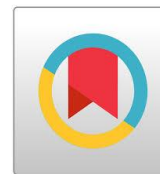


Measuring Digital Maturity in Local Government: A Case Study of Karanganyar Regency Technological Adoption and Organizational Readiness



Mengukur Kematangan Digital di Pemerintahan Daerah: Studi Kasus Adopsi Teknologi dan Kesiapan Organisasi di Kabupaten Karanganyar

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ARTICLE INFORMATION

<p>Keywords Digital Maturity; Local Government; Technological Adoption; Organizational Readiness; Karanganyar Regency;</p>	<p>ABSTRACT Although there is no fixed definition for digital maturity, it can be concluded that digital maturity refers to the ability of an organization to use digital technology effectively and efficiently in achieving its strategic goals. This research proposes a new framework to assess the digital maturity of local governments called the Digital Maturity Model for Local Governments in Indonesia (DMM-LGI). The framework has two main dimensions, namely technology adoption and organizational readiness. This research method uses a mixed approach, combining quantitative and qualitative research methods. The research process begins with a literature review from scopus-indexed journals, followed by the formulation of a digital maturity framework, measuring the level of digital maturity, identifying a certain level, and providing recommendations for further digital transformation. The results showed that the digital maturity of the local government of Karanganyar regency was at the level of average digitalization, where the main obstacle was that there were limitations in aspects of adequate and quality human resources (HR). In addition, the excessive number of applications and information systems poses new problems, especially related to integration and interoperability. The suggestion for future research is that the concept of digital maturity is dynamic, nothing is fixed and will continue to evolve as science and technology advance</p>
<p>Kata Kunci Kematangan Digital; Pemerintah lokal; Adopsi Teknologi; Kesiapan Organisasi; Kabupaten Karanganyar;</p>	<p>ABSTRAK Meskipun tidak ada definisi pasti mengenai kematangan digital, namun dapat disimpulkan bahwa kematangan digital mengacu pada kemampuan suatu organisasi untuk menggunakan teknologi digital secara efektif dan efisien dalam mencapai tujuan strategisnya. Penelitian ini mengusulkan kerangka baru untuk menilai kematangan digital pemerintah daerah yang disebut Digital Maturity Model for Local Governments in Indonesia (DMM-LGI). Kerangka tersebut memiliki dua dimensi utama, yaitu adopsi teknologi dan kesiapan organisasi. Metode penelitian ini menggunakan pendekatan campuran, yaitu memadukan metode penelitian kuantitatif dan kualitatif. Proses penelitian diawali dengan tinjauan pustaka dari jurnal terindeks scopus, dilanjutkan dengan perumusan kerangka kematangan digital, pengukuran tingkat kematangan digital, identifikasi tingkat tertentu, dan pemberian rekomendasi transformasi digital lebih lanjut. Hasil penelitian menunjukkan bahwa kematangan digital pemerintah daerah Kabupaten Karanganyar berada pada level digitalisasi rata-rata, dimana kendala utama adalah adanya keterbatasan pada aspek sumber daya manusia (SDM) yang memadai dan berkualitas. Selain itu, banyaknya aplikasi dan sistem informasi menimbulkan permasalahan baru, terutama terkait integrasi dan interoperabilitas. Saran untuk penelitian selanjutnya adalah konsep kematangan digital bersifat dinamis, tidak ada yang tetap dan akan terus berkembang seiring kemajuan ilmu pengetahuan dan</p>

Article History Send 17 th April 2024 Review 15 th May 2024 Accepted 10 th June 2024	teknologi. Copyright ©2025 Jurnal Aristo (Social, Politic, Humaniora) This is an open access article under the CC-BY-NC-SA license. Akses artikel terbuka dengan model CC-BY-NC-SA sebagai lisensinya.
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Introduction

Advances in information and communication technology (ICT) have resulted in significant changes in almost every aspect of human life in the 21st century (Congge et al., 2023). The private aspect, showing the impact of the COVID-19 outbreak, has a tendency to adopt digital technology massively in the business sector of micro, small, and medium enterprises (MSMEs). The adoption of digital technology is positively and significantly influenced by organizational readiness, financial resources, and government regulations (Nikopoulou et al., 2023). In the government aspect, digital government provides faster service benefits and creates a conducive investment climate. Digital technology adoption tends to be influenced by flexible organizational structures, adaptive leadership, qualified human resources, and the implementation of regulations (Budhyatma et al., 2022).

Governments around the world are willing to spend a lot of resources to implement digital-based technology, also known as digital government, e-government, or electronic government, because digital government offers services that can be accessed quickly, reliably, and personally (Ranerup & Henriksen, 2019); (Lyudmila & Anzhela, 2022). The new era of digital government requires primary citizen-centered activities (Abu Bakar et al., 2022), this represents a new opportunity that allows governments to serve their citizens more effectively and create a favorable environment for business and industry competition (Rytova et al., 2020).

Digital transformation in the government sector continues to be developed by cities around the world, because it has a very positive impact. First, it can increase transparency and accountability in public governance. Second, it can improve the efficiency and effectiveness of government operations. Third, digital transformation allows governments to better engage and connect with citizens (Shenkoya, 2022). For example, through digital platform innovation, governments can foster collaboration and partnerships with civil society organizations, business organizations, and academia to co-create solutions and address complex challenges (Faruquee et al., 2021); (Huda, 2020). In addition, digital transformation also supports big data-based decision-making so that governments can gain insight into social trends, identify areas for improvement, and make policy decisions based on facts (Xu et al., 2023).

To find out the extent of digital transformation and where local governments are currently in terms of utilizing digital technology, local governments need to measure their digital maturity in order to provide a clear picture of the extent to which local governments have adopted and utilized digital technology in their operational processes (Pirola et al., 2020); (Brodny & Tutak, 2023); (Rytova et al., 2020). In addition, measuring digital maturity can also

help an organization identify areas that need improvement in terms of utilizing digital technology (Teichert, 2019); (Neunaber & Meister, 2023).

The definition of digital maturity refers to the ability of an organization to use digital technology effectively to achieve its strategic goals. In general, digital maturity involves the adoption, integration, and utilization of digital technologies in an organization's business processes (Tangi et al., 2021); (Salume et al., 2021); (Pinto et al., 2023a). Although definitions and measurements of digital maturity vary, the core of digital maturity focuses on better serving customers and markets by applying digital technologies to drive efficiency and innovation (Robertson et al., 2022).

The issue of digital transformation and digital maturity will remain relevant for decades to come, and become an integral part of government policy (Merzlov & Shilova, 2022a). Evaluation of the level of digital maturity has become very important for organizations, including governments, to remain competitive in the digital age (Thordsen et al., 2020). However, for governments, measuring digital maturity is a complex and multifaceted challenge (Pucihar & Borštnar, 2022). By understanding their level of digital maturity, local governments can improve service delivery, drive economic development, and successfully navigate the digital transformation journey (Tangi et al., 2021); (Fesenko et al., 2021).

The urgency of this research lies in the increasing importance of digital technology in local government operations and effective and efficient services, in line with previous research highlighting the adoption of information and communication technology (ICT) as an important instrument to reduce the role of long and complicated bureaucracy (Cordella & Paletti, 2018). The research also proposes a new framework for assessing the digital maturity of local governments, with two main dimensions: technological adoption and organizational readiness (Borštnar & Pucihar, 2021). This digital maturity framework for local governments is implemented by taking inspiration from various digital maturity models and adapting it to the context of local government in Indonesia.

This study looks at Indonesia's local governments' digital maturity and discovers that, in comparison to its Southeast Asian neighbors, the country still lags behind in terms of both digital technology use and digital maturity. Three Indonesian cities (Jakarta, Medan, and Makassar) are listed in the Smart City Index (SCI) 2023 list, according to a report from the IMD World Competitiveness Center. Despite this, the third-place ranking is still lower than that of Singapore, Kuala Lumpur in Malaysia, Bangkok in Thailand, and Hanoi in Vietnam (IMD World Competitiveness Center, 2023). Research results from (Tangi et al., 2021; Hein-pensel et al., 2023; Tutak & Brodny, 2022; Duncan et al., 2022; Awdziej et al., 2023; Redjep et al.,

2021) in summary, it is critical that the public sector, business, industry, hospitals, colleges, schools, and other organizations encourage digital maturity among all parties involved and make use of it to give the best customer service possible in order to stay competitive.

Currently, research on digital maturity in local governments in Indonesia is still very limited. In addition, there is a need for continuous evaluation and monitoring to ensure that local governments remain effective and responsive to changes (Faro et al., 2022). The novelty of this research is to propose a digital maturity framework for local governments in Indonesia that is relevant to the current condition of district and city governments in Indonesia.

The results of this research provide recommendations for a digital maturity framework for local governments in Indonesia and can be used as a guideline to assess the digital maturity of local governments. Furthermore, this research presents an in-depth analysis of the level of digital maturity of the Karanganyar Regency Government, illustrates the extent of their current position in the use of digital technology, and helps encourage them to carry out further digital transformation.

Method

The research method used to develop a new digital maturity framework for local governments is a mixed research method, which is a combination of quantitative and qualitative methods. Quantitative methods are used to collect quantitative data, such as statistical data and survey data. This data is used to understand the general condition of the digital maturity of local governments in Indonesia. Qualitative methods are used to collect qualitative data, such as interview data and case study data. This data is used to understand the factors that influence the digital maturity of local governments as well as to provide recommendations to improve the digital maturity of local governments.

The local government of Karanganyar Regency's digital maturity is assessed in this study using both primary and secondary data. The Communication and Information Agency (DISKOMINFO) of the Karanganyar Regency conducted in-depth interviews with structural officials and IT staff to gather primary data. These interviews lasted between 15 and 30 minutes per resource person. Additionally, observations were made of daily activities at the Karanganyar Regency Government office to observe how digital technology is used in administrative and public services processes. Secondary data is gathered from a variety of sources, including local government reports (performance reports, statistics, evaluations), official documents (policies, strategies, digital transformation initiatives), and local rules (regulations pertaining to digital technology and public services). By comparing information

from key informant interviews, direct observation, and examination of official local government papers, the data's veracity was verified. After that, the researchers contrasted and talked about the differences and similarities between their results.

The following is a research flow to measure the digital maturity of the Karanganyar Regency government.

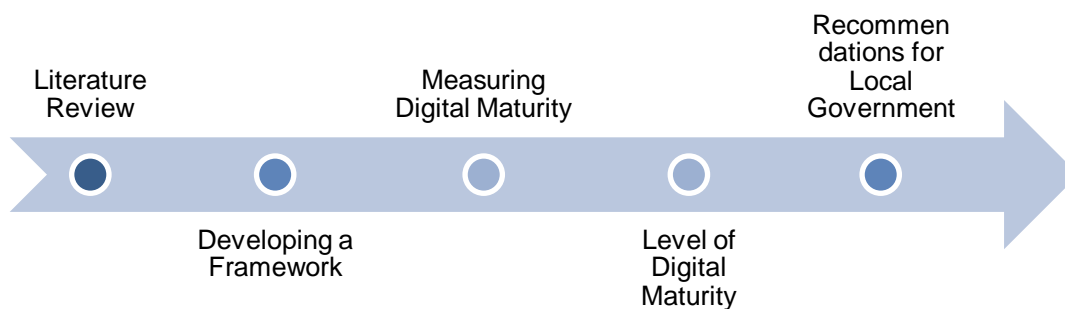


Figure 1. Research Flow

In order to conduct this literature review, we gathered references from pertinent scientific journals, particularly those that are Scopus-indexed, as well as from policy documents and data reports that support the use of digital technology in local governments. The next step is to develop a new framework for local government digital maturity that is adapted to the conditions of districts and cities in Indonesia. After that, to measure digital maturity, an in-depth survey and interview were conducted with the Communication and Information Service (Kominfo) of the Karanganyar Regency Government. The next step is to process the data findings, classifying them into specific levels of digital maturity to illustrate the extent of their digital maturity position. Finally, recommendations will be given to improve the digital maturity of the Karanganyar Regency government based on these findings.

Literatur Review

Transformasi Digital in Local Government

Several studies have examined the concept of digital transformation in local government. Digital transformation is often interpreted as the process of applying digital technology (Hortovanyi et al., 2023). For example, the definition of digital transformation describes the comprehensive and strategic integration among digital technologies, processes, and cultural changes within an organization. The goal is to fundamentally change operations, business models, and value propositions in order to adapt to the digital age (Verhoef et al.,

2021). In addition, digital transformation also means applying and using modern technology in business processes to increase productivity, flexibility, and responsiveness of organizational structures (Merdin et al., 2022).

The success of digital transformation is influenced by various factors. For example, the presence of digital orientation, digital intensity, and digital maturity. Digital orientation refers to an organization's strategic focus on digital transformation; digital intensity refers to the rate of adoption and use of digital technology; and digital maturity refers to the level of an organization's digital capabilities and competencies (Nasiri et al., 2022). Digital transformation has been recognized as an important path to improving organizational resilience. These findings show that a positive impact on organizational resilience can be achieved in two ways: by facilitating exploitative innovation (improvement of existing processes and products) and exploratory innovation (exploring new opportunities and markets) (J. Zhang et al., 2021).

In Indonesia, many local governments are still in the early stages of digital transformation, as reflected by the low level of digital maturity marked by weak digital technology infrastructure and highly competent human resources (Huda et al., 2023). The development of technology, information, and telecommunications (ICT), along with the need for faster, more practical, and more efficient public services, while increasing the level of transparency to the public, encourages cities around the world to undergo a digital transformation process (Congge et al., 2023); (Dewi et al., 2022).

Digital Maturity: Models, Dimensions, and Levels

Digital maturity is a term to indicate the level of digitalization of an organization at this time (Merzlov & Shilova, 2022b). Digital maturity in the local government sector encompasses various dimensions that reflect the level of advancement and integration of digital technologies and practices within them. Several studies have identified and explored these dimensions, including:

Table 1. Digital Maturity Model

Name Maturity Model	Focus Sector	Level Maturity	Dimensions/ Elements	Source
Digital Internet Maturity Model (DIMM)	Industrial Company	1. Initiated 2. Managed 3. Defined 4. Quantitatively managed 5. Optimized	1. Strategy 2. Organization 3. Staff 4. Offer 5. Technology and Innovation 6. Environment	(Zaoui & Souissi, 2022)
DTM dimensions used for IT2F-AHP (Interval Type-2 Fuzzy AHP)	Airline firms	Phase 1: Snail Phase 2: Turtle Phase 3: Rabbit Phase 4: Car Phase 5: Rocket	1. Customer 2. Competition 3. Data 4. Innovation 5. Value 6. Organization 7. Digital Ecosystem 8. Technology 9. Strategy	(Kıyıklık et al., 2022)
Digital Readiness Level (DRL) 4.0 Model	Small & Medium-Sized Enterprises (SMEs)	Level 1-5	1. Strategy 2. People 3. Integration 4. Processes 5. Technology	(Pirola et al., 2020)
Digital Maturity Based on SCP and DCV	Retail Industry	1. Beginners 2. On the way 3. Digitally mature	1. Strategy 2. Market 3. Operations 4. Culture 5. Technology	(Pinto et al., 2023b); (Salume et al., 2021)
Framework for Digitally Mature Schools (FDMS)	School	1. Basic 2. Initial 3. e-Enabled 4. e-Confident 5. e-Mature	1. PML: Planning, management, and leadership 2. ICTLT: ICT in learning and teaching 3. DDC: Development of digital competences 4. ICTC: ICT culture 5. ICTI: ICT infrastructure	(Redjep et al., 2021); (Balaban et al., 2018)
Digital Maturity of SMEs	Small and medium-sized enterprises (SMEs)	1. No Capability 2. Partial/ planning 3. Business Intelligence/ Limited 4. Advanced/ Full Capability	Digital Capability: (1) Digital Technology, (2) Role of Informatics, (3) Digital Business Models, (4) Strategy. Organizational Capability: (5) Human Resources, (6) Organizational Culture, (7) Management.	(Borštnar & Pucihar, 2021)
Digital maturity model for the B2B project sales process	B2B Sales	1. Initial 2. Basic digitalization 3. Average digitalization 4. Advanced digitalization 5. Digital oriented	1. Digital business culture 2. Leader responsibility 3. Digital business organization 4. Digital tools 5. Digital skills	(Voss et al., 2022)
Components analysis of IT-enabled resources	Manufacturing firms	1. Novice 2. Beginner 3. Competent 4. Expert	1. Technology 2. Strategy and organization 3. Marketing 4. Production	(Hortovanyi et al., 2023)

			5. Logistics 6. Procurement	
Digital maturity assessment framework for construction site operations	Construction site operations	0 = Initial, 1 = Digitization, 2 = Digitalization, 3 = Digital transformation	1. Individuals 2. Technologies 3. Organizational structure 4. Goals 5. Environment	(Wernicke et al., 2021)
Digital business maturity in the EU countries	Business	Class 1: Novice Class 2: Intermediate Class 3: Experienced Class 4: Expert	1. Artificial Intelligence 2. 3D Printing 3. Big Data Analytics 4. Robotics 5. Cloud Computing Services 6. Horizontal Integration 7. Vertical Integration 8. Cybersecurity	(Tutak & Brodny, 2022)

(Source: Scopus Indexed Journals)

The Digital Maturity Model focuses on an organization's level of digital capability and helps identify areas that require improvement in digital transformation (Pirola et al., 2020). In the context of local governments, digital maturity models are used to measure the extent to which digital technologies are effectively integrated into government operations and activities in delivering public services (Fesenko et al., 2021); (Tangi et al., 2021); (Salume et al., 2021); (Teichert, 2019).

Digital maturity is critical for local governments for several reasons. First, digitalization plays an important role in improving the efficiency and effectiveness of city management (Fesenko et al., 2021). Second, digital maturity allows local governments to provide various digital services to citizens, such as citizen-to-citizen services (Tangi et al., 2021). Third, digital maturity is closely linked to economic development, it has been found that a high level of digital maturity is associated with greater effectiveness, which can drive corporate innovation and economic growth (X. Zhang & Jin, 2022). Fourth, digital maturity is critical to the successful implementation of digital transformation initiatives in local governments (Kuhlmann & Heuberger, 2023).

Digital Maturity: Technological Adoption and Organizational Readiness

A holistic approach is needed to achieve digital maturity because companies must coordinate factors relevant to their operations through the utilization of existing technology inside and outside the organization. Technological adoption and organizational readiness are key to achieving sustainable adaptation, which in turn helps improve the digital maturity of companies. Digital maturity as a qualitative parameter continues to evolve over time, and companies must learn to respond appropriately to the digital competitive environment (Sándor & Gubán, 2022).

In a study on digital maturity assessment in the small and medium-sized enterprises (SMEs) sector, we proposed a DEX (decision expert) model with seven dimensions mapped into digital capabilities and organizational capabilities. Digital capabilities include aspects of digital technology, the role of informatics, digital business models, and strategy, while organizational capabilities include human resources, organizational culture, and management. The model provides critical information about the position and weaknesses of MSMEs in their digital transformation, helping them prioritize future investments (Borštnar & Pucihar, 2021).

Achieving digital maturity in local government requires two crucial aspects, namely technology adoption and organizational readiness. The adoption of digital technology is the main foundation, providing significant benefits such as increased efficiency and effectiveness of public services, better government management, and strengthening transparency and accountability. The use of technology also contributes to increasing the productivity of government apparatus and the quality of public services, thereby increasing regional competitiveness at the global level (Pirola et al., 2020); (Merdin et al., 2022); (Redjep et al., 2021); (Balaban et al., 2018).

In addition, organizational readiness becomes a critical factor in ensuring the effectiveness of technology adoption by utilizing it efficiently. Organizational readiness also plays an important role in increasing regional competitiveness and improving public satisfaction with government services. The adoption of technologies, such as ICT, big data, AI, and blockchain, is a concrete example of how local governments can increase their digital maturity. Overall, technology adoption and organizational readiness support each other to achieve comprehensive and sustainable digital maturity (Zaoui & Souissi, 2022); (Eremina et al., 2019); (Tutak & Brodny, 2022); (Merdin et al., 2022).

Results and Discussion

Digital Maturity Model for Local Government in Indonesia (DMM-LGI)

a. Dimensions DMM-LGI

In this study, it proposes DMM-LGI as a new framework to measure the digital maturity of local governments with dimensions relevant to the local conditions of districts and cities in Indonesia. DMM-LGI as a framework serves as a tool for local governments to evaluate their progress in digital transformation efforts. The use of this framework enables local governments to identify and prioritize areas that need improvement to improve the effectiveness of their digital transformation. Furthermore, the framework allows benchmarking the performance of local governments with similar entities, providing a broader picture of achieving digital transformation.

DMM-LGI uses two main dimensions, namely digital adoption and organizational readiness. The technology adoption dimension refers to the extent to which local governments have adopted digital technology in their business processes. The adoption of this technology can be seen from several indicators, namely: first, the availability of technological infrastructure, such as internet networks, hardware, and software. Second is the field of application of technology, namely, in what fields digital technology has been applied. Third, the level of application of technology, namely the extent to which digital technology has been integrated in business processes (Redjep et al., 2021); (Perera et al., 2023); (Minonne et al., 2018); (Hortovanyi et al., 2023); (Gökalp & Martinez, 2021); (Eremina et al., 2019); (Pirola et al., 2020).

The organizational readiness dimension refers to the extent to which government organizations are ready to take advantage of digital technology. The readiness of this government organization can be seen from several indicators, namely: First, policies and regulations, which are policies and regulations that support the use of digital technology, Second, work culture is an employee work culture and mindset that supports the use of digital technology. Third, organizational ability is the ability of the organization to manage and utilize digital technology (Laaber et al., 2023); (Elif et al., 2023); (Polyanska et al., 2022); (Zaoui & Souissi, 2022); (Borštnar & Pucihar, 2021); (Voss et al., 2022).

The suggested framework below was modified from a digital maturity model across agencies and sectors that was found in articles with Scopus indexes.

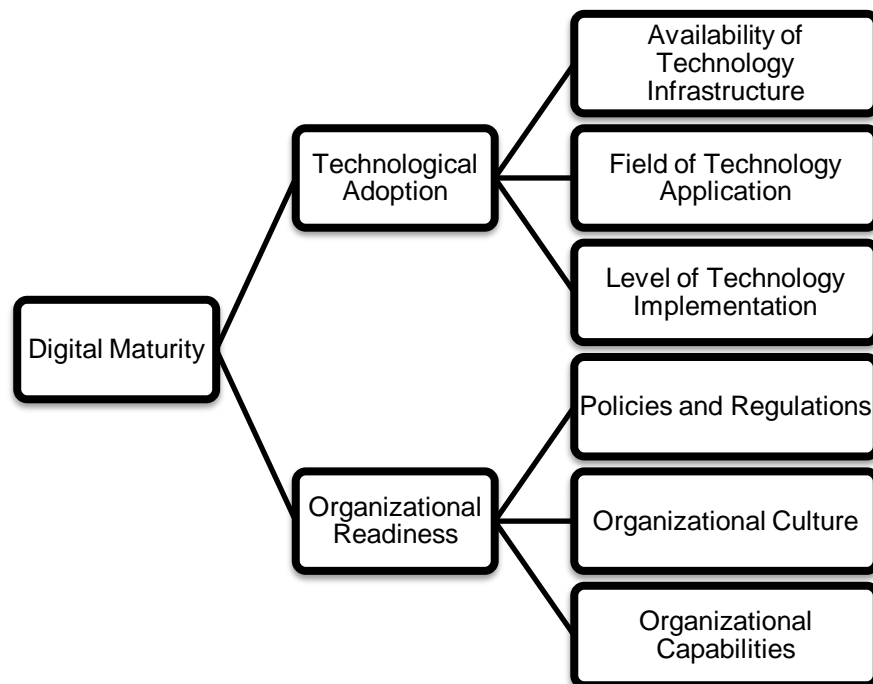


Figure 2. Framework Digital Maturity Model

b. Items DMM-LGI

The following are digital maturity items in local governments adapted from various digital maturity models relevant to local governments in Indonesia:

Table 2. Items DMM-LGI

Indicator	Code	Items	Information	Adoption
Availability of technology infrastructure	A1	Internet network	Availability of adequate internet networks to support connectivity and access to digital information and services.	Framework for Digitally Mature Schools (FDMS) (Redjep et al., 2021); (Balaban et al., 2018)
	A2	Hardware	Availability of adequate hardware to support digital business processes, such as computers, laptops, and mobile devices.	Framework for assessing digital maturity of design and construction (Perera et al., 2023)
	A3	Software	Availability of adequate software to support digital business processes, such as information systems, applications, and other supporting software.	Enterprise architecture layers (Archimate 3.0) (Minonne et al., 2018)
Spheres of application of technology	A4	Public service	The reach of public services that have utilized digital technology.	Components analysis of IT-enabled resources (Hortovanyi et al., 2023)
	A5	Financial management	Financial management processes that have utilized digital technology.	The digital transformation capability maturity model (DX-CMM) (Gökalp & Martinez, 2021)
	A6	Development planning	Development planning process that has utilized digital technology.	Framework for assessing digital maturity of design and construction (Perera et al., 2023)
The degree of application of technology	A7	Automation level	The extent to which business processes have been automated with digital technology.	The six major groups of the digital maturity elements (Eremina et al., 2019)
	A8	Integration level	The extent to which digital technology has been integrated with other business processes.	Digital business maturity in the EU countries (Tutak & Brodny, 2022). Digital Readiness Level (DRL) 4.0 Model (Pirola et al., 2020).
	A9	Interoperability level	The extent to which digital technology can be used in conjunction with other technologies.	The six major groups of the digital maturity elements (Eremina et al., 2019)

Policies and regulations	B1	Technology utilization policy	Policies and regulations that encourage the use of digital technologies in an organization's business processes.	Digital Maturity Inventory (DIMI) (Laaber et al., 2023)
	B2	Policy implementation	The extent to which policies and regulations have been implemented in practice.	Digital Maturity Inventory (DIMI) (Laaber et al., 2023)
Organizational culture	B3	Understanding and adoption of technology	The extent to which members of the organization understand and adopt digital technologies.	DMM based on SF-AHP and SF-TODIM (Elif et al., 2023)
	B4	Support for change	The extent to which members of the organization support the changes brought about by digital technology.	Digital Maturity of Energy Enterprises (Polyanska et al., 2022)
Organizational capabilities	B5	HR capabilities	Knowledge, skills, and attitudes of organizational HR in utilizing digital technology.	Digital Internet Maturity Model (DIMM) (Zaoui & Souissi, 2022).
	B6	Technology capabilities	Organizational ability to manage digital technology infrastructure and systems.	Digital Maturity of SMEs (Borštnar & Pucihar, 2021)
	B7	Business process capabilities	Organizational ability to integrate digital technologies in business processes.	Digital maturity model for the B2B project sales process (Voss et al., 2022)

(Source: Scopus Indexed Journals)

c. Levels DMM-LGI

While different industries or agencies employ different versions of the digital maturity model's phases or levels, the DMM-LGI framework evaluates digital maturity using levels 1–5, which are thought to be the most widely used and pertinent (Zaoui & Souissi, 2022); (Kıyıklık et al., 2022); (Laaber et al., 2023); (Pirola et al., 2020); (Redjep et al., 2021); (Voss et al., 2022). The degree of digital maturity in local government is as follows.

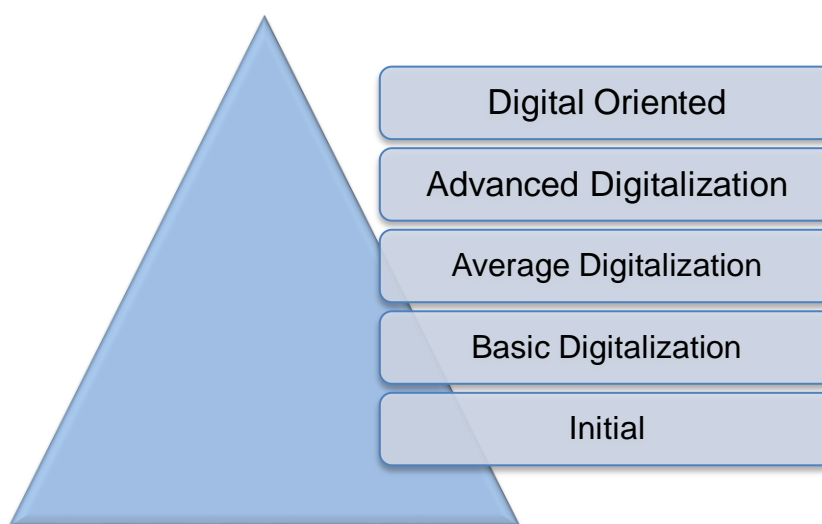


Figure 3. Level of Digital Maturity

- Level 1: Initial

At this stage, local governments begin to develop plans and strategies to utilize digital technology. Local governments need to conduct needs analyses and develop action plans to utilize digital technology effectively and efficiently. At this level, local governments provide services manually or conventionally.

- Level 2: Basic Digitalization

At this stage, local governments begin to apply digital technology to their business processes. Local governments need to identify potential areas to apply digital technology and conduct socialization and training on the use of digital technology. At this level, local governments have basic organizational instruments and digital tools for efficient services.

- Level 3: Average Digitalization

Local governments are expanding the application of digital technology to other fields. Local governments need to continue to improve human resource capabilities and innovate in the use of digital technology. At this level, local governments have many organizational instruments and digital tools for efficient services.

- Level 4: Advanced Digitalization

Local governments are starting to integrate digital technology into their various business processes. Local governments need to change their mindset and work culture to support the integrated use of digital technology. At this level, local governments have almost all organizational instruments and digital tools for efficient services.

- Level 5: Digital Oriented

Local governments are leveraging digital technology to fundamentally change and improve the way it works. Local governments have transformed into organizations that are adaptive and responsive to technological changes. At this level, local governments own and use all relevant organizational instruments and digital tools for services perfectly.

Adoption of Technology by the Local Government of Karanganyar Regency

a. Technology Infrastructure Availability

Technology infrastructure consists of three main components, namely internet networks, hardware, and software. In 2019, Karanganyar Regent H. Juliyatmono, S.E., M.M., through Regent Decree Number 555/68, formed an internet network management

team. This team is responsible for managing internet services used for access in and out through the Communication and Information Office of Karanganyar Regency. Their duties include solving technical problems that may arise as well as monitoring and evaluating the implementation of bandwidth capacity. Furthermore, in 2020, the Communication and Information Office of Karanganyar Regency collaborated with PT. Solo Jaya Buana to increase internet access bandwidth capacity. This project involves a budget of Rp 89,200,000.

In terms of hardware, based on information from the asset records and inventory of the Karanganyar District Government, all Regional Equipment Organizations (OPDs) have an adequate number of PC units, laptops, and other supporting components. Most of the hardware is in good condition, although there are some that are in poor condition and have suffered heavy damage. However, the majority of device specifications are in the mid-to-low category, with only a small percentage having mid-to-high-end specifications. One of the challenges faced is that these devices are already included in the old product category, so it is necessary to procure new devices to support local government digitalization initiatives.

In terms of software, the Regional Government of Karanganyar Regency uses various information systems and applications. According to data obtained from the Communication and Information Office of Karanganyar Regency, there are a total of 119 information systems and applications managed by the Regional Government of Karanganyar Regency. The application has ownership from the central, provincial, district, and other agencies. For example, "Sidenokk" is an application that provides information related to tourism, the creative economy, youth, and sports in Karanganyar Regency. In addition, there are applications "I Am Present" and "I Serve," which function as attendance systems for employees of the local government of Karanganyar Regency. However, the application is considered immature because it often experiences system errors.

b. Field of Technology Application

All Regional Apparatus Organizations (OPD) in Karanganyar Regency have carried out initiatives to utilize digital technology according to the instructions of the Regent to change all public services to be digital-based. The Karanganyar Regency Government has successfully implemented various public services using digital technology, including aspects of population and civil registration, health services, education, licensing, taxes, levies, public information, electronic government (e-government), and others.

In the context of financial management, the Karanganyar Regency Government has adopted digital technology to manage their finances. One example of its implementation is through the use of the Regional Asset Management Information System (SIMDA BMD). SIMDA BMD Karanganyar Regency plays a central role in regional asset management, involving inventory modules, asset accounting, and asset reporting. By ensuring the accuracy and completeness of regional asset data, SIMDA BMD helps improve the effectiveness, efficiency, transparency, and accountability of asset management. The inventory module manages information such as the location, condition, and value of assets, while the asset accounting module records acquisition, deletion, and mutation transactions according to government accounting standards. The asset reporting module generates inventory, accounting, and value reports, ensuring the information is available and accessible to related parties.

The Karanganyar Regency Government has successfully integrated the e-planning system, a web-based digital technology, in the development planning process, including the preparation of Renstra, RKPD, APBD, and evaluation monitoring. The use of e-planning provides a number of benefits, such as increased planning efficiency and effectiveness, better transparency and accountability by facilitating access to public information, and improving the quality of planning through comprehensive data and information integration. Nevertheless, the government remains committed to continuing to develop the use of e-planning, with a focus on all stages of development planning, while increasing the capacity of human resources in the use of this technology.

c. Technology Application Rate

The Karanganyar Regency Government has adopted an e-office system to replace the manual correspondence process. With this system, local government employees can process correspondence electronically, eliminating the need to print, process, and send letters manually. The existence of e-offices also paves the way to better transparency, as every letter sent or received can be tracked online.

Furthermore, the Local Government Information System (SIPD) has been integrated with various other information systems, including financial, staffing, and public service information systems. This integration makes it easier for local governments to manage data and information in an integrated manner, so that the data obtained becomes more complete and accurate. The information becomes the basis for more informed decision-making.

Not only that, SIPD has also been integrated with national information systems, such as the Indonesian One Data Information System (SSIDI). This integration facilitates local governments' access to national data and information while allowing data and information sharing with the central government. Through the integration of SIPD with SSIDI, local governments can obtain more complete and accurate national data and information, which becomes the basis for more targeted policy formulation.

Readiness of Local Government Organizations in Karanganyar Regency

a. Policy and Regulation

The Karanganyar Regency Government has issued policies and regulations to encourage the use of digital technology in the organization's business processes. The main objective of these policies and regulations is to improve the efficiency, effectiveness, and transparency of governance in Karanganyar District. Data from the Legal Information Documentation Network (JDIH) of Karanganyar Regency recorded that since 2010, there have been 7 Regent Regulations (PERBUP) and 1 Regent Instruction that focus on supporting digital-based public service policies. An example is Karanganyar Regent Regulation Number 31 of 2022 concerning the Electronic-Based Government System (SPBE) within the Karanganyar Regency Government.

The SPBE policy implementation process in the Karanganyar Regency Government has made significant progress. Human resource capacity building is carried out through training and technical guidance, while infrastructure is strengthened by the provision of internet networks in all government offices and the development of applications such as population administration, licensing, and health services. Although the implementation is going well, there are still challenges such as budget availability, human resources, and infrastructure. The Karanganyar Regency Government affirmed its commitment to overcome these challenges, with the aim of achieving comprehensive SPBE implementation by 2025. This underlines the need for further efforts so that the benefits of this policy can be maximally felt by the community.

b. Organizational Culture

Local government employees of Karanganyar Regency as a whole have understood and adopted digital technology; this is reflected in the increased use in various aspects of government. The 2023 Karanganyar Regency Bappeda survey noted that 85% of employees understand digital technology, and 70% of them use it in their daily work. However, challenges remain, including the lack of basic skills of some employees in digital

technology, barriers to internet access in some areas, and the need for increased coordination and collaboration among government agencies in the use of digital technology.

Local government employees of Karanganyar Regency realize that digital technology is an inevitable trend, and they are committed to continuing to learn and adapt to the changes brought by the technology. Employee support for digital technology change can be seen through active participation in training and development programs organized by local governments. They not only provide advice for the development of digital technology but also actively use digital technology in their daily work. Local governments continue to encourage employees by providing facilities and support, such as training programs, improving internet access, and building data integration platforms and information systems.

c. Organizational Capabilities

The knowledge, skills, and attitudes of Human Resources (HR) of Karanganyar Regency government employees in adopting digital technology can be classified as follows: Their knowledge, as reflected in the results of the 2023 Karanganyar Regency Bappeda survey, shows that 85% of employees understand digital technology, including basic knowledge of digital technology hardware, software, and applications. Employee HR skills, as delivered by 70% of those who use digital technology in their daily work, involve foundational skills in the use of relevant hardware, software, and applications. Their attitudes towards digital technology are generally positive, with support for the changes brought about by such technology. However, there are still challenges, such as a lack of basic skills among some employees, barriers to internet access in some areas, and the need for improved coordination among government agencies.

The ability of local government organizations in Karanganyar Regency to manage digital technology infrastructure and systems has experienced a significant increase, reflected in the availability of better digital technology infrastructure and systems throughout the region, including remote areas. Local governments actively provide infrastructure such as internet networks, hardware, and software, with a focus on capacity building, security, and modernization. Digital technology systems such as population administration, regional finance, and regional development planning have been developed and implemented throughout government agencies.

The ability of local government organizations in Karanganyar Regency to integrate digital technology in business processes has increased, reflected in the increasingly

widespread integration of digital technology in various aspects of the district. Some concrete examples of integration involve the Population Administration Information System (SIAK) with other systems, the application of e-government for online public services, and the construction of data integration platforms and information systems. However, challenges such as coordination barriers between government agencies and the need to improve the understanding and skills of local government employees in integrating digital technology still need to be overcome. Concrete steps have been taken but need to be continuously improved to ensure more effective and efficient integration of digital technology in local government business processes.

Level of Digital Maturity of the Local Government of Karanganyar Regency

Despite having adequate technological infrastructure and applying digital technology in several fields, such as public services and financial management, the application is still partial and has not been integrated thoroughly. The lack of integrated digital technology in the Regional Equipment Organization (OPD) of Karanganyar Regency is caused by a lack of coordination and communication between organizations, differences in needs and goals, limitations of integrated data, and a lack of competent human resources.

Based on the analysis above, it can be concluded that the level of digital maturity of the Karanganyar District Government, which is assessed using the DMM-LGI framework, is at the Average Digitalization level. At this stage, local governments have been able to implement various organizational instruments and digital tools to improve service efficiency. However, there are still shortcomings, especially in terms of developing Human Resources (HR) capabilities and integration between regional apparatus organizations.

The following is an overview of the evaluation of the digital maturity level of the Karanganyar District Government, which is based on two main dimensions, namely technology adoption and organizational readiness:

a. Technology Adoption

In the aspect of technological infrastructure availability, the Karanganyar Regency Government already has adequate facilities, involving elements such as internet networks, hardware, and software. Within the scope of technology application, the Karanganyar Regency Government has implemented digital technology in various sectors, including public services, financial management, and development planning. However, in the depth of digital technology application, the Karanganyar Regency Government still faces

obstacles because its implementation is still limited to a partial level and has not been integrated holistically.

Table 3. Digital Maturity Dimensions of Technology Adoption

	A1	A2	A3	A4	A5	A6	A7	A8	A9
Explanation	Average	Average	Average	Partial	Partial	Partial	Average	Low	Low

(Source: Interview and Observation)

b. Organizational Readiness

In terms of policies and regulations, the Karanganyar Regency Government has implemented a series of policies and regulations aimed at providing support for the use of digital technology. However, in the aspect of work culture, there is still a need to make improvements to support the optimization of the use of digital technology in the government environment. In the context of organizational capabilities, the Karanganyar Regency Government is faced with the task of continuously improving its organizational capabilities, especially in the aspects of human resources (HR) capabilities and business process capabilities, in order to ensure the effectiveness and efficiency of digital technology implementation.

Table 4. Digital Maturity Dimensions of Organizational Readiness

	B1	B2	B3	B4	B5	B6	B7
Explanation	Support	Average	Average	Average	Limited	Limited	Low

(Source: Interview and Observation)

Conclusion

There is no standard definition of digital maturity, but it can be concluded that digital maturity is the ability of an organization to use digital technology effectively and efficiently in achieving its strategic goals. Digital maturity is not only related to the adoption of the latest infrastructure and technology but also to the extent to which the integration of these technologies is carried out in business processes, culture, and organizational structures (Teichert, 2019). The higher the level of digital maturity of an organization, the better it is able to utilize digital technology to improve performance and achieve its business goals (Woods et al., 2022). Therefore, there is a need to measure the level of digital maturity for local governments. This is to identify areas of opportunity that need improvement and drive further digital transformation efforts.

This research proposes a new framework to assess the digital maturity of local governments called the Digital Maturity Model for Local Governments in Indonesia (DMM-

LGI). This framework was developed by adopting various digital maturity models across organizational sectors and adapted to the context of district and city governments in Indonesia. The main objective of the framework is to evaluate the extent to which local governments have leveraged digital technologies and identify specific areas that can be improved to further enhance digital transformation.

In the results of the study, the Digital Maturity Model for Local Governments in Indonesia (DMM-LGI) was used to measure the level of digital maturity of the Karanganyar District Government. The results show that the digital maturity of local governments is at the average digitalization level. The Karanganyar Regency Government already has a number of adequate digital devices and technology, has implemented digital technology in various public service sectors, and has innovated in the use of digital technology. Even so, at this level, they still face limitations in terms of adequate and qualified human resources. In addition, the existence of too many applications and information systems raises new problems, especially those related to integration and interoperability.

This study makes the following recommendations: First, the Karanganyar Regency Government can increase the competency of existing human resources and balance this with the recruitment of new staff who are competent in the field of ICT. Secondly, integrating data and government services. Third, evaluate the status of digitization on a regular basis. Apart from that, researchers suggest expanding the scope of the study to maintain continuity, such as by assessing digital maturity in the application of the smart city policy of the Karanganyar district government. Subsequently broaden the study's focus by assessing the level of digital maturity across several Karanganyar Regency public sectors, including as the tourism, health, and education sectors. A more complete picture can be obtained by doing research on digital maturity across a range of sectors. By comparing digital maturity, gaps and areas for improvement can be found.

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