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ARTICLE

# Analysis of Industry 4.0 Readiness among Regional Governments in Indonesia: The Worth of Digital Wisdom and Values in Public Services

***Wawan Sobari[1*], Ibnu Asqori Pohan[1], & Nurizal Dwi Priandani[2]***

*[1]Department of Political Science, Brawijaya University, Malang, Indonesia*
*[2]Department of Informatics Engineering, Islamic State University of Maulana Malik Ibrahim, Malang, Indonesia*

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**ABSTRACT**
This research aims to evaluate the readiness of regional governments to engage with the fourth Industrial Revolution (Industry 4.0), especially in e-service delivery. In the era of Industry 4.0, governments are increasingly considered public service centres that are evaluated for their ability to provide expanded services in the most efficient and individual ways. This research applied an e-service model survey by evaluating indicators of e-services about maturity values on a user-based website or mobile device applications. Assessments of e-service in three regional governments in Greater Malang reveal flaws in personnel readiness, user preparedness, flexibility in e-service procedures and requirements, integration among applications, lack of socialization, weak leader support and commitment, low budgets, and infrastructure constraints. Guided by these discoveries, unlike with theory, this study proclaims the importance of digital wisdom involving empathy, simplicity, compromise, creativity, and humility in public service. This study also formulates the digital values of political leadership transformation, public need-based digitalization, immediate resolution, changes in digital governance networks, digital wisdom, and interregional connectivity in public services. Finally, the study expands on the theory that governments can exceed preparedness by incorporating digital wisdom and values to drive public service.

## A. INTRODUCTION

This study builds on Schwab's (2016) theory of the impact of the fourth Industrial Revolution (Industry 4.0) on government. Digital technologies, mainly web technologies, can have ambivalent effects. On the one hand, the technologies may improve the surveillance of digital activities and governmental performance by modernizing its structures and functions, including public services. On the other hand, digital technologies will diminish public authority (government) since the public will become better informed and empowered. The public will have more access, channels, and abilities to voice their demands and oversee governmental actions and policies.

* Corresponding Author
Email : wawansobari@ub.ac.id

These oppositional impacts lead the government to meet the exact demand, i.e., to improve the capability of providing public services. Increasing public empowerment and using digital technologies in government processes increases strong demand from the government regarding public services. The public will view governments as public service centres required to ably deliver expanded services in the most individualized and efficient manner (Schwab, 2016). Industry 4.0 demands governmental readiness at all levels. Schwab (2016) defined readiness as a government's ability to adapt to disruptive change and to survive. He theorized adaptation as how a government embraces a changing, exponentially disruptive world and reconfigures its structure to retain transparency, efficiency, and competitiveness.

A lean and efficient structure can be achieved through changes to electronic services (e-services), particularly those for the readiness of public services, according to Industry 4.0 demands. These services rely on digital technology breakthroughs moving quickly and dynamically, following society's changing needs and demands and the private market. In other words, e-service policies and implementations could indicate how regional governments respond to Industry 4.0.

Different studies focus on determining which factors make public e-services work. This study surveys regional governments' e-service practices to assess readiness to face the challenges of Industry 4.0. Moreover, this study analyzes the problems local governments face in implementing e-services; however, this study examines previous research that explores the workings of public e-services. Based on these assessments, this study then formulates that the regions must carry out digital wisdom so that e-service policies and implementation benefit the public. Finally, this article explains digital values as essential for regional governments to navigate the revolution.

## B. LITERATURE REVIEW

The kinds of literature on public e-services are divided into two periods: before Schwab's 2016 publication on the fourth Industrial Revolution and after 2016. Studies before 2016 reveal nine factors that drive public e-services to work well. First, the context (internal and external) where e-services are implemented plays an essential role in e-service acceptance (Ellen et al., 2013). It is mentioned in different terms-social structures, cultural values and attitudes, and ethics (Asgarkhani, 2004; Meng-Hao & Feeney, 2014). Second, citizen involvement in e-services encourages e-service success (Melin & Axelsson, 2009) or the provision of e-services to meet the demands of users (Bhattacharya et al., 2012; Hassan et al., 2010).

Third, the availability of ICT infrastructure is a crucial prerequisite. Fourth, the digital literacy of users is critical in making them worthy of e-services implementation (Hermana & Silfianti, 2011). Fifth, the ability of government personnel to run e-services (Bhattacharya et al., 2012), the involvement of government employees in e-service design (Zeiris et al., 2010), and good communication with staff (Streib & Willoughby, 2005) are pressing governmental factors in implementing e-service successfully. Sixth, professional leadership contributes to the effective implementation of e-services (Reddick, 2004). Other studies explain the importance of leaders' political will (commitment) (Streib & Willoughby, 2005; Ho and Pardo in Melin & Axelsson, 2009; Hassan et al., 2010). Seventh, relevance to the needs of the business sector is essential to the success of public e-services (Ho and Pardo, 2004 in Melin & Axelsson, 2009). Eighth, e-services that adopt an e-business system or platform tend to work well (Zeiris et al., 2010). Finally, funding availability and commitment drive public e-services' success (Hassan et al., 2010).

Meanwhile, studies after 2016 found several determinants that were relatively similar. First, social factors (Batara et al., 2017; Butneva, Gumerova, & Sh, 2020) in the form of responsiveness and empathy (Ali et al., 2017) and social influence (Kamarudin et al., 2021) encourage the successful implementation of e-services. Second, user participation, orientation

(Janita, M. S., & Miranda, 2018; Ming et al., 2018), trust, and performance expectancy (Kamarudin et al., 2021) cannot be separated from e-service success. Third, facilitating conditions or the availability of ICT infrastructure is a prerequisite for the operation of e-services (Kamarudin et al., 2021). Fourth, digital literacy and user awareness are other critical factors (Kamarudin et al., 2021). Fifth, a staff's technological capacity and practical training support the implementation of e-services (Nurbaity, 2019). Sixth, leadership at the central and local government levels plays an essential role in the success of e-services (Sagarik et al., 2018). Seventh, the performance of e-services includes service reliability and security (Ali, 2017; Janita & Miranda, 2018), user benefits (Holgersson et al., 2017), and information quality (Janita & Miranda, 2018).

Based on the review of these studies, there is no difference in the several exigency factors that drive the success of public e-services before and after the development of Industry 4.0. Consideration of context or social factors is equally crucial for successful e-service implementation. User participation in the provision of e-services seems to be increasingly crucial for its success. The readiness and availability of more equitable infrastructure remain an essential prerequisite for the success of e-services.

Furthermore, the digital literacy of users is an increasingly important demand in the development of ICT in the Industry 4.0 era. Other supporting factors for the success of e-services that are equally important before and after the presence of Industry 4.0 issues are the capacity of personnel, leadership, system reliability used in e-services, and the availability of an adequate budget. Thus, there are no essential changes to prerequisites and enabling factors of e-service in the literature published before and after the emergence of Industry 4.0. These pieces of literature have not explicitly linked e-service to assessing readiness to face the challenges of Industry 4.0 at the regional level. Issues that arise in the implementation of e-service are the main concerns of this study. This study seeks to improve the educational value of e-service studies as an indication of the readiness of local governments to meet the challenges of the fourth Industrial Revolution.

This study examines the policy and implementation of public services by local governments in Greater Malang-Malang City, Malang Regency, and Batu City. Policy reviews were conducted on regional medium-term development plans (RPJMDs) and strategic plans (*Renstra*) of regional offices (hereafter OPD) in response to Industry 4.0. This study of policy implementation focused on one form of government response, the provision of e-services. This research also revealed problems faced by regional governments in running e-services.

Unlike previous studies, the analysis results regarding regions' constraints when running e-services, as experienced by providers and users, form the basis for building digital wisdom notions. Based on these ideas, this study constructs digital values offering alternative views for implementing e-services. Generally, digital wisdom and digital values are part of regional governments' responses to Industry 4.0. This study seeks to broaden Schwab's theory of adaptation, which governments at all levels must undertake, including changes caused by digital technology breakthroughs. Schwab (2016) explained that adaptability is a prerequisite for government survival. This study operationalizes adaptability as a form of governmental digital wisdom to guide the implementation of e-service and provide optimal user benefits. Moreover, based on these findings, this study constructs digital values as the core concept of regional government administration in the era of Industry 4.0.

## C. METHOD

The government of Indonesia is aware of the information and communication technology (ICT) revolution’s open space to reform state apparatuses through the implementation of e-government. Indonesia officially began to initiate e-government in 2001 when the president of

the Republic of Indonesia issued Presidential Instruction Number 6 of 2001, which concerned the Development and Utilization of Telematics in Indonesia. 2018 the government issued Presidential Decree Number 95 of 2018, which concerned a *Sistem Pemerintahan Berbasis Elektronik* (SPBE, or electronic-based government system). The decree addressed ensuring clean, effective, transparent, accountable government and reliable, quality public services (public e-service). E-services are part of e-government development in the country.

In this study, the crucial emphasis is on public e-service or the deployment of ICT in delivering services provided by public authorities, namely, regional governments. Moreover, the present study is mainly intended to give an academic explanation of the readiness of regional governments to face the challenge of Industry 4.0, especially in implementing public e-services. This study centres on the local government in Greater Malang (Indonesian: Malang Raya) as the subject of research for two reasons. First, these regions are three of the 100 regions in Indonesia participating in the smart city pilot project under the direction of the Ministry of Communication and Informatics. The project integrates ICT into daily governance, intending to increase efficiency, enhance public services, and improve the welfare of citizens. These three regions have at least prepared policies to encourage the achievement of a smart city project, like having public services that utilize ICT. Second, Malang Raya is an area that comprises three regions with diverse sociological characteristics, namely, Malang City (urban), Batu City (semi-urban), and Malang Regency (rural). The differences in the region's characters allow for different orientations to e-service development according to the needs of its residents.

This research applied an electronic-based service or e-service model referring to the Reference Model for Service Oriented Architecture introduced by Ostasius & Petraviciute (2010). The used model can help researchers to evaluate the maturity and complexity of the electronic services provided by an authority and other systems that support these services. It helps compare an e-service with other e-services provided by other authorities in the country or with other countries.

This model aims to learn how e-services are implemented in Greater Malang. Eight evaluation indicators were used, including visibility (awareness and possibility of outreach), users of electronic services (identification of users and the role the users play), case management (process performed manually, automated process, and e-notification), document management (application and e-authentication), electronic payment (internet banking and other types of payment), integration of process (service of information dissemination, information and decisions, access to a database, and transparency), post-service activities (manual and non-automated process and electronic delivery), and security (privacy and payment security).

The evaluation of every indicator in the survey of e-services was conducted about maturity values on a user-based website or mobile device application, as introduced by Ostasius & Petraviciute (2010). A maturity value of 1 indicates that the application has not yet been implemented. This value increases when no features or modules in the e-services are found to correspond to the indicator. A value of 2 indicates that an application has completed the planning stage. This value represents the condition that describes features or modules of the e-services corresponding to indicators while the application is already in a planning document. This value was omitted since the survey referred to a user-based perspective.

Value 3 shows that the e-service application is in the process of development. This value shows that features or modules of the application fit the indicators, although the app is still in development or indicates that errors are still being discovered. Value 4 indicates that the e-service application has been implemented. This value shows that the application features or modules are found. They also fit the indicators, and the application works appropriately. Value 5 indicates that the application is undergoing further development. This value designates that the features and modules of the e-service application match the indicators.

From September 29 to October 1, 2020, a survey on e-services involved evaluating e-services offered on mobile devices or websites developed and controlled by OPD. This research also obtained data from an analysis of documents for more supporting data. Three focus group discussions (FGD) attended by OPDs to represent their regional governments in Greater Malang were also arranged on October 5, 7, and 8, 2020. Service-based applications and the system allowing grievances to be posted electronically, as developed by the three regional governments, served as the research objects presented in Table 1.

Table 1. Assessed Applications

| Malang Regency | Malang City | Batu City |
|---|---|---|
| 1. SIPEDULI (http://sipeduli.malangkabupaten.go.id)<br>2. MalangKab Tanggap (Mobile Android Apps)<br>3. MalangKab UMKM (Mobile Android Apps)<br>4. GOKIR (Mobile Android Apps) | 1. Sambat (https://sambat.malangkota.go.id)<br>2. Izol (https://izol.malangkota.go.id)<br>3. Pasar Mbois (https://pasarmbois.com)<br>4. Ker! (Mobile Android Apps)<br>5. Sampade (Mobile Android Apps)<br>6. Website Perpustakaan Kota Malang (https://dispussipda.malangkota.go.id)<br>7. D-Cillin (Mobile Android Apps)<br>8. Dinas Pendidikan (https://dikbud.malangkota.go.id)<br>9. Sembako Malang (http://sembakomalang.com) | 1. Dispendukcapil (https://dispendukcapil.batukota.go.id)<br>2. City Living (Mobile Android Apps)<br>3. Among Tani (Mobile Android Apps) |

## D. RESULT AND DISCUSSION

### Regional Policies Regulating e-Services

This research aims to conduct document analysis in the government to find the responses and commitments to facing the challenges of Industry 4.0, especially regarding the applications of e-services. This research studies the RPJMD and the strategic plan of OPD (OPD's *Renstra*). Malang City is committed to facing the challenges that occur with Industry 4.0. The RPJMD 2018-2023 mentions two options of policy that respond to challenges. First, Malang City has prepared a Roadmap for the Smart City of 2019–2023 to be constructed parallel to the concept of services in the city.

Malang has developed over 60 applications to provide services in the city to facilitate government administration and support public services. "Acceleration of technology and information integration" is one of four indicators comprising fast response, utilization of big data, optimization of the command centre, formation of the team assigned to regional coordination for SPBE, and several other initiatives (RPJMD Malang City, 2019). Malang City plays a vital role in building the path that leads to the city's future through Malang 4.0 (Information and Technology literacy in all domains). The city fully understands its characteristics as a city of education and the nature of Industry 4.0 (RPJMD Malang City, 2019).

Furthermore, OPDs stipulated RPJMD further in their *Renstra*. The Office of Information and Communication (hereafter KOMINFO) set a strategic plan for all SPBEs in public services. The Office of Labor, Investment, and One-Stop Integrated Services (hereafter DPMPTSP) created a strategic plan to embody IT-based services that are accurate and fast. The Office of Cooperatives, Industries, and Trade espoused a roadmap of the industry, "Indonesia heading to 4.0," initiated by the government. However, responses to the era of Industry 4.0 are not explicitly stated by the Regency of Malang in RPJMD 2016-2021. The second mission of

RPJMD mentioned the "expansion of innovation and reform of bureaucracy for clean, effective, accountable, and democratic governance based on information technology" (RPJMD, the Regency of Malang, 2016). One of the strategies applied to run this mission is improving ICT-based services.

Some OPDs specified these missions and strategies in their OPDs' *Renstra*. KOMINFO is intended to embody the information and management of electronic data based on information technology. DPMPTSP is in the process of making an electronic system of investment licensing information services available. The education and culture agency utilizes IT to help with its data report regarding primary education and information services (DAPODIK) functions, which are directly linked to the Ministry of Education and Culture. The Population and Civil Registry Agency (hereafter DISPENDUKCAPIL) utilizes IT in its application for population administration.

Batu City has a platform, RPJMD 2017-2022, committed to facing the challenges of Industry 4.0 and accelerating the implementation of a smart city. The government of Batu City manages its resources effectively and efficiently. The Mayor of Batu City has put Mayor Regulation Number 78 of 2017, concerning a Smart City Master Plan, in place. A "smart city" is principally innovative and applies ICT in public service, government management, and creative economy. RPJMD confirms that during the era of Industry 4.0, the involvement of ICT in governments is essential (RPJMD, the City of Batu, 2017).

OPD in Batu stipulated the RPJMD in OPD's *Renstra*. DISPENDUKCAPIL utilizes IT for innovations in public services. DPMPTSP developed a program intended to maximize the utilization of technology to facilitate licensing databases and to bring the online-based integrated licensing service information system to the next level (*Renstra* of DPMPTSP of Batu City 2018-2022). Overall, all regions have platforms to face the challenges associated with Industry 4.0. Those regions manage the services using information technology for the public and to facilitate business. Every region has taken some measures to meet the challenges of Industry 4.0, particularly by implementing e-services.

## E-Service Evaluation

The survey conducted to investigate further e-service also involved evaluating how applications run and how the regional governments utilize the applications to facilitate services in business and for people. This evaluation was performed according to eight indicators of an e-service model that refer to the Reference Model for Service Oriented Architecture developed by Ostasius & Petraviciute (2010). The first evaluation to test the development of e-service in Malang City was performed on September 29, 2020. The first evaluation addressed testing an online licensing application (IZOL) developed by DPMPTSP that provides services in business permit issuance. Presently, IZOL is responsible for the issuance of 35 (out of 129) permits, including a trading business license (SIUP), company registration certificates (TDP), clinical practice permits for general practitioners, and research certificates.

The evaluation of IZOL indicated that this application lacked details on its homepage, objective, methods, or technical terms. Moreover, no contact information was provided, no AI was used for document checking, the application was not integrated into the module of population administration, and post-service-related activities were too complicated for users. The survey results also indicated issues with several other applications where errors were common, and apps failed to open. SAMPADE is an application facilitating regional tax services, and it failed to work appropriately, especially the registration feature. This application stopped responding to the registration function and failed to send an activation code; thus, the evaluation was discontinued.

The Application for Education and Culture Office is accessible only on the website, but access failed during the evaluation. It was found that the applications of KER! and SEMBAKO

did not facilitate two-way communication. PASAR MBOIS is an application that is deemed practically beyond the evaluation standard. Trade Office, Malang Creative Fusion, created this application with Bank Negara Indonesia (BNI). This application serves as a medium to help market products of excellence in Malang and is accessible via a website and Android. This application also has a QR code, allowing users to scan product codes displayed in public places, such as train stations, bus terminals, airports, and hotels. Malang Creative Cooperative Mbois is responsible for the operation of PASAR MBOIS, which was developed in collaboration with creative communities and leading producers in Malang. Generally, this application has met all the indicators of e-services.

However, the evaluation of e-service in Malang City revealed that the OPD faced a human resource-related issue. One of the participants, representing Malang City Library and Archives Office, in FGD (held on October 8, 2020) found that some customers appeared awkward when switching from a conventional system to a digital system. The participant remarked, "One of the problems comes from the customers themselves. They become accustomed to the manual (service) then are suddenly forced to use digital."

A similar problem was also apparent in organizing IZOL. One of the DPMPTSP staff members shared a problem at the FGD held on October 8, 2020. The staff specifically confirmed a human resource issue of no one addressing grievances.

Moreover, it seems that steps in services are not entirely implemented online. For example, at the FGD on October 8, 2020, a staff member from a village office (*Kelurahan)* argued that not all office activities had to be performed electronically. She stated:

> *"Not all (services) can be done electronically. It is difficult for Kelurahan to explain to the community because several (service) processes must be done manually. It results in administration process delays. In contrast, services or facilities under Kelurahan cannot fully support online services."*

The village's office had difficulty explaining this issue to the public, and the awkwardness impeded some administrative processes.

Another survey was conducted on September 30, 2020. SIPEDULI, a system created to assist population administration and civil registry, was the first to be evaluated. This application is accessible for registration, monitoring, family data registration, and other population administration-related requirements and information. Based on the evaluation, SIPEDULI was found to work correctly, with some drawbacks. The homepage had no detailed information regarding the app's functions, objectives, or usage.

Meanwhile, Malang Kab UMKM is an application intended to accommodate businesses in the Regency of Malang and help entrepreneurs market and register their businesses. This app also helps promote business in regional areas. This application is connected to the platform used by the OPD responsible for permit issuance. It allows the OPD to perform verification of business entities with an official permit registered on the app. Another evaluation was also performed to assess GOKIR, an application aimed to facilitate vehicle owners in the administrative process of a roadworthiness test. Unfortunately, the application is only limited to information and does not support services like a payment system, roadworthiness test documents, or other services. MalangKab Tanggap is intended to handle public grievances and other issues arising in the regency. It is available for download on mobile devices and was developed for OPDs in the Regency of Malang. However, the app was full of complaints without any response.

The FGD attended by officials and the staff of OPDs, held on October 5, 2020, responded to the evaluation result of e-services. One of the participants from the Poncokusumo subdistrict,

who directly interacted with people when performing tasks, complained that the application was not running correctly. He critically stated:

> *"Seeing the performance of Dispendukcapil, I can say that they operated many applications, but they are not clear (the functions). So, I see that these applications are developed solely for competition; there is no follow-up (about the implementation). In Malang Regency, we, who work in the field (perform public service), actually need acceleration regarding e-government (implementation)."*

Staff working at the Agriculture Office complained that the head of the office was not fully committed to running the app, and the team also admitted that the app had received an award from the government. However, after the head decided to leave for another OPD, the app was not continued to be operated. He clearly remarked:

> *"Si Brilian, from the Agriculture Office. The application won first place (award) nationally. However, after those who had the idea to develop the application moved to the Food Security Office, the application was no longer running."*

Another staff member representing the Health Office voiced that most users were left clueless about how to use the app, although the office has developed several still-running applications.

Another problem is that the network infrastructure does not cover Malang Regency. In the FGD, a staff member representing the Tourism Agency complained about the unavailability of internet accessibility in the Regency of Malang, especially at several points located in southern Malang. Several applications were also found only to provide information, and the app's development was incomplete.

Furthermore, on October 1, 2020, an evaluation was addressed to all e-service-related applications developed and applied for in the city government of Batu. This evaluation focused on three crucial applications: Dispendukcapil, City Living, and Among Tani. Dispendukcapil is a web-based app that provides administrative services regarding birth and death certificates. This app also allows people to access news, programs, activities, and all services provided by the Population Administration and Civil Registry Office (Dispendukcapil).

The evaluation concluded that upgrading the electronic-based service quality is required. It also revealed that the app lacked user authentication and login and register pages, that no features enabled users to trace documents, and that e-authentication/e-signatures on documents could not be uploaded or downloaded. City Living features news, tourist spots, and other attractive locations in Batu City. All the information given was essential for residents and visitors. However, it was found that this app lacked two-way communication and did not provide any interactive features.

Among Tani is one of the three apps the Smart City of Batu uses. Besides providing updated information on city and agricultural guidelines, this app enables more effortless transactions of horticultural products between farmers and buyers. However, this app was in a further development stage when the evaluation took place and was discontinued. The FGD held on October 7, 2020, revealed an obvious problem in developing electronic-based services: insufficient staff and funds for development. DPMPTSP developed SI CANTIK to facilitate the issuance of 130 types of permits, and it was expensive. All permits should come with derivative programs to adjust to the reality of permit services. Unfortunately, all government officials do not have the opportunity to develop an application. Therefore, only five out of 130 permits have been issued.

Hence, this e-service evaluation at least, reveals three main findings. First, not all service processes need to switch to a digitalized mode since some administrative procedures require people to be present for the administrative process. Second, e-services are inextricably linked to infrastructure and user literacy. Widespread areas face topographical problems that heavily affect the provision of e-services. These regions must procure a network infrastructure that is costly and complex. Also, the digital literacy level in the older population is low, which presents another obstacle to adjusting the e-service application. Third, the small number of human resource personnel tasked with mastering the skills to develop applications is a recurring problem in almost every region. This complication has hindered the development of e-services.

## Digital Wisdom

The most important consideration concerning obstacles when implementing e-services is the urgency of digital wisdom. It is the necessity of values to bring together the demands of Industry 4.0 and the readiness of e-service, both in terms of provider and user preparedness. Wisdom is needed for e-service operations to prioritize user benefits rather than simply following developments in digitalization, automation, and service efficiency. For this reason, a government can apply the wisdom of social practices and political and governmental methods. Moss (2008) mentioned several important political wisdom characteristics for the government to implement. Some relevant wisdom values involve compassion and empathy, humility, modesty, tolerance and compromise, humour and creativity, restraint and self-discipline, and passion and courage. These wisdom values are adopted by and adapted to the research results and can be performed by local governments when developing and implementing e-services.

Problems or gaps in implementing the e-service above are important baselines for encouraging regional government wisdom in Greater Malang. First, digitalization, automation, and service efficiency efforts (e-service) should be compatible with the diversity of users accessing services. Information technology to accelerate and simplify services should consider user capabilities. Second, e-service design should emphasize simplicity. Procedures, language, and service requirements are easy to follow and operate to facilitate public access and use of applications provided by the regional governments. Hence, users can use applications, services, and transactions optimally and securely. Third, in the early stages of e-service development, governments should remain open to compromise regarding service procedures. Not all procedures and service requirements must meet the digitization, automation, and efficiency criteria or be based on mobile or web applications. User diversity must be anticipated and accommodated through manual and digital service practices and procedures. Governments can remain open to accomplishing service objectives while transforming services to reflect the capabilities of users to access procedures and service requirements.

Fourth, the gap between the use of information technology in public service and the varied realities and situations of users demands the creativity of governments to overcome it, such as the implementation of the app by the Malang City Library and Archives Office and the *Kelurahan*. Creativity is born from critical thinking that reacts to and overcomes this gap. Governments should consistently find creative solutions to achieve service goals through digitalization, automation, and efficiency without neglecting users' digital literacy level. Finally, the three regional governments in question must humbly address the diversity of users' needs and demands. The governments can continue prioritising attitudes and policies that demonstrate patience, not superiority, to the public or users. There is no need to display governmental excellence or underestimate users if they cannot utilize e-services. To apply digital wisdom in public service, governments may execute them in stages and adapt to developing users' needs, demands, and capabilities. Governments can create a long-term plan

describing the steps of digitalization, automation, and efficiency in delivering public services, such as in the roadmap of regional e-government development. At the same time, governments can consistently market digital-based public services to residents. Social solid marketing of e-service could accelerate user acceptance and utility.

## Digital Values

Previous descriptions have presented the reality and challenges of regional government efforts to implement e-services. Based on these descriptions, this study proposes several values for governments to make their efforts worthwhile. These values are defined as regional government principles that aid in navigating Industry 4.0 and as values of digital benefits. The constructed digital values represent digital principles in service delivery.

Table 2. Digital Wisdom and Digital Values

| Digital Wisdom | Digital Values |
|---|---|
| - Compatibility | - The transformation of regional political leadership |
| - Simplicity | - Need-based digitalization |
| - Compromise | - Immediate resolution |
| - Creativity | - Changes in digital governance networks |
| - Humility | - The worth of digital wisdom |
| | - Interregional connectivity |

Source: Constructed Based on the Study Findings by Authors (2020)

The first value is the transformation of regional political leadership. The response to Industry 4.0 challenges requires a change in the perspective of political leadership. Local political leadership must be able to transform the public value into digital value. Policymaking should not only consider efficiency, effectiveness, economy, and their potential effects on the public. Regional heads must also calculate disruptions, such as technological disruption, innovation, and radical changes in the public's perspective on subnational political leadership practices.

Additionally, transformation requires a strong commitment from leaders in initiating, developing, and maintaining the digitalization and automation of public services. The following action is to understand need-based digitalization. Regional governments must acknowledge that public needs are increasingly complex. At the same time, the needs of citizens are also influenced by digital systems. A progressively digital life demands a redefinition of public needs and demands. For example, governments must respond to the need for digital-oriented education, digital-based health services, and a digital economy.

However, this study finds that programs or activities responding to Industry 4.0 must consider the community's digital literacy level or readiness among users. The third value is the immediate settlement of problems. Regional leaders and governments should consider the context of a continuously evolving regional situation characterized by rapid, broad, deep, and systemic change significantly different from the previous context. Decision-making is a final effort to solve problems and adapt to changes intelligently and carefully. The fourth principle is a change in digital governance. Regional governments need to understand policymaking networks in conventional partnerships and build a policy network in the form of a digital community with private sectors, civil society, and digital citizens. Governments can position the digital community as partners in discussions, consultations, and negotiations in response to Industry 4.0 services.

The fifth principle is the worth of digital wisdom, which governments must practice. The idealism of response, regulation, and service to Industry 4.0 demands must not override the realities of regional context (history, values, and needs). Digital wisdom allows regional governments to emphasize e-services with compassion, empathy, humility, tolerance, courage,

and justice for all residents under the influence of creativity and innovation. The last value is the importance of interregional connectivity. Interconnectedness is a crucial and inevitable characteristic of Industry 4.0. Encountering this, regional governments should view that the implementation of e-services must consider the interconnected aspects of regional authorities.

This study examines examples of business licensing services. Increasingly unlimited user mobility should be balanced with cooperation between regional authorities in licensing services. Suppose a regional government provides licensing services coverage in its area. In that case, license data should be accessible to other regional authorities to facilitate supervision and enforce regulations since users may conduct business activities in different regions. The position of this study departs from Schwab's (2016) theoretical assumption regarding the impact of Industry 4.0 on the government. Industry 4.0 demands that the government perform as a public service centre that can deliver expanded services most efficiently and individually. Through e-service assessments provided by the three regional governments in Greater Malang, this study details the capacity of regional governments' public services relevant to the demands of Industry 4.0.

In organizing e-services, local governments will face some challenges in development arising from local governments as providers and communities and businesses as users. Although the three regional governments have had platforms of e-services, the governments had to grapple with several constraints that corrected their awareness of readiness. To provide e-service, governments must engage with personnel readiness, user preparedness, the flexibility of e-service procedures and requirements, application integration, lack of application socialization, weak leader support and commitment, low budgets, and infrastructure issues. Specific to the infrastructure issue, regional governments are constrained by the lack of internet network infrastructure. The governments can only provide a limited budget to build network infrastructure, limiting internet coverage in rural and remote regions.

As a result, it is critical to review Schwab's (2016) theory on the significance of mastering and utilizing digital technology to deliver the most effective and individualized public services. The challenges providers and users face in implementing e-services lead to a consciousness of the importance of public benefit rather than just efficiency and individuality of service. The intended benefit criteria are influenced by digital wisdom and digital values in the implementation of e-services. This study does not reject the theory of Schwab (2016) that the government's ability to adapt is an essential condition for survival. Similarly, this study finds that adaptability is relevant precisely by prioritizing digital wisdom and values as a reflection of the problems governments and the public face in implementing e-services.

This research also expands on the study of Chung (2017), which explores South Korea's experience regarding the importance of organizational innovation through e-government when confronted with Industry 4.0 challenges. Local governments must practice organizational innovation and digital wisdom so that responses to the challenges of Industry 4.0 do not omit parties who cannot meet the demands of change under Industry 4.0. This study also echoes Balkaran's (2017) finding that leaders are open to technological change. This study finds leadership commitment in directing the transformation toward implementing e-services important. Besides leaders' commitment, budget commitment can support the design of e-service development. Also, consistently monitoring user needs in implementing e-services is crucial for regional readiness when encountering the revolution's challenges.

Finally, the results of this study do not reject Nick & Pongrácz (2016) ideas regarding the innovation capabilities of cities or Mukwawaya & Emwanu's (2018) regarding the need to have a holistic strategy that incorporates government policy on innovation, education, and skill development that responds to changes in the era of Industry 4.0. Nonetheless, this study proposes the importance of governments considering digital wisdom and values when

responding to Industry 4.0 challenges. Without undermining the demand for the transformation of public services in the era of Industry 4.0, this study considers the diversity of users' contexts, needs, and capacities. Consequently, a government's adaptation to Industry 4.0 should prioritize public benefit.

## E. CONCLUSION

E-service assessment of policies and their implementation can indicate the readiness of regional governments in Greater Malang to anticipate the challenges of Industry 4.0. The study reveals several obstacles to e-service development, namely the lack of IT expertise among government personnel, user literacy, e-service flexibility, integration between similar e-service applications that has not occurred, e-service marketing to the public that has not transpired on a massive scale, low acceptability and utility of e-services, and lack of e-service infrastructure.

This study reviews the importance of digital technology for public services through the most efficient and individual ways, as Schwab (2016) theorised. This study proposes the significance of digital wisdom and values in facing the challenges of Industry 4.0 in government policies and the implementation of e-services. Digital wisdom is realized through empathy, simplicity, compromise, creativity, and humility. Consequently, digitalization, automation, and efficiency in public service delivery can be attained by observing the development of people's needs, demands, and capabilities. The link between them is unified by digital wisdom held by the regional governments. The governments carefully consider people's needs, markets, and capabilities before designing e-service programs and policies and forecasting the benefits that the people will gain.

This study also formulates digital values through principles that governments can apply. These values attempt to ensure that policy responses and services that meet the demands of Industry 4.0 can provide public benefits. These relevant values are the transformation of regional political leadership, digitalization based on public need, immediate resolution, changes in governance networks, digital wisdom, and interregional connectivity.

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## Contributorship

All three authors contributed equally to writing the article and conducting the research.

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