Otoritas : Jurnal Ilmu Pemerintahan Vol. 15, No. 3, 2025
DOI: https://doi.org/10.26618/ojip.v15i3.19490

# Strategy for integrating data on demographic to accelerate digital transformation in Makassar City, Indonesia

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**Abstract**

*This study examines Makassar, Indonesia, as an example of accelerated demographic data integration. The uniqueness of this study lies in the application of SWOT-based diagnostics in qualitative research to map, within a single analytical framework, the conditions that facilitate and the obstacles that shape the speed and quality of data integration across various institutions. A qualitative approach was used to reveal and discuss strategies for accelerating demographic data integration to support digital transformation. The analysis shows that the application of information technology, inter-agency collaboration, and systematic human resource capacity building are determining factors for acceleration. The results of the study found that the main challenges include data privacy issues, system interoperability, and resistance to change. The contribution of this study provides insights into data integration strategies to support more effective and efficient digital transformation in the future.*

***Keywords:*** *demographic, data integration, digital transformation, acceleration*

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## Introduction

In the digital era, the rapid advancement of information and communication technology (ICT) has substantially reshaped multiple domains of social life, including the public sector. Digital technologies have created new opportunities for governments to improve the efficiency and effectiveness with which public functions are delivered. More broadly, digital transformation extends beyond the adoption of information technology; it constitutes a complex organizational phenomenon that reflects the broader institutional environment and the ways technological change influences individuals, organizations, and communities within that context. Conceptually, digital transformation may be understood as a process of enhancing organizational quality and performance through significant progress enabled by the integrated use of interconnected information, computing, communication, and related technologies (Vial, 2019).

The Population and Civil Registration Agency is one of the government agencies actively transforming the public service sector (Ashari & Sallu, 2023; Windra et al., 2024). The Directorate General of Population and Civil Registration of the Ministry of Home Affairs, as the agency responsible for policies, regulations, and supervision related to demographic administration and civil registration throughout Indonesia, began its initial transformation by implementing Electronic Signatures on demographic administration documents. Documents such as Family Cards and civil registration certificates use this Electronic Signature system to replace the handwritten signatures of

the Head of the Population and Civil Registration Office with a digital form, namely a QR Code. The next transformation was carried out by creating the *Anjungan Dukcapil Mandiri* (ADM) machine, which functions as a self-service kiosk for printing various demographic administration documents.

Many have provided insights to the state-of-the-art and the future of Digital Transformation. Few have started to commit to it, many are still unaware, and few are still resistant or skeptical. This keynote will provide a few examples of Indonesian people attitude towards digital transformation, including data integration which is still not optimal (Tedjasaputra, 2019).

The Directorate General of Population and Civil Registration has essentially implemented the transformation and policies mentioned above. On the other hand, they also provide space for the Population and Civil Registration Offices at the district/city level to realize transformation through innovations desired by each region. For example, they have the authority to use independent websites/applications to facilitate the submission of requests for demographic administration documents. This is in accordance with Article 1, Paragraph 2 of the Ministry of Home Affairs Regulation Number 7 of 2019 on Online Population Administration Services, which stipulates that Online Population Administration Services are the process of managing demographic documents where the submission of data/requirements is done electronically via web-based media, utilizing technology, communication, and information facilities. Through these websites and applications, the services provided by Population and Civil Registration Offices at the district/city level gradually but surely demonstrate their transformation efforts by shifting from face-to-face services using physical documents (paper-based) to online services using electronic (web/application-based) systems.

The urgency of digital transformation is not merely about following global trends. According to a 2018 UN report, the use of ICT platforms and e-government is a critical catalyst for achieving the success of the Sustainable Development Goals by 2030. The UN states that the spread of ICT and global connections between countries have immense potential to accelerate human work, bridge the digital technology gap, and enhance public knowledge (such as science and technological innovation). The rapid advancement of technology and the significant impact of digital transformation, which will undoubtedly continue to occur, serve as a wake-up call for every country to understand digital transformation as a necessity rather than just an obligation (Alojail & Khan, 2023; Kraus et al., 2021).

There are various issues that still hinder demographic registration and civil registration in the city of Makassar. This can be seen from the suboptimal performance of demographic data collection in Makassar. For instance, in 2020, out of a total of 1.2 million residents of Makassar who are required to have an ID card, there were 54,500 people who had not yet completed their e-ID Card registration. This means they do not yet have an e-ID card. A few years later, in 2023, more than 18,000 residents of Makassar still do not have an e-ID card. In the city of Makassar, South Sulawesi, 56.98% of children do not yet have a child identity card. Similarly, out of the 1.4 million residents of Makassar, only 4.73% have registered for the Digital Demographic Identity.

Suboptimal integration of demographic data is suspected to cause various negative impacts. It can hinder the planning and implementation of regional development, while people without legitimate demographic documents may face difficulties accessing public services such as education, healthcare, and social assistance. Inaccurate data can also lead to injustice in public services, including misdirected social assistance distribution, and inadequate integration of demographic

data may ultimately reduce public trust in the government (Agisah et al., 2025; Fitsum et al., 2010).

The emergence of the new digital era in Indonesia, particularly in the city of Makassar, urges the local government, as a provider of public services, to adapt to the evolving environment driven by globalization. Demographic data integration is a crucial part of digital-based demographic services to support digital transformation in public services and governance in Makassar.

Data integration, or linking data between units, is one method to make bureaucratic services more effective and efficient (Chen & Lee, 2018; Merhi & Bregu, 2020; Raghavan et al., 2020). This is an aspiration that the government is currently striving for, starting with the integration of data on a national scale. This is important because, according to data from the Ministry of Communication and Information, demographic-related data is still scattered across 2,700 data storage units in various agencies and institutions. This makes data integration urgently necessary.

The problems occurring at the national or central level are actually a continuation of issues originating from the local level of government administration. Why can this be said? Of course, we know that the most basic service related to information collection is the responsibility of the local government. Upon observation, there is disintegration between units and local government agencies or organizations. This issue continues to this day, despite the fact that Indonesian citizens' identity cards are now electronic. It is quite strange that in an era where everyone is talking about the Industrial Revolution 4.0, people still have to photocopy their ID cards (Ristiandy, 2021).

Currently, none of the various regional government agencies and institutions are directly integrated. However, agencies that are already directly connected include the Tax Office, Social Security Administration Agency, and the Department of Education. Yet, the data obtained from the Department of Education is still incomplete as it is sourced from the primary education data. The government’s efforts to integrate data have been made and pursued through Law Number 39 of 2019 concerning One Data Indonesia. Since 2020, the Ministry of Home Affairs, through the Directorate General of Population and Civil Registration, has been developing the iPOP application, which stands for Indonesia’s Population and Civil Registration Map, with the aim of integrating all demographic data into a single platform (Ristiandy, 2021)

The research questions posed are: How does demographic data integration support digital transformation in the city of Makassar, and what are the strategies to accelerate demographic data integrity in supporting digital transformation in Makassar?

**Research Methods**

A qualitative approach is used to uncover and discuss strategies for accelerating the integration of demographic data to support digital transformation. Qualitative research is intended as a type of research whose findings are not obtained through statistical procedures or other forms of quantification. The aim of qualitative research is to present the social world and its perspective within the world, in terms of concepts, behaviors, perceptions, and issues concerning the people being studied.

Meanwhile, based on its type, this research falls under descriptive research. The purpose of the descriptive method is to create a systematic, factual, and accurate description, depiction, or illustration of the facts, characteristics, and relationships between the phenomena being investigated.

In qualitative research, informants are key to obtaining primary data in the form of words and their perceptions of the phenomena being studied. As this research involves the three pillars of governance, the main data sources consist of the words and actions of informants from local government, the community, and academics. These informants include those involved in policy and program formulation, public service implementers in demographic administration, and public service users. The selection of informants uses Non-Probability Sampling techniques, such as purposive sampling and accidental sampling, which do not give all members of the demographic an equal chance to be sampled.

In this research, data is collected using in-depth interviews, non-participant observation, and documentation studies. In-depth interviews aim to obtain more comprehensive data and allow informants to provide information more freely and openly, guided by an interview protocol. Non-participant observation is conducted to maintain objectivity and record activities without researcher intervention, using an observation guide. Documentation studies are used to collect data from reports, records, news, and literature related to demographic data integration in the city of Makassar. In qualitative studies, data collection and analysis are conducted interactively, including Data Collecting, Data Condensation, Data Display, and Conclusion Drawing activities (Huberman & Miles, 2002).

In designing a strategy, SWOT analysis is used as an evaluation of the overall strengths, weaknesses, opportunities, and threats. SWOT analysis is also interpreted as identification as a factor to formulate a strategy. This analysis is based on logic that can maximize strengths and opportunities, but together can minimize weaknesses and threats.

The Internal Factor Analysis Summary (IFAS) matrix is also used as a strategic formulation tool by summarizing and evaluating the key strengths and weaknesses in functional business areas. It serves as a foundation for identifying and evaluating relationships among these areas. Additionally, the IFAS matrix enables strategists to summarize and assess economic, social, cultural, demographic, environmental, political, governmental, legal, technological, and competitive information.

The next stage is the IE (*Internal-External*) matrix with a cartesius diagram to position the total IFAS weight score on the x-axis and the total EFAS weight score on the y-axis. The IE matrix can be divided into four quadrants, namely:

- Quadrant I : This is a very favorable situation. The company has opportunities and strengths so that it can take advantage of the existing opportunities. The strategy that must be implemented in this condition is to support aggressive growth policies (Growth oriented strategy).
- Quadrant II: Despite facing various threats, the company still has strength internally. The strategy that must be applied is to use strengths to take advantage of long-term opportunities by means of a diversification strategy (product/service).
- Quadrant III : The company faces huge market opportunities, but on the other hand, it faces some internal constraints or weaknesses. The business conditions in quadrant 3 are similar to the Question Mark in the BCG matrix. The focus of this company's strategy is to minimize the company's internal problems so that it can seize more market opportunities.
- Quadrant IV : This is a very unfortunate situation, the company faces various internal threats and weaknesses.

The results of the IE matrix are combined with the SWOT matrix as an important matching tool that helps managers develop four types of strategies: SO Strategy (strength-opportunity), WO Strategy (weakness-opportunity), ST Strategy (threat strength), and WT Strategy (weakness-threat) (David, 2011).

## Results and Discussion

### Demographic Data Integration in Supporting Digital Transformation in Makassar City

The demographic data integration policy is an instrument designed to support digital transformation as an effort to address issues in demographic administration. In the context of governance and public service delivery, demographic data integration to support digital transformation is essentially a manifestation of government functions in regulation and service provision.

An overview of the local government's efforts to support digital transformation through demographic data integration was provided by the Mayor of Makassar. The mayor stated that Makassar has made efforts to implement the demographic data integration policy to support digital transformation, one of which has been articulated since the introduction of the Sombero and Smart City concepts.

The implementation of demographic data integration is also reflected in the remarks of the Head of the Regional Development Planning Agency (Bappeda) of Makassar City. The Head of Bappeda expressed that there are tangible efforts from the local government to promote digital transformation, as evidenced by the ongoing Smart City concept. However, to optimize demographic data integration, comprehensive planning, especially in terms of adequate resources, is necessary. The informant believes that resources, particularly budgetary resources, need to be increased.

Furthermore, the public service in the field of demographic administration, relevant to the efforts of demographic data integration to support digital transformation, is represented in the statement of the Head of the Population and Civil Registration Office of Makassar City. The Head stated that the awareness of the importance of adopting digital technology in government and public services is quite high, particularly with the Smart City concept being a focus of development. However, despite this enthusiasm, there are still several issues in realizing optimal demographic data integration. Demographic data integration is seen as the main foundation in building a sustainable Smart City ecosystem. Still, challenges such as data fragmentation, limited information technology infrastructure, and low public awareness remain significant obstacles. At the level of governmental units and public service units in demographic administration, the integration of demographic data to support digital transformation is illustrated by the statements of the Subdistrict Head of Makassar. The Subdistrict Head highlighted that the subdistrict government, as the front line in delivering public services in demographic administration, plays a crucial role due to its up-to-date records and services. However, the informant noted that to support demographic data integration, the quality and quantity of required resources and facilities need to be improved. The high demand for demographic administration services often surpasses the available human and facility resources, leading to insufficient support.

From the perspective of service recipients, as represented by community informants, community leaders, and NGOs, it is evident that demographic data

integration is crucial for facilitating various service needs in both government and private sectors. However, these informants acknowledged that public awareness and literacy regarding digital technology are uneven. Similarly, the ownership and operational knowledge of digital devices are not yet widespread, resulting in difficulties accessing demographic administration services through digital platforms.

In both conceptual and empirical terms, academic informants view the digital transformation in Makassar as quite successful, citing the implementation of the Sombero and Smart City concepts. This success is evidenced by various awards for the local government's performance in integrating digital technology through various e-government initiatives. However, in terms of data interoperability and demographic data integration, gaps still exist, necessitating ongoing evaluations and innovations to enhance the effectiveness of digital transformation through demographic data integration.

Various statements from informants regarding the integration of demographic data to support digital transformation in Makassar City are also relevant to field observations, which confirm the issues described by the informants and align with previously outlined problems. This integration plays a central role in supporting digital transformation in Makassar, but it faces several challenges that need to be addressed.

First, the lack of demographic documents such as e-ID cards and birth certificates remains an issue that needs resolution. Data integration enables the identification of groups lacking official documents, facilitating more accurate and effective service provision. Second, the suboptimal Information and Communication Technology (ICT) infrastructure, particularly limited internet access in some areas, requires integrated data for proper investment planning. Third, the low data interoperability across public service sectors indicates the need for data integration to expedite information exchange and service efficiency. Lastly, public awareness of the importance of demographic documents needs to be enhanced, and data integration can be used to disseminate information and provide more accessible services. By addressing these challenges through demographic data integration, the Makassar City government can accelerate digital transformation, improve public service quality, and advance overall community welfare.

Stakeholders recognize that demographic data integration faces several barriers that must be overcome. Cross-sector commitment and collaboration are essential to effectively implementing data integration and positively impacting public service advancement and digital government transformation. One major barrier is the lack of strong political will in budgeting. The data integration process requires not only advanced technology but also hard work and effective cross-sector coordination. Without strong political support and adequate budget allocation, efforts to realize demographic data integration may be hindered. The importance of government commitment to planning and implementing necessary steps for comprehensive digital transformation is also emphasized.

The successful digital transformation of the public sector largely depends on strategic focus, a strong governance model, and a high level of intergovernmental cooperation. The analysis finds strong evidence that their existing governance and intergovernmental cooperation frameworks, in combination with their established service production and delivery ecosystems, have allowed the three countries to move towards real user-centric (Nielsen & Jordanoski, 2023).

Although the concept of government that integrates e-government in Makassar City is considered to support digital transformation, the implementation of

demographic data integration has not been optimal. This is caused by various problems, including the performance of the implementation of the demographic data integration policy that has not been optimal and the lack of maximum infrastructure support. The lack of resources, human resources, budget, and infrastructure is still a challenge that needs to be overcome to achieve the goal of effectively integrating demographic data in Makassar City.

**Strategy for Accelerating Demographic Data Integration in Supporting Digital Transformation in Makassar City**

As a result of data processing, internal and external conditions were identified in the form of factors as strengths, weaknesses, opportunities and threats which were then input and analyzed into the internal factor matrix (IFAS/*internal factor analysis summary*) and external factor matrix (EFAS/*external factor analysis summary*). The following is presented the IFAS matrix with weighting and scoring as follows:

**Table 1.** Internal Factor Matrix (IFAS) Integration of Demographic Data in Supporting Digital Transformation

| Internal Key Factor | Weight | Rating | Score |
|---|---|---|---|
| **Strength** | | | |
| 1) Makassar City Government's Commitment through the Sombero and *Smart City Concept* | 0,15 | 4 | 0,60 |
| 2) Regional Regulations and Mayor's Regulations related to demographic administration and Standard Operating Procedures (SOP) for demographic administration services. | 0,10 | 3 | 0,30 |
| 3) Digital leadership of the Mayor of Makassar | 0,15 | 4 | 0,60 |
| 4) Availability of e-government digital platforms | 0,15 | 3 | 0,45 |
| **Amount** | **0,55** | | 1,95 |
| **Weakness** | | | |
| 1) Limited budget resources, human resources and infrastructure | 0,15 | 3 | 0,45 |
| 2) Uneven internet network infrastructure | 0,10 | 3 | 0,30 |
| 3) Capacity and competence of ICT apparatus | 0,10 | 3 | 0,30 |
| 4) Coordination between government sectors and collaboration with parties outside the government | 0,10 | 3 | 0,30 |
| **Amount** | **0,45** | | 1,35 |
| **Total** | **1,00** | | **3,30** |

*Source : processed by author*

As shown in Table 1 of the IFAS matrix above, the highest score among the strength factors is commitment and leadership (0.60). This indicates that strong leadership support and organizational commitment constitute a major strategic asset in advancing demographic data integration, particularly in ensuring policy consistency, strengthening inter-agency coordination, and facilitating effective implementation across operational levels.

In contrast, the highest score among the weakness factors is resource limitations (0.45), suggesting that this aspect represents the most critical constraint in demographic data integration. Such limitations may involve inadequate human resources in terms of both quantity and competency, restricted budget allocations, and insufficient supporting infrastructure and information technology capacity. Consequently, these constraints may impede routine data updating, interoperability and data exchange across institutions, improvements in database quality and accuracy, and the sustained monitoring and evaluation required to maintain effective data integration.

**Table 2.** External Factor Matrix (EFAS) Integration of Demographic Data in Supporting Digital Transformation

| External Key Factor | | Weight | Rating | Score |
|---|---|---|---|---|
| **Opportunities** | | | | |
| 1) | National policies and central government budget assistance | 0,10 | 1 | 0,10 |
| 2) | Parties outside the government that facilitate public literacy and the development of digital technology | 0,10 | 1 | 0,10 |
| 3) | Device penetration and development of digital technology innovation | 0,10 | 1 | 0,10 |
| 4) | Government, private and public needs for digital technology and administrative documents | 0,10 | 2 | 0,20 |
| | **Amount** | **0,40** | | **0,50** |
| **Threatness** | | | | |
| 1) | Policy changes | 0,10 | 1 | 0,10 |
| 2) | Data security, hacking and data privacy violations | 0,20 | 2 | 0,40 |
| 3) | Data misuse | 0,15 | 1 | 0,15 |
| 4) | Knowledge and literacy of the community related to digital technology and demographic administration. | 0,15 | 2 | 0,30 |
| | **Amount** | **0,60** | | 0,95 |
| | **Total** | **1,00** | | **1,45** |

*Source : processed by author*

As presented in table 2 of the EFAS matrix above, it is known that the highest score on the opportunity factor is related to the need for digital technology and administration with a score of 0.20 which is the largest opportunity in demographic data integration. Meanwhile, the threat with the highest score of 0.40 is related to data security.

Furthermore, a calculation equation was obtained to determine which quadrant strategies can be recommended in the integration of demographic data in supporting digital transformation. The difference in the score of strength and weakness is 1.95 – 1.35 = + 0.60. Meanwhile, the difference in the score of opportunity and threat weight (OT) is 0.50 – 0.95 = - 0.45. Then the results are presented in the Cartesius diagram to see which quadrant of strategies is the integration of demographic data in supporting digital transformation as follows:

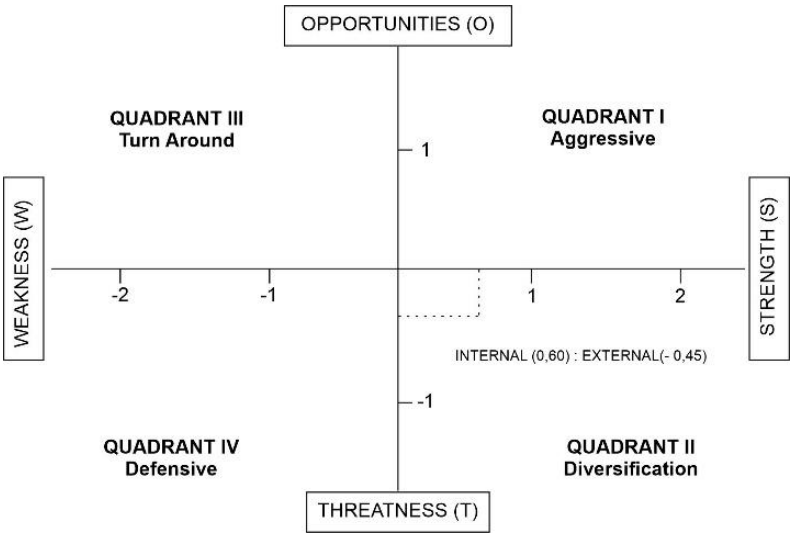


**Figure 1.** Diagram of Demographic Data Integration
*Source : processed by author*

As shown in the figure above, it is known that the difference in SW values from the internal environment has a positive value of 0.60 while the OT from the external environment has a negative value of -0.45, so that the position is in quadrant II, namely diversification. The recommended strategy based on the IE analysis in this condition is diversification.

Several alternative strategies were obtained from the results of the SWOT matrix analysis in the integration of demographic data administration, as follows :

***Strategy SO***

The SO (Strength–Opportunity) strategy emphasizes leveraging internal strengths to capitalize on external opportunities for advancing demographic data integration. First, local governments should maintain consistent and sustained commitments, align their initiatives with central government policies, and optimize the utilization of budget support provided by the central government. Second, governments should develop accommodating standard operating procedures (SOPs) and regulatory provisions that enable assistance and meaningful participation from non-government actors, thereby strengthening collaboration and expanding implementation capacity. Third, leaders should function as visible role models in adopting and using digital devices and technologies, as leadership-by-example can accelerate organizational acceptance and strengthen the digital culture within public institutions. Finally, local governments should promote continuous e-government innovation to respond to public demand for efficient, accessible, and citizen-centered digital services.

***Strategy ST***

The ST (Strength–Threat) strategy focuses on mobilizing internal strengths to mitigate external threats that may undermine demographic data integration. First, administrative policies should be synchronized across institutions and levels of government to ensure coherence, reduce fragmentation, and minimize regulatory gaps that could expose the system to operational and security risks. Second, targeted regulations and policy instruments should be formulated to strengthen data security, including clear standards for access control, data governance, encryption, incident response, and institutional accountability. Third, strong and decisive local government leadership is essential to prevent data misuse; this should be reinforced through enforceable regulatory mechanisms as well as persuasive communication that builds shared understanding among implementers and stakeholders regarding ethical data practices. Finally, local governments should develop additional application-based programs that function as learning media to improve digital literacy and demographic administration literacy, thereby increasing user competence, compliance, and the overall resilience of the integrated data ecosystem.

***Strategy WO***

The WO (Weakness–Opportunity) strategy focuses on reducing internal constraints by leveraging external opportunities that can accelerate demographic data integration. Local governments should increase budget capacity, strengthen human resources, and improve supporting infrastructure by optimizing assistance from the central government. Network infrastructure should be enhanced by maximizing access to support from outside the government, including potential partnerships with private sector actors, universities, and other relevant stakeholders. In addition, the capacity and competence of ICT personnel should be strengthened through expanded digital

technology training and literacy programs to ensure that systems are managed effectively and consistently. Finally, coordination and collaboration across agencies should be improved so that integrated demographic data can directly support public demand for efficient, accessible, and digital technology based public services.

***Strategy WT***

The WT (Weakness–Threat) strategy emphasizes minimizing internal weaknesses while simultaneously mitigating external threats that may disrupt demographic data integration. Local governments should strengthen budget capacity, human resources, and infrastructure readiness to ensure institutional resilience in responding to policy changes. Network infrastructure should be upgraded to support stronger data security, including more reliable connectivity, system redundancy, and safeguards that reduce vulnerability to cyber risks. In addition, the capacity, competence, and integrity of government personnel should be systematically reinforced to prevent data misuse through targeted training, clear accountability mechanisms, and ethical standards in data handling. Finally, coordination across government sectors and collaboration with relevant partners should be enhanced to expand digital technology literacy and demographic administration literacy, thereby improving compliance, service quality, and the overall sustainability of integrated data governance.

Among the various strategies derived from the SWOT matrix analysis, the most suitable for the conditions in Makassar City, and considered a potential solution to the issues of demographic data integration in supporting digital transformation, as depicted in Figure 1 of the Cartesian IE diagram analysis, is the S-T (Strength-Threat) strategy. This strategy involves leveraging internal strengths to minimize external threats. The choice of this strategy takes into account the significant threats faced in demographic data integration, placing it in quadrant II, which focuses on diversification. The following are the recommended diversification strategy efforts.

*Synchronization of demographic administration policies*

To achieve the synchronization of demographic administration policies between the central government and the Makassar City Government, steps such as comparative policy studies, the formation of coordination teams, discussions and consultations, joint policy development, implementation, and systematic evaluation are needed. Through continuous dialogue and close cooperation, it is hoped that understanding and conformity will be created between the two parties in ensuring the efficiency and effectiveness of the implementation of administrative policies for the people of Makassa City.

Projection shows that demographic of Indonesia will keep increasing in the next twenty five years from, 238,5 million in 2010 to 305,6 million in 2035.
However, In the period of 2010-2015 and 2030-2035 the demographic growth rate will decrease from 1,38 percent to 0,62 percent per year. This decrease is determined by a decrease of the birth and death rates. The decrease rate caused by birth is faster than that caused by death. The Crude Birth Rate (CBR) will decrease from approximately 21,0 for 1000 population in the beginning of the projection to 14,0 per 1000 population in the end of the projection period. Meanwhile the Crude Dead Rate (CDR) will increase from 6,4 per 1000 population to 8,8 per 1000 population in the same period of time (Bijak et al., 2014). Indonesia Gold in 2045 is a condition in Indonesia is superior, advanced to compete with other nations in the world in 2045.

*Formulation of regulations and policies to improve data security*

To improve data security and privacy, comprehensive regulatory and policy formulation is needed. The measures include the development of data protection policies, the implementation of data security standards, the training of ICT human resources, regular security audits, cooperation with regulatory authorities, and strict law enforcement against data privacy violations. It is hoped that these measures can reduce the risk of hacking and privacy violations, as well as increase the sense of security in the use of personal data.

The Synergy of Ministries and related institutions (Legislative, Executive, and Judiciary) is the key to protecting personal data and cyber resilience. Then, strengthening efforts should be made, namely immediately passing the Draft Law on Personal Data Protection (RUU PDP), forming an independent institution (Marune & Hartanto, 2021). The level of crime in cyberspace increases if there is no strong enough protection (Mohmmadi, 2021). The National Cyber Agency of Indonesia (BSSN) stated that there were around 888 million cyber-attacks in Indonesia recorded from January to August 2021.

*Determination of local government leadership to prevent data misuse, through regulatory instruments and persuasive communication*

The determination of local governments in preventing data misuse can be done with regulatory instruments and persuasive communication. The regulations include data protection policies and sanctions for violations, while persuasive communication through public campaigns and training raises public awareness. With a combination of strong regulation and effective communication, local governments can provide a significant boost in preventing data misuse.

The traditional leadership mindsets approaches are insufcient in the era of highly uncertain and rapid changing business settings (Kane et al., 2019). Leadership must adapt how to work in the digital environment to obtain an efective long-lasting performance (Contreras et al., 2020). Besides, organizations must be aware of the main leadership capabilities that managers need to thrive in that environment (Cortellazzo et al., 2019). Capability is a condition or potential condition (physical or mental) can be turned to use (Bolton et al., 1999), and some authors use capability and competence interchangeably (Fowler et al., 2000). The digital environment provides challenges for leadership capabilities, and motivates their study (Roman et al., 2019). As leadership is context-related, identifying the leadership capabilities needed nowadays and preparing the leaders to better perform their roles is crucial (Bolden & O'Regan, 2016).

*Developing more application programs as learning media to enhance digital and demographic administration literacy*

To improve digital literacy and demographic administration, it is necessary to make efforts to increase the number of learning application programs. This includes the development of interactive educational apps with features such as quizzes and simulations, as well as ensuring universal accessibility for the public. Collaboration with educational institutions and extensive promotional campaigns are also important, accompanied by regular evaluations to continuously improve the quality and effectiveness of the app. With these steps, it is hoped that digital literacy and understanding of demographic administration can increase significantly in Makassar City.

Sousa and Rocha (2019) explained that there is a stake of digital skills for disruptive digital business, and they connect it to the latest developments, such as the Internet of Tings (IoT), cloud technology, big data, artifcial intelligence, and robotics. Te topic is even more important given the large disparities in digital literacy across regions. More precisely, digital inequalities encompass skills, along with access, usage and self-perceptions. Tese inequalities need to be addressed, as they are credited with a 'potential to shape life chances in multiple ways' (Robinson et al., 2015), e.g., academic performance, labour market competitiveness, health, civic and political participation. Steps have been successfully taken to address physical access gaps, but skills gaps are still looming (Deursen & van Dijk, 2010). Moreover, digital inequalities have grown larger due to the COVID-19 pandemic, and they infuenced the very state of health of the most vulnerable categories of demographic or their employability in a time when digital skills are required (Baber et al., 2022).

In addition to the diversification strategy to overcome threats with strength, strategic digital leadership is also needed which is the main foundation in facing the challenges of implementing strategic programs based on digital technology. This requires not only a deep understanding of technology, but also the ability to coordinate different sectors and improve the capacity of human resources. Effective leaders can find solutions to possible resource constraints, maintain strong coordination between sectors, and build productive collaborations with various *stakeholders*, both from the government and the private sector, academia, and civil society. This is because, data integration is a collaborative task that may involve many people with different degrees of experience, knowledge of the application domain, and expectations relating to the integrated resource (Martin et al., 2014).

The achievement of the Mayor of Makassar, Mohammad Ramdhan Pomanto, in bringing Makassar City into the list of World Smart Cities is a concrete example of the importance of strategic digital leadership. The implementation of the Sombere and *Smart City* concept initiated at the beginning of his leadership in 2014 shows that digital technology can be well integrated with local values and cultural wisdom. This concept is not only about the application of technology, but also about how government policies and programs can effectively respond to the needs of society.

The integration of demographic data has become increasingly important, especially considering the significant amount of data scattered across various government units and agencies. Data integration is not only a technical process but also involves content management, data warehousing, and other applications. The service of data integration is crucial in the era of digital transformation, but it must be balanced with stringent data security measures to prevent leaks or misuse of sensitive information.

Additionally, to achieve comprehensive digital transformation, regulatory changes, industry shifts towards digitalization, and changes in consumer behavior must also be considered. Initiatives such as the Digital Readiness Index (*IKD*) related to government policies in promoting digital transformation, as well as relevant laws such as Law Number 1 of 2024 on Information and Electronic Transactions and Law Number 27 of 2022 on Personal Data Protection, provide the legal foundation that supports data integration efforts and overall digital transformation.

## Conclusion

There are still challenges for local governments to achieve optimal data integration. Although the commitment of Makassar City Government to digital transformation through the implementation of the Sombero and Smart City concepts is strong, the integration of demographic data is still hindered by limited resources, including budget, human resources, and information and communication technology (ICT) infrastructure. These issues can impede the development and maintenance of data integration systems, as well as reduce the efficiency and effectiveness of public services.

To accelerate the integration of demographic data in support of digital transformation, the SWOT analysis recommends a diversification strategy with an ST (strength-threat) strategic approach, which involves leveraging internal strengths and minimizing external threats. This strategy can be implemented through efforts such as: synchronizing demographic administration policies between the central and local governments; formulating regulations and implementing policies to enhance data security; determining the active role of digital leadership; and increasing media and digital technology literacy activities for the government as public service providers and the community as public service users.

Further research should conduct an in-depth analysis of the mechanisms and barriers in synchronizing demographic administration policies between the central and local governments, and what strategies should be adopted to improve coordination and alignment between the policies of both parties. Likewise, practically, local governments should consider strategic efforts as recommended, to understand the contribution of these strategies to accelerating demographic data integration in support of digital transformation in Makassar City.

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