

# DATA INTEROPERABILITY IN SUPPORTING ELECTRONIC-BASED GOVERNANCE SYSTEMS IN THE LOCAL GOVERNMENT

Dyah Mutiarin<sup>\*</sup>, Dwian Hartomi Akta Padma Eldo<sup>\*\*</sup>,  
Riska Sarofah<sup>\*\*\*</sup>, Akhmad Habibullah<sup>\*\*\*\*</sup>

<sup>\*</sup> Corresponding author, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

Contact details: Universitas Muhammadiyah Yogyakarta, Jalan Brawijaya, Kabupaten Bantul, Daerah Istimewa Yogyakarta 55183, Indonesia

<sup>\*\*</sup> Universitas Sains Al-Qur'an, Wonosobo, Indonesia

<sup>\*\*\*</sup> Universitas Siliwangi, Tasikmalaya, Indonesia

<sup>\*\*\*\*</sup> Universitas Pancasakti Tegal, Tegal, Indonesia



## Abstract

### How to cite this paper:

Mutiarin, D., Eldo, D. H. A. P., Sarofah, R., & Habibullah, A. (2024). Data interoperability in supporting electronic-based governance systems in the local government. *Corporate Law & Governance Review*, 6(4), 43–52. <https://doi.org/10.22495/clgrv6i4p4>

Copyright © 2024 The Authors

This work is licensed under a Creative Commons Attribution 4.0 International License (CC BY 4.0). <https://creativecommons.org/licenses/by/4.0>

ISSN Online: 2664-1542

ISSN Print: 2707-1111

Received: 01.09.2023

Accepted: 28.11.2024

JEL Classification: H7, N4, R5

DOI: 10.22495/clgrv6i4p4

Application data interoperability governance can be used without sectoral data type restrictions, as long as the information model has been defined and agreed upon by the local government in supporting electronic-based local government systems (Koesnadi, 2022). This research aims to see how data interoperability can support electronic-based government systems in the regions. The object of this research is the Wonosobo district, Central Java province, Indonesia. The type of research conducted was mixed method, with the data collection technique of distributing questionnaires in local government agencies in the Wonosobo district, Central Java province, Indonesia. Researchers conducted in-depth interviews with relevant agencies responsible for data management in the region to get more in-depth data. The results of the study found that data interoperability in the Wonosobo district is still not going well, this is indicated by the digitization model only limited to information and digital services with a percentage of 78.13 percent. In addition, related to data integration in the region, this study also found that 28.13 percent of agencies only have metadata and 25 percent of Wonosobo local government agencies do not have data integration. This shows how the Wonosobo local government is still not maximizing the utilization of its data and there is also a need for improvement in data integration. This happens because there is no interconnection between one agency and another so data interoperability can run well.

**Keywords:** Data Interoperability, Electronic Government System, Local Government

**Authors' individual contribution:** Conceptualization — D.M. and D.H.A.P.E.; Methodology — D.M. and R.S.; Resources — D.M., D.H.A.P.E., and A.H.; Writing — Original Draft — D.M., D.H.A.P.E., R.S., and A.H.; Writing — Review & Editing — D.M., D.H.A.P.E., R.S., and A.H.; Supervision — D.M.; Project Administration — D.M. and D.H.A.P.E.

**Declaration of conflicting interests:** The Authors declare that there is no conflict of interest.

**Acknowledgements:** The Authors would like to thank Universitas Muhammadiyah Yogyakarta and Universitas Sains Al-Qur'an for their support and resources.

## 1. INTRODUCTION

The rapid development of information and communication technology (ICT) requires the government to develop an organized state administration and deliver public services (Muthu et al., 2016; Wahyuni, 2023). Nowadays, technology can bring social changes to people's lives. It also has an impact on the model of governance in public services, which is required to be able to adapt to the times. The current government must be ready to face the era of digitalization. The government's performance and capacity are determining factors in successfully implementing digital-based services (Mensah, 2019, 2020).

Electronic-based government system policies are very important in supporting the implementation of e-government in governance. Nowadays, technology can provide and facilitate opportunities for people to interact more intensely with the government in e-government (Aljazzaf et al., 2020). The electronic-based government system policy in Indonesia began with the issuing of Presidential Regulation No. 95 of 2018 concerning electronic-based government systems. This shows the government's seriousness in implementing e-government from the central to regional levels. Electronic-based government systems or e-government will facilitate and accelerate access to government information compared to the days of paper-based bureaucracy (Abdulkareem & Ishola, 2016). Moreover, quite some government officials are also responsive to their duties because digitalization will make their duties easier (Myeong et al., 2014).

Indonesia's e-government policy includes utilizing ICT to improve efficiency, transparency, and public participation in public services and reduce bureaucracy. Based on the research results of Meftah et al. (2015) and Zhao and Khan (2013), several things need to be considered in the implementation of e-government in a country, including culture, awareness, trust, and adoption of e-government which are determining factors in the implementation of e-government in a country. Nowadays, many countries have invested in e-government projects to provide the best government services to their citizens (Yera et al., 2020).

Some of the key initiatives and policies that the Indonesian government has adopted in the development of e-government include 1) E-government Development Master Plan; 2) Electronic System for Procurement of Goods and Services; 3) Online Public Service; 4) Personnel Management Information System; 5) E-budgeting and E-planning; 6) Online Complaint Application. This e-government policy in Indonesia is part of an effort to improve government openness, public participation, and administrative efficiency. It can help implement digital transformation in government towards a better level (Lemke et al., 2020). E-government democratizes the nature of services and the provision, maintenance, and creation of effective policy processes and public administration systems (Turner et al., 2022).

When compared to other countries that implement e-government, Indonesia is far behind other countries, based on data that has been presented (Annur, 2022), about the e-government development index and shows the results of

the 12th electronic government or e-government survey in 2022. The survey aims to review recent progress made by the United Nations (UN) member states in developing e-government. Based on the results, Denmark is the country with the highest e-government development score in the world. The score reaches 0.9717 out of 1 point. Indonesia ranks 77th in the world with a score of e-government development index 0.7160. Meanwhile, South Sudan became the country with the world's lowest score, in 193rd place, only 0.0852 points. The methodology used in this e-government survey is based on three main pillars. First, the coverage and quality of online services are quantified as the Online Service Index (OSI); second, the status of telecommunications infrastructure development or Telecommunications Infrastructure Index (TII); third, human capital or Human Capital Index (HCI).

The electronic-based government system policy in Indonesia does not only apply at the center but also local governments are asked to be able to do the same. Since decentralization was implemented in Indonesia to transfer power, resources, and responsibilities from the central government to the regions, it has provided a great opportunity for local governments to exercise their authority (Puspawati, 2016; Widaningrum, 2007). The authority possessed by local governments includes the implementation of electronic government systems at the local level. In the context of local government, local authority enables customization between the characteristics of public services and the specificities of local communities (Sá et al., 2016). This will make it easier to implement a policy at the local level (Warbroek & Hoppe, 2017).

Based on the research conducted by Norris and Reddick (2013), e-government implementation at the local level is largely one-way, from the government to citizens, and there is little evidence that e-government is transformative in any way. This shows that while having the authority to run an electronic-based government system, the local government level has not been able to run it optimally (Asatryan & De Witte, 2015; Kamolov & Konstantinova, 2017; Sutopo et al., 2017). Local government is a key factor in development, and technological advances can improve efficiency in public services at the local level (Wu et al., 2020).

The challenges in implementing an electronic-based government system at the regional level are also not small (Pederson, 2016). Some of the challenges local governments face in Indonesia include, first, changes in organizational culture because the e-government implementation process requires changes in organizational culture in local governments. Rigid bureaucracy and resistance to change can be an obstacle to introducing new technology and integrating it into work processes. Second, the lack of awareness and technological skills of the state civil apparatus and the general public will hinder e-government services. Third, data security and protection. This must be a concern because implementing e-government requires high data security in protecting personal information and community data. Fourth, coordination between agencies is a problem in itself because, in local governments, agencies must coordinate to harmonize the implementation of e-government.

Electronic-based government systems are a necessity that must be carried out at the regional level, supported by policies from the central government, and now require commitment from local government organizers to run. Coordination between agencies in the region must be well established because the use of ICT in public organizations increasingly has the potential to increase transparency, accountability, and public participation, by providing more effective and efficient information disclosure to citizens and organizations and by providing channels to interact with government (Yavuz & Welch, 2014). In addition, in supporting the successful implementation of electronic-based government systems in the regions, an effort is needed to carry out the digital transformation of services and also the use of big and open data (Bertot & Choi, 2013).

When e-government utilizes big data technology, which offers effective new technologies to provide interactive services, e-government will become more than just big data and more than just data (Al-Sai & Abualigah, 2017). This will be able to have a positive impact on local governments in maximizing their potential by utilizing e-government. Countries such as the United Kingdom (UK) are already trying to introduce a new service delivery model based on routine information extraction from big data (Malomo & Sena, 2017).

For governance at the regional level, data is an important thing in supporting existing service activities. Policy formulation also requires valid data as its basis (Ciesielska et al., 2022). Therefore, data is one of the supporting factors in the success of electronic-based government systems at the local level. It can also be seen from how local governments focus on building, maintaining, and strengthening relationships with citizens to fulfill "service government" (Jun & Chung, 2016).

Studies on using electronic-based government systems at the local level have been carried out in various countries. The conducted analysis was done using the VoSviewer application by taking various writings published on Scopus. The keywords used are "E-Government" and "Local Government" from 2013-2023. Of the 200 articles obtained, there are only 114 articles that are interrelated and have a relationship with one another. Much research has been conducted on discussing government systems, techniques, digital devices, lessons, experience, and validation. This means that many e-government implementations in local governments still focus on using applications or websites (Kurfali et al., 2017). In addition, the measures established for national e-government are still unsuitable for local governments, and most of the existing research focuses on national e-government even though local e-government is closer to citizens (Zahran et al., 2015).

Apart from some of the obstacles faced at the regional level, some things need special attention in the success of electronic-based government systems at the regional level, namely the use and utilization of available data (Agbozo & Spassov, 2018). The implementation of electronic-based government systems is not only to improve direct services to the community but also fellow agencies at the regional level must be able to connect, better known as interoperability. Data interoperability refers to the ability of existing systems, applications, and databases in government

to communicate with each other, share data, and operate together efficiently and effectively. In e-government, data interoperability is very important because governments often use various information systems across different departments and agencies (Chan, 2013). Interoperability allows data stored in various sources to be integrated and exchanged smoothly. This is the basis for this research on implementing data interoperability in supporting electronic-based government systems at the regional level.

Several previous studies have conveyed how important an electronic-based government system is to the local government (Nurdin et al., 2022). However, this research focuses on how data as one of the main sources in determining public policy must be considered. Data interoperability will determine how an electronic-based government system can be maximized.

Therefore, this research is important to see how the implementation of data interoperability in supporting electronic-based government systems in the regions. This research has good relevance to what is being done in the current Indonesian government which is carrying out digital transformation in government management. digital transformation will not be able to be carried out properly without data interoperability.

This research will contribute to the government and other researchers:

1) Data interoperability is one of the main pillars of running an Electronic-Based Government System. Without data interoperability, the Electronic-Based Government System cannot run effectively and efficiently at the regional level.

2) Indonesia is undergoing a digital transformation in government. This digital transformation requires data interoperability to be optimally implemented from the center to the regions.

3) Technological advances have enabled data interoperability to become easier and more affordable. This opens up opportunities for the government to improve data interoperability in the Electronic Based Government System.

The structure of this article is as follows. Section 1 is the introduction which discusses some of the gaps and problems that arise related to data interoperability. Section 2 describes the relevant literature in supporting this research. Section 3 presents the method used to complete this article following the desired objectives. Section 4 discusses the findings of this article. Section 5 discusses the reflection of the research results and Section 6 concludes the paper.

## 2. LITERATURE REVIEW

### 2.1. Electronic government system in Indonesia

The electronic-based government system in Indonesia refers to using ICT to change how the government operates, interacts with the public, and provides public services. Theoretically, the implementation of e-government in Indonesia can be explained through several stages and basic principles, including the planning and strategy stage. Second, is the implementation stage. Third, is the community involvement stage. Fourth, is the monitoring and evaluation stage. This is because

one of the impacts of the ICT revolution has provided opportunities for the government to innovate the development of the state apparatus through the implementation of e-government (Prawira et al., 2023).

Through these stages, the theory of e-government implementation in Indonesia includes strategic planning, technology development, implementation of online public services, public participation, and continuous monitoring (Elbahnasawy, 2014). The goal is to improve public services, transparency, and community participation in government. E-government development is carried out in a way:

- 1) Optimizing the use of advances in information technology to eliminate organizational and bureaucratic barriers.
- 2) Establish a network of management systems and work processes that allow government agencies to work in an integrated manner to simplify access to all information and public services that should be available.

## 2.2. Interoperability data

Data interoperability in government refers to the ability of government systems, applications, and databases to communicate, share data, and operate together efficiently and effectively. In e-government, data interoperability is critical as governments often use various information systems across different departments and agencies. In principle, interoperability is a socio-technical and computational project that is feasible to adopt in various government sectors (Terzis & Santamaria Echeverria, 2023). Interoperability allows data stored in different sources to be integrated and exchanged seamlessly.

The benefits of data interoperability in government include:

- 1) Efficiency: Data interoperability allows the government to share data and information more quickly and easily between departments and agencies. This can reduce the time and effort required to access important information.
- 2) Better decision-making: With data interoperability, the government has better access to relevant and accurate data from various sources. This enables better decision-making and more comprehensive information.
- 3) Improved public services: With better data integration, the government can provide more integrated and better public services. The public can access services more efficiently and get more complete information.
- 4) Transparency and accountability: Data interoperability can increase government transparency as information can be easily accessed and shared with the public. It also helps improve accountability in public service delivery.

However, there are challenges in achieving data interoperability in government, including the complexity of existing systems, differences in data standards and formats, and data security issues. In addition, interoperability enables seamless data exchange among heterogeneous networks within the government to be integrated (Kharche & Dere, 2022). Therefore, the government must continuously achieve effective data interoperability to improve service quality and overall government performance.

## 3. RESEARCH METHODOLOGY

This type of research was conducted using mixed methods. A mixed method combines qualitative and quantitative research elements in one study (Sugiyono, 2010). Quantitative and qualitative methods in a research activity so that the data obtained will be more comprehensive, valid, reliable, and objective. This research method seeks to develop understanding by describing in depth an object that is the research focus (Creswell & Creswell, 2017).

Quantitative research data was obtained through the distribution of questionnaires to all regional apparatus organizations in the Wonosobo district, totaling 32 agencies as respondents. All questionnaires distributed to the respondents were returned with a total of 20 question items answered by the respondents. The questionnaire focuses on the leading indicators of how data interoperability supports the electronic-based government system in the Wonosobo district. The aim is to see objectively how data integration and interconnection exist in each agency.

This research was conducted over five months from March 2023 to July 2023 in the Wonosobo district, Indonesia. We used two types of data sources, surveys, and interviews to answer the research questions. In a mixed methods design, multiple data methods such as surveys, observations, interviews, and document analysis are significant (Nugraha et al., 2022). Data collection methods should be linked to the research approach. Both data collection methods are important to provide complete information and complete and detailed information in this study (Nugraha et al., 2022).

In addition, to deepen the data to be obtained, researchers also conducted in-depth interviews with several related agencies responsible for data in the Wonosobo area. The aim is how these agencies understand data management and the urgency of data interoperability in local governance. This is an alternative method used by researchers, to confirm data and obtain more accurate data.

These agencies include the Regional Planning and Development Agency (BAPPEDA), and the Communication and Information Office (DISKOMINFO) of Wonosobo district. The researchers conducted interviews with semi-structured techniques, by interviewing the manager level and also technical implementers. It aims to see how integration at the policy and implementation levels. Interviews were conducted in Bahasa Indonesia and lasted 60 to 70 minutes. This aims to see the object of research empirically about what happened.

Furthermore, the data analysis technique in this study uses the NVivo 12 plus application, a qualitative and quantitative research application that can analyze effectively and efficiently and display data in tables, graphs, and diagrams (Bandur, 2019).

After the data was analyzed using NVivo 12 plus, the researchers explored using word cloud, hierarchy, project maps, and mind maps. This aims to visualize the research results obtained empirically and with other document data. The visualization results were analyzed so researchers could explain the conditions that occur with data interoperability in the Wonosobo district.

## 4. RESULTS

### 4.1. Electronic-based government systems in the regions

Electronic government system at the local level, often called local e-government, refers to the application of ICT in regional or local government administration. The main objective of e-government at the local level is to improve efficiency, transparency, and community involvement in the decision-making process and the provision of public services (Taufiq et al., 2007). Therefore, an electronic-based government system must also be realized at the regional level in Indonesia.

To get a more in-depth explanation of implementing an electronic-based government system in the regions, qualitative data analysis from various primary and secondary sources was carried out using the NVivo 12 application. This analysis begins with analyzing the frequency of occurrence of words or word clouds.

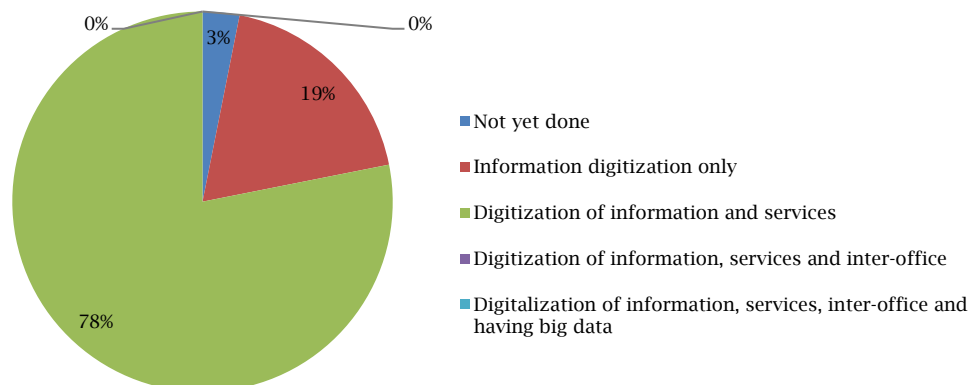
Based on the word cloud feature from NVivo 12 analysis, it was found that the word "Electronic-based Government System" is the word that appears the most in the data, namely 28 times or 5.61%, followed by the word "Government" (18 times) and the word "Service" (8 times). This shows that an electronic-based government system is a must at the regional level in improving services. E-government

at the local level does provide significant benefits, such as increasing accessibility (Serra et al., 2015) and quality of public services, increasing public participation in decision-making processes (Aljazzaf et al., 2020), reducing bureaucracy, and increasing administrative efficiency (Kamolov & Konstantinova, 2017; Yıldırım & Bostancı, 2021).

Currently, some of the characteristics and components of electronic-based government systems at the regional level in Indonesia include 1) online services, 2) data and system integration, 3) information portal; 4) employee system; 5) procurement of goods and services; 6) reporting and complaint system. There is still much that can be improved in electronic-based government systems at the regional level, therefore collaboration between local governments, communities, and the private sector is needed (Khan & Park, 2013). It also requires awareness of the benefits of technology essential for implementing e-government at the local level.

For the Wonosobo district, many things still need to be considered in running an electronic-based government system, one of which can be seen is how to adopt the implementation of the electronic-based government system. The implementation of e-government at the regional level also faces challenges, such as limited technological infrastructure in some areas and changes in organizational culture (Yousef, 2017). Based on the data obtained by researchers, after analyzing the answers to the responses, it can be seen in Figure 1.

**Figure 1.** Analysis of the respondents' answers to the question: "Has Wonosobo district implemented digitalization as a whole?"



Source: Authors' elaboration using NVivo 12.

The data above is the result of analysis from NVivo 12 related to the results of respondents' answers to the question "Has Wonosobo district implemented digitalization as a whole?". Seventy-eight percent of respondents answered that the services carried out were only limited to digitizing information services and digitizing public services, then 19% of respondents answered digitizing information services only. Finally, 3% of respondents answered that there was no digitization. Respondents, in this case, are regional apparatus organizations in Wonosobo. This shows that the implementation of an electronic-based government system in Wonosobo has not been effective. In addition, the absence of digitization between agencies makes accelerating the electronic-

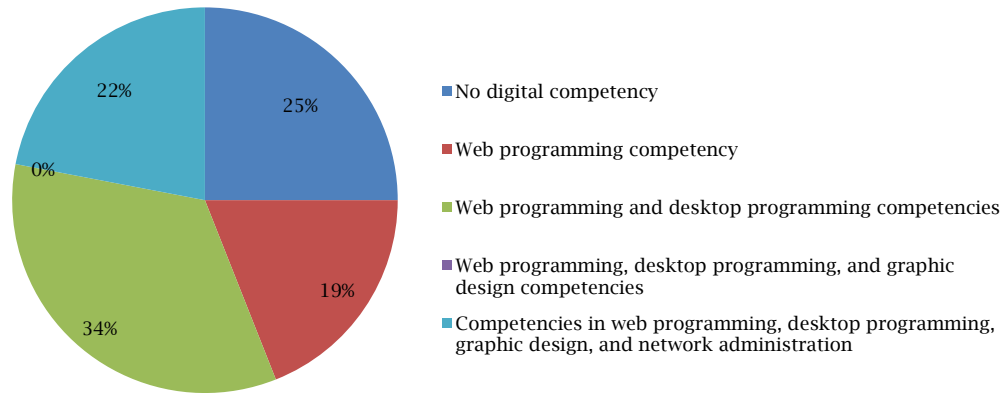
based government system an obstacle. In addition, big data is also important in the process of implementing an electronic-based government system in the region (Long et al., 2021).

It is time for the Wonosobo district government to increase investment productivity in technology and information to help improve public services (Pedersen, 2018). One of the main problems is the difficulty in achieving proper alignment between information technology and organizational processes. There is still a lack of human resources in the region who are experts in technology and information, so it will be a challenge to implement an electronic-based government system in the Wonosobo district. Several indicators must be met to increase acceleration in implementing an electronic-based

government system, one of which is the digital competence that the state civil apparatus in the Wonosobo district must possess. More details

regarding the digital competencies possessed by public service implementers in Wonosobo Regency can be seen in Figure 2.

**Figure 2.** Analysis of the respondents' answers to the question: "What digital competencies are possessed by public service implementers in Wonosobo?"



Source: Authors' elaboration using NVivo 12.

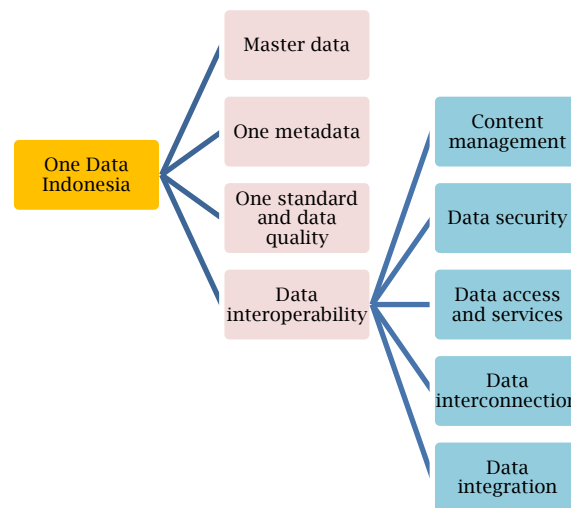
The data above results from an analysis of the hierarchy feature in the NVivo 12 plus application. The data illustrates the answers from respondents regarding the question: "What digital competencies are possessed by public service implementers?" Figure 3 shows that 34% of local government agencies only have basic web programming competencies and basic desktop programming competencies. As many as 25% of local government agencies do not have digital literacy competencies. As many as 19% of local government agencies have basic web programming skills. The last 22% of government agencies have basic design graphics competencies and basic network administration competencies. This condition shows that the state civil apparatus in the Wonosobo district still has minimal digital literacy skills. The lack of digital competence of the state civil apparatus towards the ability in digital literacy is one of the factors inhibiting the development of digital literacy (Ramli, 2017) in accelerating the implementation of an electronic-based government system in the Wonosobo district.

#### 4.2. Data interoperability in regions

Data interoperability is a product or system characteristic of interacting and functioning with other products or systems, now or in the future, without access or implementation restrictions because interoperability has data standards to interact with each other (Aam et al., 2019). Data interoperability in government refers to the ability of government systems, applications, and databases to communicate, share data, and operate together efficiently and effectively. In e-government, data interoperability is critical as governments often use various information systems across different departments and agencies. Interoperability allows data stored in different sources to be integrated and exchanged seamlessly.

Interoperability is one of the Indonesian government's policies regarding One Data Indonesia. It also applies to the local government level. For more details, the researchers did a mind map with the help of the NVivo 12 application, as shown in Figure 3.

**Figure 3.** Mind map about One Data Indonesia



Source: Authors' elaboration using NVivo 12.



These results show that data interoperability is one of the indicators of the successful implementation of One Data Indonesia. There is also one master data, one metadata, one standard and data quality, and finally, data interoperability. Data interoperability has several indicators that need to be considered, including 1) content management, 2) data security, 3) data access and presentation, 4) data interconnection, and 5) data integration. To run data interoperability at the regional level, paying attention to these five indicators is necessary to implement an electronic-based government system according to the plan.

Data interoperability is widely used in accelerating electronic-based government systems at the regional level. Separating public and private parts is important in building interoperability between two applications (Sutanta & Istiyanto, 2012). In the e-government system in the Wonosobo district, data interoperability is very important because the government often uses various information systems across different departments and agencies. Interoperability allows data stored in various

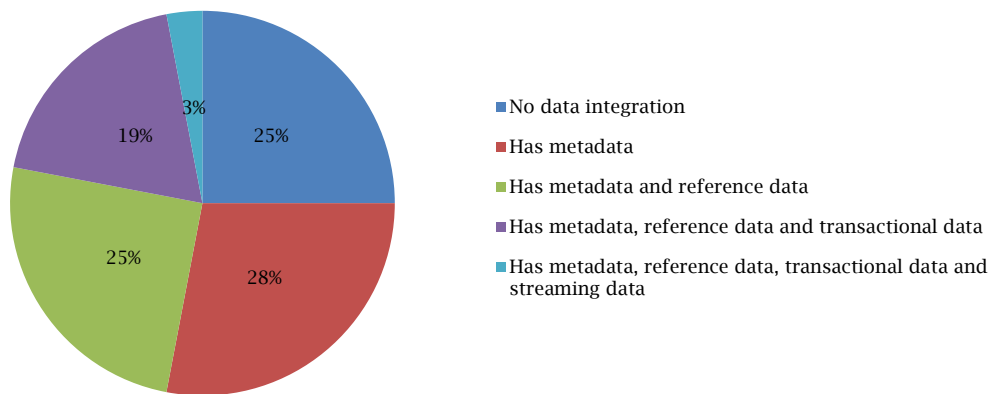
sources to be integrated and exchanged smoothly. Data interoperability can help improve community services and facilitate policymaking.

In general, several benefits can be directly felt by implementing data interoperability in the regions. Among these benefits are efficiency, better decision-making, improved public services, and transparency and accountability.

From some of the benefits that can be directly felt in an e-government system, it can be seen how urgent it is (Jimenez et al., 2014).

Based on the word cloud from analysis from NVivo 12, it is found that the word "Data" is the word that appears most often, namely 77 times or 9.61%, followed by the word "Government" (21 times) and the word "Interoperability" (18 times). Figure 4 shows how important data in government administration today is, and interoperability will facilitate policy making. This applies to local governments such as the Wonosobo district, which is currently not maximized in implementing regional data interoperability. This is shown in Figure 4.

**Figure 4.** Analysis of the respondents' answers to the question: "Is the data integration system already running?"



Source: Authors' elaboration using NVivo 12.

Figure 4 shows the respondents' answers to the question: "Is the data integration system already running?" As many as 28% of respondents answered that the Wonosobo district government agency only had metadata, and 25% answered that the Wonosobo district government agency did not have data integration. In addition, 25% of respondents have metadata and reference data. Moreover, 19% of respondents answered that they have metadata, reference, and transactional data. Finally, only 3% of the Wonosobo district government agencies have metadata, reference, transactional, and streaming data. This shows that there is still a lack of data integration in the Wonosobo district government, and the existing data is only partial data for each agency. This is one of the factors hampering the implementation of data interoperability in the Wonosobo district government.

If you look at the current conditions, the important aspects of data interoperability in local government are data standards: data standards are regulations and guidelines that govern how data should be organized, stored, and exchanged. Adopting uniform data standards allows different systems and applications to understand and interpret data correctly. Furthermore, data format: Data format refers to how data is represented and

stored in the system. Adopting uniform data formats ensures that data can be exchanged easily between systems without requiring manual conversion or re-interpretation. Communication protocols: Communication protocols are the rules and procedures used to allow various systems to communicate with each other. Using uniform protocols ensures that data can be sent and received correctly over a computer network. Data security: Data interoperability must also carefully consider data security. Data exchanged between systems must be protected from unauthorized access and damage.

## 5. DISCUSSION

One of the success factors in implementing an electronic-based government system is how each region can utilize data as a basis for making government decisions (Mostafa & El-Masry, 2013). This also applies to regional governments regarding how to utilize data as a basis for making policies at the regional level. Data can be utilized well by the government and the community in carrying out their daily activities and needs (Zheng et al., 2014).

Local governments currently have challenges in managing existing data so that it becomes a unity

that many parties can utilize. The existence of regulations on electronic-based government systems is a good opportunity for local governments to implement the concept of one data Indonesia with an interoperability approach to existing data. However, in reality, the Wonosobo local government has been unable to maximize its opportunities. One of the obstacles faced by the Wonosobo district government is the lack of human resources who are experts in programmers and coding. This is one of the challenges that is quite heavy because talking about data is talking about information and technology that must run and be well integrated (Fan & Yang, 2015).

Some things that need to be done by local governments in accelerating the utilization of data interoperability in supporting electronic-based government systems, specifically in the Wonosobo district, include 1) identification of needs according to regional conditions; 2) having a master plan for development in accelerating the implementation of electronic-based government systems; 3) adopting the right policies in supporting electronic-based government systems in the regions.

## 6. CONCLUSION

Based on the results of research on data interoperability in supporting electronic-based government systems in the Wonosobo district government, it shows that there are still many tasks that must be completed to get maximum results according to what is expected. This refers to the research findings, which explain that digitization in local government is only limited to digitizing information and digital services by 78.13%.

In addition, related to data integration in the region, this study also found that 28.13% of agencies only have metadata, and 25% of the Wonosobo regional government agencies do not have data integration. This shows how

the Wonosobo local government is still not maximizing the utilization of its data, and there is also a need for improvement in data integration. This happens because there is no interconnection between one agency and another.

In general, data interoperability is still not running optimally in the Wonosobo district. It should be a special concern if you want to implement digital transformation as a whole and can make a basis for making policies. Currently, the Wonosobo district government only has application data in supporting electronic-based government systems, but it has not been perfected with existing data integration and interoperability.

This research is still imperfect and has limitations because it only looks at how data interoperability already exists in supporting electronic-based government systems in the regions. Some things need to be considered, including how regulations have supported the management of existing data interoperability. Because of regulations, the seriousness of data management and data utilization can be improved. In the future, further research needs to be carried out regarding the rules governing data management in the regions, in supporting electronic-based government systems in the regions. In addition, local governments need to provide understanding to government officials regarding the importance of data interoperability in making a policy so that the One Data Indonesia program can run in the regions (Fikri et al., 2020).

A joint commitment is needed regarding understanding the importance of data in electronic-based government systems in the Wonosobo district. One Data Indonesia is a good foundation for realizing data-based public policies. Interoperability cannot run properly if there is no data integration and data utilization by local governments. These things must be well integrated to get the electronic-based government process in the regions to run optimally as expected.

## REFERENCES

- Aam, M. R., Musnansyah, A., & Witarasyah, D. (2019). Penerapan manajemen interoperabilitas open data citarum menggunakan opendatasoft. *E-Proceeding of Engineering*, 6(2), 8051-8065. <https://openlibrarypublications.telkomuniversity.ac.id/index.php/engineering/article/view/10792/10650>
- Abdulkareem, A., & Ishola, A. (2016). E-government in Nigeria: Progress and prospects. *Ilorin Journal of Administration and Development*, 2(1), 59-67. <https://uilspace.unilorin.edu.ng/items/db0e92dc-9c18-4a78-9320-4fc7880691b1>
- Agbozo, E., & Spassov, K. (2018). Establishing efficient governance through data-driven e-government. In A. Kankanhalli, A. Ojo, & D. Soares (Eds.), *Proceedings of the 11th International Conference on Theory and Practice of Electronic Governance* (pp. 662-674). Association for Computing Machinery. <https://doi.org/10.1145/3209415.3209419>
- Aljazzaf, Z. M., Al-Ali, S. A., & Sarfraz, M. (2020). E-participation model for Kuwait e-government. *International Journal of Advanced Computer Science and Applications (IJACSA)*, 11(2), 192-199. <https://doi.org/10.14569/IJACSA.2020.0110226>
- Al-Sai, Z. A., & Abualigah, L. M. (2017). Big data and e-government: A review. In *2017 8th International Conference on Information Technology (ICIT)* (pp. 580-587). IEEE. <https://doi.org/10.1109/ICITECH.2017.8080062>
- Annur, C. M. (2022, October 5). Denmark, negara dengan sistem pemerintahan berbasis elektronik terbaik dunia pada 2022. Databoks. <https://databoks.katadata.co.id/datapublish/2022/10/05/denmark-negara-dengan-sistem-pemerintahan-berbasis-elektronik-terbaik-dunia-pada-2022>
- Asatryan, Z., & De Witte, K. (2015). Direct democracy and local government efficiency. *European Journal of Political Economy*, 39, 58-66. <https://doi.org/10.1016/j.ejpoleco.2015.04.005>
- Bandur, A. (2019). *Penelitian kualitatif: Studi multi-disiplin keilmuan nvivo 12 plus*. Mitra Wacana Media.
- Bertot, J. C., & Choi, H. (2013). Big data and e-government: Issues, policies, and recommendations. In S. Mellouli, L. F. Luna-Reyes, & J. Zhang (Eds.), *Proceedings of the 14th Annual International Conference on Digital Government* (pp. 1-10). Association for Computing Machinery. <https://doi.org/10.1145/2479724.2479730>
- Chan, C. M. L. (2013). From open data to open innovation strategies: Creating e-services using open government data. In *Proceedings of 2013 46th Hawaii International Conference on System Sciences* (pp. 1890-1899). IEEE. <https://doi.org/10.1109/HICSS.2013.236>



- Ciesielska, M., Rizun, N., & Chabik, J. (2022). Assessment of E-government inclusion policies toward seniors: A framework and case study. *Telecommunications Policy*, 46(7), Article 102316. <https://doi.org/10.1016/j.telpol.2022.102316>
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications, Inc.
- Elbahnasawy, N. G. (2014). E-government, internet adoption, and corruption: An empirical investigation. *World Development*, 57, 114-126. <https://doi.org/10.1016/j.worlddev.2013.12.005>
- Fan, J., & Yang, W. (2015). Study on e-government services quality: The integration of online and offline services. *Journal of Industrial Engineering and Management*, 8(3), 693-718. <https://doi.org/10.3926/jiem.1405>
- Fikri, R., Amrillah, M. F., & Selwa, H. (2020). Kapasitas adaptif lokal pemerintah desa dalam penerapan sistem pemerintahan berbasis elektronik di kabupaten Bengkalis [Adaptive capacity of village government in the implementation of electronic-based government systems in Bengkalis Regency]. *Journal of Information Technology and Computer Science (INTECOMS)*, 3(2), 179-191. <https://doi.org/10.31539/intecom.v3i2.1820>
- Jimenez, C. E., Solanas, A., & Falcone, F. (2014). E-government interoperability: Linking open and smart government. *Computer*, 47(10), 22-24. <https://doi.org/10.1109/MC.2014.281>
- Jun, C. N., & Chung, C. J. (2016). Big data analysis of local government 3.0: Focusing on Gyeongsangbuk-do in Korea. *Technological Forecasting and Social Change*, 110, 3-12. <https://doi.org/10.1016/j.techfore.2015.11.007>
- Kamolov, S., & Konstantinova, A. (2017). E-government: Way of modernization and efficiency enhancement of public governance. *Journal of Law and Administration*, 42(1), 13-21. <https://doi.org/10.24833/2073-8420-2017-1-42-13-21>
- Khan, G. F., & Park, H. W. (2013). The e-government research domain: A triple helix network analysis of collaboration at the regional, country, and institutional levels. *Government Information Quarterly*, 30(2), 182-193. <https://doi.org/10.1016/j.giq.2012.09.003>
- Kharche, S., & Dere, P. (2022). Interoperability issues and challenges in 6G networks. *Journal of Mobile Multimedia*, 18(5), 1445-1470. <https://doi.org/10.13052/jmm1550-4646.1856>
- Koesnadi, I. (2022). Tata kelola interoperabilitas data aplikasi [Paper presentation]. *Seminar Nasional Teknologi Informasi, Komunikasi Dan Industri*. Garuda. <https://garuda.kemdikbud.go.id/documents/detail/3161546>
- Kurfah, M., Arifoglu, A., Tokdemir, G., & Pacin, Y. (2017). Adoption of e-government services in Turkey. *Computers in Human Behavior*, 66, 168-178. <https://doi.org/10.1016/j.chb.2016.09.041>
- Lemke, F., Taveter, K., Erlenheim, R., Pappel, I., Draheim, D., & Janssen, M. (2020). Stage models for moving from e-government to smart government. In A. Chugunov, I. Khodachek, Y. Misnikov, & D. Trutnev (Eds.), *Electronic governance and open society: Challenges in Eurasia* (pp. 152-164). Springer, Cham. [https://doi.org/10.1007/978-3-030-39296-3\\_12](https://doi.org/10.1007/978-3-030-39296-3_12)
- Long, C. K., Agrawal, R., Trung, H. Q., & Pham, H. V. (2021). A big data framework for E-Government in Industry 4.0. *Open Computer Science*, 11(1), 461-479. <https://doi.org/10.1515/comp-2020-0191>
- Malomo, F., & Sena, V. (2017). Data intelligence for local government? Assessing the benefits and barriers to use of big data in the public sector. *Policy and Internet*, 9(1), 7-27. <https://doi.org/10.1002/poi.3.141>
- Meftah, M., Gharleghi, B., & Samadi, B. (2015). Adoption of e-government among Bahraini citizens. *Asian Social Science*, 11(4), 141-149. <https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=1397ae1288c8f8e68153e02a266830529e8566d0>
- Mensah, I. K. (2019). Factors influencing the intention of university students to adopt and use e-government services: An empirical evidence in China. *SAGE Open*, 9(2). <https://doi.org/10.1177/2158244019855823>
- Mensah, I. K. (2020). Impact of government capacity and e-government performance on the adoption of e-government services. *International Journal of Public Administration*, 43(4), 303-311. <https://doi.org/10.1080/01900692.2019.1628059>
- Mostafa, M. M., & El-Masry, A. A. (2013). Citizens as consumers: Profiling e-government services' users in Egypt via data mining techniques. *International Journal of Information Management*, 33(4), 627-641. <https://doi.org/10.1016/j.ijinfomgt.2013.03.007>
- Muthu, P. P., Thurasamy, R., Alzahrani, A. I., Alfarraj, O., & Alalwan, N. (2016). E-government service delivery by a local government agency: The case of E-Licensing. *Telematics and Informatics*, 33(4), 925-935. <https://doi.org/10.1016/j.tele.2016.02.003>
- Myeong, S., Kwon, Y., & Seo, H. (2014). Sustainable e-governance: The relationship among trust, digital divide, and e-government. *Sustainability*, 6(9), 6049-6069. <https://doi.org/10.3390/su6096049>
- Norris, D. F., & Reddick, C. G. (2013). Local e-government in the United States: Transformation or incremental change? *Public Administration Review*, 73(1), 165-175. <https://doi.org/10.1111/j.1540-6210.2012.02647.x>
- Nugraha, J. T., Achmad, T., Warsono, H., & Yuniningsih, T. (2022). Understanding information technology culture in digital-based public services. *Journal of Governance and Regulation*, 11(2), 62-79. <https://doi.org/10.22495/jgrv11i2art6>
- Nurdin, N., Scheepers, H., & Stockdale, R. (2022). A social system for sustainable local e-government. *Journal of Systems and Information Technology*, 24(1), 1-31. <https://doi.org/10.1108/JSIT-10-2019-0214>
- Pedersen, K. (2018). E-government transformations: challenges and strategies. *Transforming Government: People, Process and Policy*, 12(1), 84-109. <https://doi.org/10.1108/TG-06-2017-0028>
- Pederson, K. (2016). E-government in local government: Challenges and capabilities. *Electronic Journal of E-Government*, 14(1), 99-116. <https://academic-publishing.org/index.php/ejeg/article/view/632>
- Prawira, M. G., Panjaitan, A. C. D., & Paranity, A. A. S. P. (2023). Implementasi sistem pemerintahan berbasis elektronik di pemerintah kabupaten tabanan. *Jurnal Raad Kertha*, 6(1), 82-89. <https://doi.org/10.47532/jirk.v6i1.828>
- Puspawati, A. A. (2016). Penerapan new public management (NPM) di Indonesia (reformasi birokrasi, desentralisasi, kerjasama pemerintah dan swasta dalam meningkatkan pelayanan publik). *Publisia: Jurnal Ilmu Administrasi Publik*, 1(1), 38-53. <https://doi.org/10.26905/pjiap.v1i1.426>
- Ramli, R. M. (2017). Challenges and issues in Malaysian e-government. *Electronic Government, an International Journal*, 13(3). <https://doi.org/10.1504/EG.2017.086685>
- Sá, F., Rocha, A., & Cota, M. P. (2016). Potential dimensions for a local e-government services quality model. *Telematics and Informatics*, 33(2), 270-276. <https://doi.org/10.1016/j.tele.2015.08.005>

- Serra, L. C., Carvalho, L. P., Ferreira, L. P., Vaz, J. B. S., & Freire, A. P. (2015). Accessibility evaluation of e-government mobile applications in Brazil. *Procedia Computer Science*, 67, 348–357. <https://doi.org/10.1016/j.procs.2015.09.279>
- Sugiyono. (2010). *Metode Penelitian pendidikan: Pendekatan kuantitatif, kualitatif, dan R&D*. Alfabeta.
- Sutanta, E., & Istiyanto, J. E. (2012). Kebijakan standarisasi data dan problem interoperabilitas pada aplikasi e-government. *CCIT Journal*, 6(1), 1–13. <https://doi.org/10.33050/ccit.v6i1.372>
- Sutopo, B., Wulandari, T. R., Adiati, A. K., & Saputra, D. A. (2017). E-government, audit opinion, and performance of local government administration in Indonesia. *Australian Accounting, Business and Finance Journal*, 11(4), 6–22. <https://doi.org/10.14453/aabfj.v11i4.2>
- Taufiq, O. H., Yuliani, D., & Hermawandi, D. (2007). tata kelola pemerintah desa berbasis e-government menuju good governance. *Dinamika: Jurnal Ilmiah Ilmu Administrasi Negara*, 6(1), 145–152. <https://jurnal.unigal.ac.id/index.php/dinamika/article/viewFile/1987/1603>
- Terzis, P., & Santamaria Echeverria, O. E. (2023). Interoperability and governance in the European Health Data Space regulation. *Medical Law International*, 23(4), 368–376. <https://doi.org/10.1177/09685332231165692>
- Turner, M., Kim, J., & Kwon, S.-H. (2022). The political economy of e-government innovation and success in Korea. *Journal of Open Innovation: Technology, Market, and Complexity*, 8(3), 145. <https://doi.org/10.3390/joitmc8030145>
- Wahyuni, N. (2023). Implementasi kebijakan pemerintah daerah tentang sistem pemerintahan berbasis elektronik. *Musamus Journal of Public Administration*, 5(2), 385–396. <https://doi.org/10.35724/mjpa.v5i2.5097>
- Warbroek, B., & Hoppe, T. (2017). Modes of governing and policy of local and regional governments supporting local low-carbon energy initiatives; exploring the cases of the Dutch regions of Overijssel and Fryslân. *Sustainability*, 9(1), Article 75. <https://doi.org/10.3390/su9010075>
- Widaningrum, A. (2007). Bekerjanya desentralisasi pada pelayanan publik. *Jurnal Kebijakan dan Administrasi Publik*, 11(1), 43–61. <https://journal.ugm.ac.id/jkap/article/view/8553/6587>
- Wu, H., Li, Y., Hao, Y., Ren, S., & Zhang, P. (2020). Local government competition and regional green development in China: The mediating role of environmental regulation. *Science of the Total Environment*, 708, Article 135085. <https://doi.org/10.1016/j.scitotenv.2019.135085>
- Yavuz, N., & Welch, E. W. (2014). Factors affecting openness of local government websites: Examining the differences across planning, finance and police departments. *Government Information Quarterly*, 31(4), 574–583. <https://doi.org/10.1016/j.giq.2014.07.004>
- Yera, A., Arbelaitz, O., Jauregui, O., & Muguerza, J. (2020). Characterization of e-Government adoption in Europe. *PLoS ONE*, 15(4), e0231585. <https://doi.org/10.1371/journal.pone.0231585>
- Yıldırım, S., & Bostancı, S. H. (2021). The efficiency of e-government portal management from a citizen perspective: Evidences from Turkey. *World Journal of Science, Technology and Sustainable Development*, 18(3), 259–273. <https://doi.org/10.1108/WJSTSD-04-2021-0049>
- Yousef, D. A. (2017). Organizational commitment, job satisfaction and attitudes toward organizational change: A study in the local government. *International Journal of Public Administration*, 40(1), 77–88. <https://doi.org/10.1080/01900692.2015.1072217>
- Zahran, D. I., Al-Nuaim, H. A., Rutter, M. J., & Benyon, D. (2015). A critical analysis of e-government evaluation models at national and local municipal levels. *The Electronic Journal of e-Government*, 13(1), 28–42. <https://academic-publishing.org/index.php/ejeg/article/view/612>
- Zhao, F., & Khan, M. S. (2013). An empirical study of e-government service adoption: Culture and behavioral intention. *International Journal of Public Administration*, 36(10), 710–722. <https://doi.org/10.1080/01900692.2013.791314>
- Zheng, Y., Schachter, H. L., & Holzer, M. (2014). The impact of government form on e-participation: A study of New Jersey municipalities. *Government Information Quarterly*, 31(4), 653–659. <https://doi.org/10.1016/j.giq.2014.06.004>