	80% budget transaction (2022)
Public Wi-Fi		Public Wi-Fi hotspots in the city of Surabaya	1.000 points (2023)
Surabaya E-Tax		Online regional tax payment system.	IDR 5 Trillion (2022)
Surabaya Digital Academy		Digital literacy training program for the community.	10.000 peserta per year
Surabaya Smart Citizen		Digital training program to raise public awareness about technology.	50.000 participants (2022)
Air Quality Sensor		Sensors are used to monitor air quality in the city of Surabaya.	200 sensor (2023)
Surabaya Data Center	Smart	Datacenter that manages city information for data-driven decision-making.	10.000 sensors connected to the data center

Sumber : [7] Diolah Peneliti, 2024

Table 1 illustrates that the city of Surabaya has implemented digital transformation in various aspects to improve public services and city management [8]. Surabaya's commitment and achievements in the application of digital technology to enhance the quality of life for its citizens, administrative efficiency, and data-driven city governance. The Surabaya City Government uses data effectively for better decision-making. This effort leads to the smart city vision aimed at making the city more efficient, safe, and comfortable for its residents [9].

Three factors are driving digital transformation in Surabaya, namely, (1) Surabaya, as a large city with a continuously growing population, requires innovation in managing various sectors such as transportation, security, environment, and health. (2) The community increasingly desires a government that is more transparent and quicker in providing services. Digitalization has become one of the ways to achieve this. (3) As technology advances, the people of Surabaya are becoming more tech-savvy and are starting to expect digital-based services [10].

However, challenges in the implementation of digital technology persist, ranging from uneven infrastructure to organizational cultural resistance to change. Additionally, there are

obstacles in digital literacy, budget limitations, and challenges in integrating various existing digital systems. This research aims to identify the various innovations that have been implemented by the Surabaya City Government in the digital transformation process and to analyze the challenges faced in their implementation. Understanding these innovations and challenges is important for formulating more effective policies and strategies to achieve smart city goals in the future.

## **2 Research Method**

This research uses a qualitative method with a case study approach to explore digital transformation in the Surabaya City Government. The data used comes from secondary sources, such as government annual reports, academic publications, and related news articles. The data collection techniques used include document analysis to gather information related to innovation, statistics on the use of digital services, and the challenges faced during implementation [11].

The data were analyzed using a descriptive approach to present information on digital innovation, while the challenges were analyzed using thematic analysis techniques to identify patterns or key issues that emerged during the transformation process. Additionally, in-depth interviews were also conducted with several government employees of Surabaya City to gain more perspectives on the processes and challenges in the field [12].

## **3 Results and Discussion**

Based on the research conducted, several digital innovations have been implemented by the Surabaya City Government to realize the smart city vision. (smart city). In addition, this research also identifies various challenges faced in the implementation of the digital transformation. The main findings of this research include the innovations that have been successfully implemented, as well as the obstacles that need to be overcome for the digitalization process to run more optimally. Below, the researchers provide a more detailed review of these innovations and the challenges faced by the Surabaya City Government in the implementation of technology across various sectors. The research findings presented refer to the digital transformation framework, namely support, capacity, and value. [13].

### **3.1 Support**

Support is one of the key elements in the success of digital transformation, especially in the context of city government focused on smart city development. In Surabaya, support for digital transformation is visible in various aspects, ranging from government leadership, and supportive policies, to collaboration with various parties to create a conducive digital ecosystem.

- a. Leadership and Government Commitment, Surabaya shows very strong support from the city government, especially from the Mayor of Surabaya and the ranks of regional officials. Visionary and proactive leadership is crucial in driving the digital transformation process in this city. City leaders have established the smart city as one

of the main priorities in the city's development agenda, which is reflected in various innovative policies and programs that have been implemented. Surabaya has a clear vision to become a smart city by utilizing technology to improve the quality of life for its citizens and the efficiency of public services. This commitment is reflected in programs that support digital infrastructure, improve service accessibility, and utilize data for better decision-making. The Mayor of Surabaya, with full support from the Surabaya City Council, strongly supports the efforts of digitization in governance. This leadership is evidenced by the development of various digital systems that have transformed the way public services are delivered in this city.

- b. Supporting Policies and Regulations, Surabaya has several policies that support and facilitate digital transformation, both at the central government and local government levels. These policies encompass aspects such as digital infrastructure, human resource capacity building, and technology-based public services. Policies related to the development of digital infrastructure, such as the provision of public Wi-Fi at more than 1,000 points throughout Surabaya, provide technical support to connect the community with digital services. In addition, policies regarding data centers (for example, Surabaya Smart Data Center) and cloud computing systems are also very important in supporting the storage and management of data needed for smart city development. The Surabaya City Government has also issued various regulations that support the use of technology in daily life, such as the Suroboyo Bus for an application-based transportation system, e-Pajak Surabaya for online tax payments, and the Surabaya Single Window (SSW) to integrate more than 40 public administration services.
- c. Collaboration and Partnerships with Various Parties, Support for digital transformation is also evident in the form of collaboration with various parties, including the private sector, educational institutions, international organizations, and technology communities. Surabaya collaborates with several technology companies to develop and implement applications and systems that support digital-based public services. For example, partnerships with technology companies in the development of the Suroboyo Bus and the Smart Data Center system. Surabaya also involves educational institutions in developing human resource capacity through digital literacy training programs such as the Surabaya Digital Academy, which provides education and training to thousands of residents to enhance their digital skills. Surabaya is also actively collaborating with various international organizations to gain access to the knowledge and resources needed to build a sustainable smart city ecosystem.
- d. Community outreach and empowerment, support also comes from the community itself, which is increasingly open to digital technology, especially due to the ongoing digital empowerment and education programs implemented by the Surabaya City Government. The city government actively conducts training for the residents of Surabaya through programs like the Surabaya Digital Academy, which aims to reduce the digital divide and ensure that all layers of society can adapt to new technologies. This program provides opportunities for residents to learn digital skills relevant to job market needs and daily life. Through various communication channels, the Surabaya government also actively promotes the benefits of smart city programs to the public. This is important to create high public awareness regarding digital technology and to encourage active citizen participation in using the digital applications that have been provided.

- e. Financial and Investment Resources, to support digital transformation, the Surabaya City Government has allocated a substantial budget for the construction and development of digital infrastructure. In addition, the city is also striving to attract investments both from the private sector and through collaborations with international institutions. The allocation of adequate budgets for the development of Smart Data Centers, the expansion of public Wi-Fi, and the development of applications and other digital systems provide solid support for the success of digital transformation in Surabaya. In addition, Surabaya is also partnering with technology companies to provide digital solutions without directly burdening the government budget. This partnership model allows the city government to remain focused on policy development and public services while relying on the expertise and investment of the private sector.

In general, it can be said that the support for digital transformation in Surabaya is very strong and sustainable. Visionary leadership, supportive policies, collaboration with the private sector and educational institutions, as well as proper resource allocation have created a solid foundation for the implementation of smart cities. (smart city). Although there are challenges in terms of technology access in some areas, overall, Surabaya demonstrates that support from various stakeholders can accelerate the realization of effective digital transformation.

### 3.2 Capacity

Capacity in the context of digital transformation refers to an organization's ability, in this case, the Surabaya City Government, to manage and develop technological infrastructure, human resources (HR), and other supporting systems necessary to implement digital programs. This capacity includes two main dimensions: technological capacity (infrastructure, systems, and applications) and human capacity. (the capabilities and skills of human resources).

Here is an overview of the existing capacity conditions in the digital transformation in Surabaya:

- A. Technology Capacity, Surabaya has shown significant progress in building technological infrastructure that supports digital transformation. Some key elements of technological capacity that have been built and developed in Surabaya include:
  - a. Surabaya has provided more than 1,000 public Wi-Fi hotspots spread across various areas of the city, including public spaces, parks, and tourist attractions. This infrastructure provides free internet access to residents, which is crucial in enhancing community engagement with various digital services offered by the government. Surabaya has the Surabaya Smart Data Center, a centrally managed data center to support the processing and storage of city data. This data center integrates data from various sectors (transportation environment, health, and others) used for data-driven decision-making, as well as supporting smart city programs. Another technological infrastructure that supports Surabaya's digital capacity is the implementation of various information systems used in public services, such as the Regional Financial Management Information System (SIPKD), which enables more transparent and efficient management of regional budgets and finances. Digital service applications such as Surabaya Single Window (SSW), which integrates more than 40 public services, and Suroboyo Bus, which provides real-time transportation schedules and

information, demonstrate Surabaya's ability to offer effective and efficient digital-based public services.

- b. Konektivitas dan Internet of Things (IoT), Surabaya has also implemented more than 200 sensors used to monitor various aspects, such as air quality, traffic congestion, and other environmental monitoring systems. The use of these sensors enables more accurate data-driven decision-making and provides direct feedback to the community regarding the quality of life in the city. Surabaya's ability to collect and analyze big data has also improved. With more than 10,000 sensors connected to the data center, the city can manage and analyze big data in real time, which is crucial for data-driven policies that can enhance public service efficiency and residents' quality of life.

#### B. Human Resources Capacity (HR)

One of the biggest challenges in digital transformation is the development of human capacity, both in terms of technical skills and understanding of digital technology. In Surabaya, there are several significant efforts to build human resource capacity, both from the government and the general public.

- a. Education and Digital Literacy Training, the Surabaya Digital Academy Program is a concrete example of efforts to enhance human resource capacity in Surabaya. This program provides digital training for the community intending to improve their digital literacy. The program has involved 10,000 participants per year who receive training in technology, social media, cybersecurity, and other digital skills. The Surabaya City Government is also focused on improving digital skills for civil servants (PNS) and other government officials. This training aims to ensure that they can operate existing digital systems effectively, manage data, and provide optimal public services through digital platforms. Surabaya collaborates with various educational institutions, both at the local and national levels, to provide educational programs that are relevant to technological developments. This includes education on data analytics, information technology management, and digital application development.
- b. Development of Technology Skills for the Community. In addition to formal education, Surabaya also supports community-based training aimed at empowering community groups with technology skills. This includes digital startup training and community-based application development, as well as preparing residents to enter a job market that increasingly relies on technology.
- c. Challenges in Human Resource Capacity. Despite many efforts to enhance human resource capacity, the biggest challenge still faced is the digital skills gap in certain layers of society, especially in more remote or underdeveloped areas. Many citizens are not yet fully accustomed to digital technology, so more intensive and sustainable training needs to be conducted to reach all layers of society.

#### C. Collaboration with the Private Sector and Other Institutions

In addition to building internal capacity, Surabaya is also forming partnerships with the private sector and educational institutions to strengthen its digital capacity.

- a. Collaboration with Technology Companies: The Surabaya City Government collaborates with various technology companies to support the development of the necessary digital infrastructure, such as the development of public service applications and IoT to monitor the city's conditions. This partnership is crucial for accelerating the implementation of new technologies and addressing technical challenges.

- b. Cooperation with Universities and Educational Institutions: Surabaya is also collaborating with universities and higher education institutions to conduct research and development in the fields of technology and smart cities. This includes the organization of seminars, workshops, and research programs involving experts and academics.

The condition of technological capacity and human resource capacity in the digital transformation in Surabaya shows significant progress. Digital infrastructure such as public Wi-Fi, Smart Data Centers, and IoT sensors provide strong support for the implementation of smart cities. In addition, the Surabaya Digital Academy and training for government employees demonstrate a commitment to building competent human resource capacity. Although there are some challenges, such as skill gaps in certain communities, Surabaya is showing positive progress in building capacity to support sustainable and inclusive digital transformation.

### 3.3 Value

Value in digital transformation refers to the positive impact generated by the implementation of digital technology, whether in the form of increased efficiency, improved quality of public services, public satisfaction, or more optimal resource management. In the context of digital transformation in Surabaya, this value encompasses the results felt by the city's residents, the government, and the private sector. The value is not only viewed from a technical perspective but also from broader social and economic benefits. Here is an explanation of the existing value conditions that have been achieved in Surabaya's digital transformation:

- A. Improvement of Public Service Quality, one of the main values obtained from digital transformation is the improvement of public service quality. The Surabaya City Government has integrated various public services through applications and digital platforms, making it easier for residents to access these services.
  - a. Efficiency of Administrative Services, Surabaya Single Window (SSW) has integrated more than 40 administrative services into one platform, making it easier for residents to manage various documents such as business permits, ID cards, and other permits. With 1.5 million users in 2023, SSW has provided comfort and time efficiency for the community, who previously had to manage many documents manually.
  - b. Public Transportation Service, Suroboyo Bus, an application that makes it easier for Surabaya residents to obtain information about bus schedules and routes, has been used by 500,000 users in 2023. This application enhances comfort in public transportation and reduces traffic congestion by making it easier for residents to plan their journeys.
- B. Improvement of Transparency and Accountability. Digital transformation also provides significant value in terms of transparency and accountability in the management of regional finances and government programs.
  - a. Digital Financial Management. The SIPKD (Regional Financial Management Information System) implemented in Surabaya allows for the digital management of 80% of budget transactions, facilitating the planning, supervision, and reporting processes of the regional budget. This system helps enhance transparency in budget usage, enabling the public to directly monitor how public funds are utilized.
  - b. Electronic Tax Payment. E-tax Surabaya allows residents to pay local taxes online, making it easier for the community and reducing the potential for tax leakage. In 2022,

Surabaya successfully collected IDR 5 trillion from this e-tax system. With this system, Surabaya not only increased public tax compliance but also expedited the administrative process and reduced the potential for corruption.

- C. Community Empowerment and Reduction of Digital Divide, Surabaya is committed to strengthening the digital capacity of its community through empowerment and digital training programs.
  - a. Digital Literacy for Citizens, Surabaya Digital Academy, and Surabaya Smart Citizen are two flagship programs that provide digital literacy training to residents. In 2022, 50,000 participants joined the Surabaya Smart Citizen program, which teaches residents about technology and how to use digital devices effectively. This program aims to reduce the digital divide and ensure that all residents of Surabaya, especially those in the elderly age group or areas with limited access, can utilize technology for their well-being.
  - b. Training for Digital Workforce. With the rapid development of the digital-based economy, the training programs provided by Surabaya Digital Academy also prepare a skilled digital workforce. Every year, more than 10,000 participants are trained in various digital skills required in the workforce.
- D. Improvement of Environmental Quality and Health. One of the important values of Surabaya's digital transformation is its contribution to the improvement of environmental quality and public health.
  - a. Monitoring Air and Environmental Quality. Surabaya uses more than 200 air quality sensors spread throughout the city to monitor air pollution levels in real time. The data generated from these sensors is not only used by the government for environmental management policies but is also accessible to residents to know the air quality conditions around them. This plays a role in preventing health issues related to air pollution.
  - b. Improvement of Access to Digital Health Services. The use of technology also accelerates services in the health sector. For example, the integration of data and information supporting Surabaya Smart Health provides faster and more efficient access for residents to obtain health services.
- E. Improvement of City Security and Management. Digital systems also enhance city security and management, including traffic monitoring, security surveillance, and city data management.
  - a. Traffic Security and Transportation Management, Suroboyo Bus, and other digital-based transportation applications not only provide convenience but also assist the city government in monitoring and managing traffic more effectively. This system reduces congestion, optimizes the use of transportation routes, and improves the experience of public transportation users.
  - b. Improvement of City Data Management, the Surabaya Smart Data Center manages data from various sectors in the city to assist in data-driven decision-making. With 10,000 sensors connected to this data center, the government can monitor all aspects of the city in real time and create more effective policies.



- F. Operational Efficiency and Resource Management. One of the important values generated by digital transformation is operational efficiency in managing city resources, whether in terms of budget, time, or labor.
- a. Budget Management Efficiency, the implementation of SIPKD allows for more transparent and structured budget management, enabling the city government to allocate resources more accurately and efficiently.
  - b. Real-Time Resource Management. The use of technology also enables more efficient management of city resources. For example, with data collected through IoT sensors, the city can manage public services such as waste disposal, street lighting, and water management more effectively.

Overall, the value obtained from digital transformation in Surabaya is quite good and encompasses various aspects of city life, ranging from the improvement of public services, transparency, and accountability, to community empowerment. With the implementation of digital technology, Surabaya has not only succeeded in enhancing operational efficiency and city resource management but also in improving the quality of life for residents by providing better access to services, health, and a cleaner and healthier environment.

## 4 Conclusion

Surabaya has undergone digital transformation through various initiatives. This is evident from the support aspect, where there is a strong commitment from the Surabaya City Government, led by the Mayor, to realizing the Smart City Vision by designing various policies that support the use of technology in governance. Next, in terms of capacity, the Surabaya City Government has made significant investments in technology infrastructure such as smart data centers, e-tax systems, and public Wi-Fi, as well as providing training to enhance human resource capacity in facing digital technology challenges. As for the Value aspect, the positive impacts of digital transformation in Surabaya include increased transparency in public services, cost savings, and improved accessibility and convenience for city residents, demonstrating the significant value generated by these digital initiatives.

However, the challenges in digital transformation include, despite Surabaya having built a fairly good digital infrastructure, there are still challenges related to the availability of stable internet networks throughout the city, especially in more remote areas. Furthermore, uneven digital literacy. Despite the success of digital training programs like the Surabaya Digital Academy, many residents still have not fully mastered digital skills. Age, education level, and limited access to technology are the main obstacles to improving digital literacy in the community. Then, data security and privacy management of citizens' data and increasingly developing digital transactions raise concerns regarding data security and privacy protection. The Surabaya City Government must ensure that the systems used meet cybersecurity standards and protect residents' data from misuse. Lastly, the budget and funding for digital transformation require significant investment in terms of technology and human resources. Although some programs have been supported by central government funding, the city government must seek alternative funding and collaborate with the private sector to ensure the sustainability of these smart city initiatives.

## References

- [1] R. R. T. Abubakar, F. T. Andhikaputra, R. Artisa, E. Ramdani, and S. Lestari, "Strengthening the Digital Talent Ecosystem to Support Digital Transformation in Indonesia," in *5th International Conference on Administration Science*, EAI, 2024.
- [2] Y. H. Balqis and R. Abubakar, "Mendorong Peningkatan Efektivitas Digitalisasi Layanan di PT Dayamitra Telekomunikasi," in *Konferensi Nasional Ilmu Administrasi*, Bandung, 2024.
- [3] Rizal and Wijaya, "Smart City: Studi Kasus Surabaya dalam Mewujudkan Transformasi Digital Pemerintahan," *Jurnal Teknologi Informasi dan Manajemen*, vol. 9, no. 2, 2021.
- [4] Samsudin, "Digital Government Transformation in Surabaya: Challenges and Opportunities.," *International Journal of Public Administration and Management*, vol. 15, no. 1, pp. 80–94, 2022.
- [5] Santoso, "The Role of IoT in the Development of Smart City: The Case of Surabaya," *Journal of Smart City Technology*, vol. 3, no. 2, pp. 45–58, 2020.
- [6] Wahyu and Kartini, "Digital Governance and Public Policy: A Review of Surabaya's Smart City Initiatives," *Journal of Governance and Digital Transformation*, vol. 14, no. 1, pp. 120–134, 2021.
- [7] BPS Surabaya, "Statistik Digital dan Infrastruktur Teknologi di Surabaya," Surabaya, 2023.
- [8] Pemerintah Kota Surabaya, "Laporan Tahunan Smart City Surabaya," Surabaya, 2022.
- [9] Sutrisno and Dewi, "Evaluation of Smart City Implementation in Surabaya: Challenges and Outcomes," *J Urban Plan Dev*, vol. 17, no. 2, pp. 92–104, 2023.
- [10] J. Dawud, R. R. T. Abubakar, and D. F. Ramdani, "Implementasi Kebijakan Online Single Submission pada Pelayanan Perizinan Usaha (Studi Kasus di DPMTSP Kota Bandung & Kabupaten Bandung)," *Publica: Jurnal Pemikiran Administrasi Negara*, vol. 12, no. 2, pp. 83–92, 2020.
- [11] J. , W. Creswell, *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, CA: Sage, 2009.
- [12] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta, 2017.
- [13] E. Indrayani, "E-Government: Konsep, Implementasi dan Perkembangannya di Indonesia," 2020.