

The Quality of Digital Public Services in Population Administration in Rural Areas of Indonesia: A Literature Review Using the ServQual Approach

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ABSTRACT

Indonesia's public service digital transformation has been reinforced by Presidential Regulation No. 95 of 2018 on Electronic-Based Government Systems (SPBE), yet its implementation in rural areas continues to face infrastructure, institutional, and digital-literacy constraints. This article conceptually examines the quality of digitally based public services in population administration in remote rural areas, using Cisewu Sub-district, Garut Regency, as an illustrative context. The study employs a library research method with a qualitative-descriptive approach and critical content analysis of 23 sources of academic literature, regulations, and policy documents, selected through structured inclusion-exclusion criteria. The analytical framework integrates SERVQUAL theory (tangibles, reliability, responsiveness, assurance, empathy) with digitalization and digital governance theory. The findings indicate that the success of digital population administration services in rural areas is determined by a layered interaction between infrastructure readiness, institutional capacity, and community digital literacy, with the tangibles dimension functioning as a structural precondition. This study formulates the concept of a social compensation mechanism and recommends a hybrid public service model that combines digital services with direct assistance from civil servants as an adaptive strategy for rural regions. The article contributes an integrative SERVQUAL-digital governance conceptual framework that is contextually grounded in the geographic and social conditions of rural Indonesia.

Keywords: Digital Public Service; Population Administration; SERVQUAL; Digital Governance; Rural Areas; Hybrid Public Service



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INTRODUCTION

Digital transformation has become a key agenda for public service reform in various countries. The integration of information technology into government systems aims to improve efficiency, transparency, accountability, and accessibility of services. *The United Nations E-Government Development Index* (EGDI) report shows that the level of digital government maturity is correlated with increased effectiveness of public services, administrative efficiency, and public trust in the government (United Nations Department of Economic and Social Affairs, 2024; (Malizal & Pratama, 2025; Mutiarin et al., 2024) M. Empirical evidence in China also shows that *e-government integration* can improve service quality while reducing disparities between regions through administrative efficiency and technology diffusion (Mao & Zhu, 2025). The development of information technology, cloud computing, artificial intelligence, and *big data* also encourages a bureaucratic shift towards citizen - centered *digital governance*, including in the implementation of population administration, which is the foundation of various public services.

Various studies have shown that the digitalization of public services is not only related to technology adoption, but also to organizational change, apparatus competency, and public readiness to utilize digital services (Criado & Gil-Garcia, 2019; Mergel et al., 2019). However, its implementation still faces gaps between urban and rural areas. Rural areas generally experience limited telecommunications infrastructure, low digital literacy, and inadequate institutional capacity. Research confirms that digital service readiness in rural areas depends on the availability of basic digital assets, so policies designed for urban areas are not always effectively implemented in rural contexts.

In Indonesia, the digital transformation of government is strengthened through Presidential Regulation Number 95 of 2018 concerning the Electronic-Based Government System (SPBE). This policy encourages all government agencies to integrate information technology in the provision of public services. Population administration is a priority sector because it is directly related to the issuance of electronic ID cards (KTP), family cards, birth certificates, and other population documents. The development of the Population Administration Information System (SIAK) also strengthens the integration of national population data in accordance with Law Number 23 of 2006 and its amendments through Law Number 24 of 2013.

The implementation of digitized population administration has shown positive progress. The Clean Population Data for Semester II of 2025 recorded that electronic ID card (e-KTP) registration coverage had reached approximately 97.47% of the population required to have an ID card. At the regional level, *e-government -based service innovations* have proven effective in accelerating administrative processes (Regiana et al., 2024). However, implementation success has been uneven due to challenges such as limited internet access, low digital literacy, disparities in staff capacity, and suboptimal data integration between agencies. These conditions demonstrate that the success of digital services depends not only on technology but also on the institutional and social preparedness of the community.

This issue is relevant in rural areas such as Cisewu District, Garut Regency, which has relatively remote geographical characteristics and limited infrastructure compared to urban areas. In this study, Cisewu District is used as an illustrative context to conceptually understand how the quality of digital-based population administration services develops in rural areas, rather than as a field research location.

Various previous studies have shown that the digitalization of public services contributes to improving service quality, bureaucratic efficiency, transparency, and government accountability (Aritonang, 2017; Mergel et al., 2019). However, other studies

emphasize that the success of digital transformation remains influenced by changes in organizational culture, apparatus competence, institutional readiness, equitable distribution of digital infrastructure, and public literacy (Manik & Juwono, 2024; United Nations Department of Economic and Social Affairs, 2024). Furthermore, (Mesa, 2023) it shows that public education levels influence trust and acceptance of government digital services.

Although research on the digitalization of public services has progressed, several limitations remain. First, most research focuses on the implementation of *e-government* or SPBE in general, while synthesis on population administration services in rural areas is still limited. Second, previous research generally discusses technology implementation or service quality separately, resulting in limited integration of SERVQUAL theory with digitalization theory in the context of rural population administration. Third, the conceptual relationship between infrastructure readiness, apparatus capacity, and community digital literacy in determining the quality of population administration services at the sub-district level has not been comprehensively explained. This is despite the sub-district being a government unit that interacts directly with the community in the delivery of public services.

Based on these conditions, this study aims to: (1) conceptually examine the dimensions of quality of digital-based population administration services in rural areas through literature synthesis; (2) identify supporting and inhibiting factors in the implementation of digitalization of population administration services in rural areas; and (3) formulate strategies for optimizing digital services that are appropriate to the characteristics of rural areas. The analysis uses the SERVQUAL theory, which includes the dimensions of *tangibles*, *reliability*, *responsiveness*, *assurance*, and *empathy*, combined with the theory of digitalization and *digital governance*.

This research provides a theoretical contribution through the integration of SERVQUAL and *digital governance* to explain the quality of digital-based population administration services in rural areas. This integration produces a conceptual framework that positions infrastructure readiness, institutional capacity, and community digital literacy as interacting factors in determining service quality. Practically, the research results are expected to provide a basis for local governments in formulating strategies to improve technology-based population administration services, strengthen the capacity of civil servants, reduce the community digital divide, and develop more adaptive service models for rural areas.

RESEARCH METHOD

Research Design

This study employed a qualitative approach with a library research method. This approach was chosen because the study focused on a conceptual analysis of the quality of digital-based population administration services in rural areas, with Cisewu District, Garut Regency, as an illustrative context. The library study enabled critical analysis of theories, research findings, regulations, and policy documents without involving primary data collection. This method aligns with the research objective, which is to build a conceptual framework that integrates SERVQUAL theory and digitalization theory as a foundation for further empirical research.

Data Sources and Types

The research uses secondary data derived from national and international scientific journals, academic books, proceedings, laws and regulations, official government publications, and international organization reports related to the digitalization of public services, population administration, e-government, and service quality. The literature was selected based on three criteria, namely: (1) relevant to the research theme; (2) published in the period 2015–2026, except for classical theories such as SERVQUAL (Parasuraman et al., 1988) and TAM (Davis, 1989); and (3) derived from reputable sources, especially journals indexed by SINTA, Scopus, and official government publications. Sources that have not undergone a peer review process, are not relevant to public services, or are duplicate publications are not included.

A total of 23 references were analyzed, which included studies on the digitalization of public services, population administration, SERVQUAL, digital governance, SPBE regulations, the regional profile of Cisewu District, as well as official government and United Nations reports.

Literature Search Techniques

Literature was searched through Google Scholar, Garuda, national journal portals, and online scientific databases using keywords such as digitalization of public services, population administration, SERVQUAL, rural e-government, digital divide, and SPBE. All search results were selected using inclusion and exclusion criteria, then collected through a documentation study by reading, recording, grouping, and identifying relevant information.

The data were then classified into five main themes, namely: (1) digitalization of public services and SPBE; (2) SERVQUAL theory; (3) challenges of digitalization in rural areas; (4) supporting and inhibiting factors for digital-based population administration services; and (5) strategies for optimizing digital services.

Literature Selection Process

To make the source-selection process more transparent, the literature review followed four sequential stages adapted from standard systematic-review procedures. First, in the identification stage, an initial search using the keywords listed above was conducted across Google Scholar, Garuda, and other national and international scientific databases, yielding an initial pool of approximately 90 records, including journal articles, books, proceedings, regulations, and official reports. Second, in the screening stage, titles and abstracts were reviewed to remove duplicate records and sources unrelated to public-service digitalization, population administration, or SERVQUAL, narrowing the pool to approximately 55 records. Third, in the eligibility stage, the full text of each remaining record was assessed against the three inclusion criteria described above (thematic relevance, publication period, and source credibility) and the exclusion criteria (no peer review, irrelevance to public services, or duplication), which reduced the pool to approximately 30 records. Fourth, in the inclusion stage, a final check for thematic saturation and relevance to the five themes below was applied, resulting in the 23 references retained for synthesis and analysis in this study.

Data Analysis Techniques

Data analysis used content analysis and critical synthesis. Content analysis was used to identify patterns, concepts, and trends in the literature, particularly those related to

SERVQUAL dimensions and service digitalization indicators. Critical synthesis was used to integrate the findings of various studies to obtain a comprehensive understanding of the quality of digital-based population administration services in rural areas.

The analysis process was carried out in three stages. First, data reduction, which involves selecting information relevant to SERVQUAL theory and digitalization. Second, thematic categorization, which involves grouping findings into the five SERVQUAL dimensions and three main clusters: technical readiness, institutional capacity, and social readiness. Third, synthesis and interpretation, which involves connecting various findings to explain factors influencing service quality and formulating strategies for improving digital-based population administration services.

Data Validity

The validity of the research was ensured through source triangulation, comparing information from scientific journals, regulations, government publications, and statistical data. Each main argument was supported by more than one source, enhancing the consistency, objectivity, and credibility of the study's results.

Research Limitations

This research is a desk study; therefore, it does not utilize primary data through surveys or interviews with officials or the community in Cisewu District. Therefore, the results are conceptual and illustrative in nature and are not intended as empirical generalizations of actual conditions. Nevertheless, the synthesis of various literature and official documents provides a strong conceptual foundation for future field research.

RESEARCH RESULTS

Public Service Management and Digitalization

Modern public service management is oriented toward *a public service logic* that places the public at the center of service value creation (Osborne, 2021). Service success is no longer measured solely by compliance with administrative procedures, but also by service quality, efficiency, transparency, user experience, and perceived value. Advances in information technology are driving the transformation of public services toward a faster, more integrated, and more adaptive system (Denhardt & Denhardt, 1992; Hood, 1991).

Public administration digitalization is the integration of information technology into bureaucratic processes to improve the effectiveness, efficiency, and accessibility of services (Mergel et al., 2019). In population administration, digitalization is realized through the Population Administration Information System (SIAK), online services, database integration, and electronic identity. Empirical evidence shows that *e-government integration* can improve service quality and reduce disparities between regions by increasing administrative efficiency (Mao & Zhu, 2025). However, in developing countries, the success of digitalization is still influenced by infrastructure readiness, organizational capacity, apparatus competence, and community digital literacy (Criado & Gil-Garcia, 2019). In Indonesia, digital transformation is strengthened through SPBE based on Presidential Regulation Number 95 of 2018, although rural areas still face limitations in internet networks, technological devices, and community readiness.

Regional Profile of Cisewu District

Cisewu District is a sub-district in the southern region of Garut Regency, covering an area of approximately 172.83 km², comprising nine villages, and located approximately 104

km from the regency capital (BPS Garut Regency, 2025). These geographic characteristics make Cisewu a relatively remote area from the center of government, potentially facing limited access to digital-based public services. Therefore, this sub-district is used as an illustrative context to understand the implementation of digitalization of population administration services in rural areas.

Service Quality Theory (SERVQUAL)

The SERVQUAL theory (Parasuraman et al., 1988) explains that service quality is determined by the gap between public expectations and perceptions of the service received. This model includes five dimensions: tangibles, reliability, responsiveness, assurance, and empathy.

In digital-based population administration services, tangibles reflect the availability of infrastructure and technological devices; reliability indicates the accuracy and consistency of service; responsiveness describes the speed with which officials respond to community needs; assurance relates to official competence, data security, and public trust; while empathy demonstrates the government's attention to the needs of the community, especially groups with limited digital literacy.

SERVQUAL is widely used to evaluate service quality because it provides clear operational indicators (Ladhari, 2009). However, this model does not fully account for structural factors, such as institutional capacity, governance, and digital transformation, so it needs to be integrated with digitalization theory.

Digitalization and E-Government Theory

Digitalization theory has evolved from the concept of e-government to digital governance. E-government emphasizes the use of information technology to improve administrative effectiveness, service quality, transparency, and public participation, while *digital governance* encompasses institutional transformation, data integration, and technology-based decision-making.

(Mergel et al., 2019) explains that digital transformation includes technological modernization, organizational change, and community engagement. (Janowski, 2015) added that digital government is evolving toward *transformational governance*, emphasizing real-time system and service integration. In the context of developing countries, the success of digitalization is heavily influenced by infrastructure quality, institutional capacity, and community readiness (Criado & Gil-Garcia, 2019). Findings indicate that improving digital services in rural areas requires the development of core digital assets tailored to regional characteristics, not simply the provision of applications.

This study also considers *the Technology Acceptance Model* (TAM) (Davis, 1989). TAM explains that technology acceptance is influenced by perceived ease of use and perceived usefulness. However, because it is more oriented towards individual behavior and pays less attention to structural factors, TAM is used as a complementary theory, while the main analysis relies on the integration of SERVQUAL and digitalization theory.

Previous Research

Previous research shows that digital transformation of the public sector improves service quality, bureaucratic efficiency, and transparency, but its success is heavily influenced by institutional and infrastructure readiness. (Mergel et al., 2019) emphasizes that digital transformation is a multidimensional change encompassing technology, organizational culture, and work processes. (Criado & Gil-Garcia, 2019) It demonstrates the importance

of organizational capacity and inter-agency interoperability. (Aritonang, 2017)It found that *e-government* improves the quality of public services in Indonesia, despite still facing human resource and infrastructure constraints. The United Nations DESA (2024) report indicates that digital government maturity correlates with service effectiveness, transparency, and accountability.

Other research shows that disparities in digital infrastructure affect the quality of services between regions (Malizal & Pratama, 2025; Mutiarin et al., 2024).(Manik & Juwono, 2024) emphasizes that the success of digital transformation depends on changes in organizational culture and the competency of the apparatus. The study(Mao & Zhu, 2025) proves that *e-government integration* improves the distribution of public service quality, whereas it shows that rural areas need to strengthen their basic digital assets. (Mesa, 2023)He added that education levels influence public trust in government digital services. Meanwhile,(Regiana et al., 2024) found that innovation in digital population administration services can accelerate the administrative process, but its effectiveness is still influenced by infrastructure readiness and public understanding.

In general, previous research tends to discuss *e-government implementation* or service quality separately. Studies integrating the SERVQUAL perspective and digitalization theory in the context of population administration in rural areas are still relatively limited.

Table 1 . Synthesis of Previous Research

Author	Research Focus	Theory	Main Findings	Limitations	Contribution to This Article
Mergel et al. (2019)	Conceptualizing digital transformation in public administration through expert interviews.	Digital transformation / digitalization theory	Digital transformation is multidimensional, encompassing technology, organizational culture, and work processes.	Based on qualitative expert interviews in developed-country settings; not specific to rural or population-administration contexts.	Provides the definitional basis for treating digitalization as more than a technical change, supporting the institutional-capacity cluster in this study.
Criado & Gil-Garcia (2019)	Conceptual review of smart technologies and strategies for generating public value.	Public value / smart government perspective	Organizational capacity and inter-agency interoperability are prerequisites for technology to generate public value.	Theoretical/conceptual review without empirical testing; does not address rural infrastructure gaps.	Grounds the argument that infrastructure and institutional capacity jointly determine digital service quality.
Aritonang (2017)	Effect of e-government systems on public service quality in Indonesia.	E-government / public administration reform	E-government improves public service quality but is constrained by funding, technology maintenance, and work culture.	Focused on national-level e-government implementation; does not examine rural or sub-district contexts.	Supports identification of infrastructure and human-resource constraints as inhibiting factors in this study.
United Nations DESA (2024)	Global E-Government Development Index survey and digital transformation trends.	E-Government Development Index (EGDI) framework	Digital government maturity correlates with administrative efficiency, transparency, and public trust.	Cross-country, macro-level data; does not capture local or sub-district service experiences.	Provides the global benchmark used to frame the research problem in the Introduction.

Author	Research Focus	Theory	Main Findings	Limitations	Contribution to This Article
Malizal & Pratama (2025)	EGDI trends and regional disparities in Indonesia's digital bureaucracy.	EGDI and governance analysis	Regional disparities persist between urban and rural areas despite national EGDI improvement.	Relies on quantitative EGDI indicators; does not explain service-quality mechanisms at the community level.	Justifies the study's focus on rural population administration as an under-addressed disparity.
Mutiarin et al. (2024)	E-government development and agile governance transformation in Indonesia.	Agile governance / e-government evolution	E-government implementation accelerates governance transformation but requires stronger digital-inclusion policy.	National-level qualitative analysis; limited attention to infrastructure gaps in remote sub-districts.	Reinforces the supporting-factor cluster (national policy and bureaucratic reform) used in this study.
Manik & Juwono (2024)	Digital transformation strategy at the Ministry of Finance.	Organizational digital-transformation on strategy	Organizational culture, capacity building, and leadership involvement drive successful digital transformation.	Case study of a well-resourced ministry; not generalizable to under-resourced rural sub-districts.	Informs the institutional-capacity cluster and the study's recommendations on capacity building.
Mao & Zhu (2025)	Effect of e-government integration on the quality and equality of local public services in China.	E-government integration / administrative efficiency	Integrated e-government improves service quality and reduces inter-regional inequality.	Provincial-level panel data from China; not tested at the rural sub-district level.	Supports the argument that integrated digital systems can narrow regional service disparities.
Mesa (2023)	Relationship between the digital divide, e-government, and public trust.	Digital divide and trust theory	Education level is a key determinant of public trust and willingness to use digital government services.	Survey-based study in an Italian urban context; does not address rural Indonesian settings.	Underpins the study's emphasis on digital literacy and empathy within the SERVQUAL framework.
Regiana et al. (2024)	E-government-based public service innovation at a civil registration office.	Public service innovation	Digital innovation accelerates administrative processes, but effectiveness depends on infrastructure and public understanding.	Single case study at a district civil registration office; limited generalizability to remote sub-districts.	Provides an empirical comparator for the study's illustrative Cisewu context and its factor framework.

Source: Own Compilation (2026)

Conceptual Thinking Framework

This study develops a conceptual framework that integrates SERVQUAL and digitalization theory. The quality of digital-based population administration services is viewed as the result of the interaction of three main clusters, namely: (1) technical readiness, which includes infrastructure and technology (tangibles); (2) institutional capacity, which includes reliability, responsiveness, assurance, apparatus competence, and system integration; and (3) social readiness, which includes empathy, digital literacy, and service accessibility. These three clusters interact with each other in determining the effectiveness of digital services, especially in rural areas.

This framework also accommodates the concept of social compensation, namely strengthening the dimensions of assurance and empathy to mitigate the impact of

infrastructure limitations through a hybrid service approach that combines digital services and direct assistance.

Research Position Synthesis

SERVQUAL and digitalization theory have different but complementary focuses. SERVQUAL explains the quality of service interactions from the user's perspective, while digitalization theory explains the institutional and technological transformations that support public services. This study integrates these two approaches to explain the quality of digital-based population administration services in rural areas, using Cisewu District as an illustrative context. This integration is expected to enrich *digital governance studies* and provide a more comprehensive conceptual framework for understanding digital public services in areas with limited infrastructure.

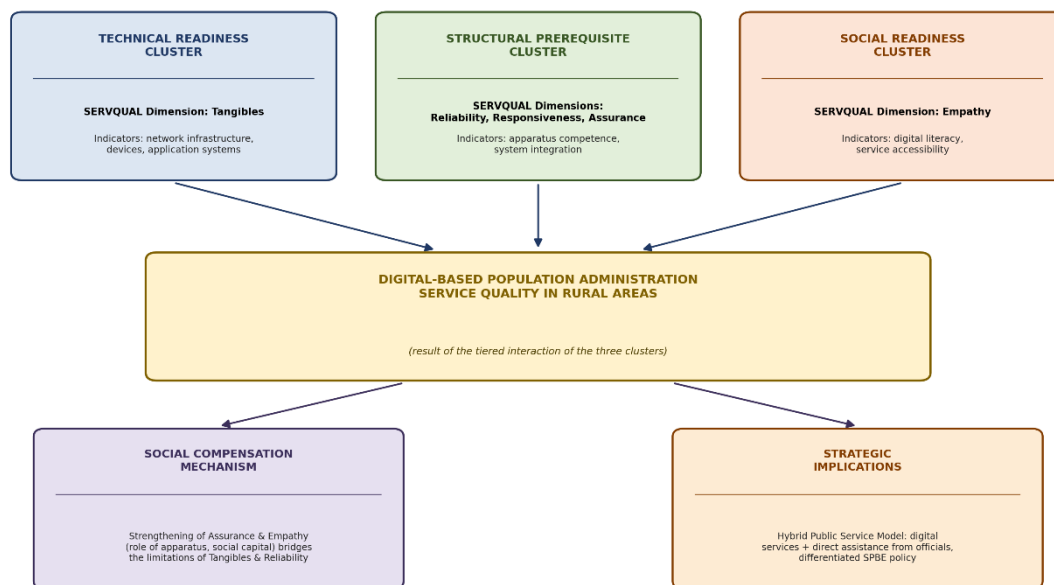


Figure 1 . Conceptual Thinking Framework
 Source: Own Compilation (2026)

As visualized in Figure 1, this framework also includes the concept of social compensation mechanisms, namely strengthening the assurance and empathy dimensions that can bridge limitations in the tangibles and reliability dimensions, as well as its strategic implications in the form of a hybrid service model. These two elements are further elaborated in the Discussion (D.4) and Theoretical Contributions (D.5) sections.

Conceptual Relevance of Cisewu Regional Profile to Service Digitalization

Referring to the regional profile described, an area of 172.83 km² spread across 9 villages, with a distance of approximately 104 km from the capital of Garut Regency, Cisewu can be placed in the category of sub-districts with a relatively high level of remoteness compared to sub-districts in the district center. This characteristic conceptually has implications for three main aspects: the availability of telecommunications infrastructure, the reach of guidance and supervision of apparatus from the district government, and the intensity of community interaction with information technology-based services.

A literature synthesis shows that geographic distance and regional remoteness are not simply technical transportation issues, but rather structural factors that shape the overall pattern of public service provision. Areas with long distances from district

government centers generally also experience delays in the distribution of telecommunications infrastructure, including cellular networks and broadband internet access, due to the economic considerations of service provider investments, which tend to prioritize densely populated areas. This condition aligns with the findings of (Criado & Gil-Garcia, 2019), who emphasized that infrastructure readiness is a key prerequisite for successful digitalization. It is also consistent with the findings of (Misra & Singh, 2024) in rural India that the gap in online service readiness between urban and rural areas stems primarily from the disparity in the provision of basic digital assets. Thus, areas with limited infrastructure, such as Cisewu, conceptually face a different starting point than urban areas in adopting digital-based population administration services.

In addition to infrastructure, the Cisewu regional context is also relevant from the perspective of the institutional capacity of the sub-district government. As a government unit at the forefront of public services, sub-districts, with their large number of villages and vast territory, face a spatially dispersed service burden, while the number of digital apparatus and supporting facilities is relatively limited. This situation reinforces (Manik & Juwono, 2024) argument that the success of digital transformation is determined not only by the availability of applications or information systems, but also by the organization's capacity to distribute these services evenly across its administrative area. A case study of the Civil Registration Agency (Dukcapil) of Banjarnegara Regency (Regiana et al., 2024) also confirms that digital service innovations in the population administration sector are often successful at the technical level, but their effectiveness still depends on the institutional capacity that supports their implementation.

In terms of social readiness, the characteristics of rural areas like Cisewu are also associated with a lower level of digital literacy compared to urban areas. The relatively long distance from the district center results in limited public access to information technology training facilities and the socialization of government digital services. This finding is relevant to a report by the (United Nations - Departement of Economic and Social Affairs, 2024), which states that the digital literacy gap between regions is a major obstacle to equitable distribution of the benefits of government digitalization. This finding aligns with (Mesa, 2023) findings that public education levels are a key determinant of citizen trust and readiness to adopt government digital services.

Overall, this regional profile synthesis confirms that Cisewu District can be understood as a conceptual representation of a remote rural area facing digitalization challenges at three levels simultaneously: physical infrastructure, institutional capacity, and community social preparedness. These three levels of challenges form the basis for the discussion of the SERVQUAL dimensions in the following subsection.

Synthesis of SERVQUAL Dimensions in the Context of Digital Services in Rural Areas

A synthesis of the five dimensions of SERVQUAL shows that each dimension requires recontextualization when applied to the context of digital services in rural areas, given that this model was originally developed for service organizations in the urban private sector (Ladhari, 2009). The following discussion outlines these five dimensions within the framework of digital-based population administration services in areas such as Cisewu District.

Tangibles

The tangible dimension in the context of rural digital services refers not only to the physical condition of the service office, but also to the availability of internet networks,

computer devices, and application systems accessible to the public. In areas with limited telecommunications infrastructure, such as Cisewu, the tangible dimension is a basic prerequisite for determining whether the other four SERVQUAL dimensions can be realized at all. Without a stable network, digital population administration services are practically inaccessible, so the tangible dimension in rural contexts has a greater determinant weight than in urban contexts where infrastructure is relatively adequate.

Reliability

Reliability in digital-based population administration services is reflected in the consistency of the system in processing data, the accuracy of the population database, and the certainty of the completion time for documents such as electronic ID cards, family cards, and birth certificates. In rural areas, the reliability of digital systems is greatly influenced by the stability of internet connections, which are often disrupted, so that data input and verification processes are at risk of technical failures. This reinforces the findings of (Mergel et al., 2019) that the reliability of digital services is not solely a function of system design, but also of the technical conditions of the environment in which the system operates.

Responsiveness

Responsiveness refers to the speed with which sub-district officials respond to community needs, both through digital channels and in-person. In rural contexts, the limited number of officials skilled in information technology can slow down the response to technical challenges experienced by the public, particularly when service requests are submitted online, but the public lacks the ability to address these challenges independently. Therefore, responsiveness in rural areas depends not only on system speed but also on the readiness of officials to provide direct technical assistance.

Assurance

Assurance relates to the competence of government officials, the security of population data, and the level of public trust in digital government systems. In regions with emerging digital literacy, assurance becomes a crucial dimension because citizens need confidence that their personal data is managed securely and professionally by government officials, even if the service process is conducted through a relatively new digital platform. (Criado & Gil-Garcia, 2019) emphasize that public trust in government technology is built gradually through consistent service experiences, not solely through guarantees of technical system security, an argument consistent with (Mesa, 2023) finding that trust in digital government services is strongly influenced by social readiness and public education, not just technical assurance alone.

Empathy

Empathy demonstrates the extent to which officials understand and address the needs of the community, particularly groups with limited digital literacy, such as the elderly, those with low education, or people with disabilities. In rural areas, empathy serves as a balancing factor for the limitations of tangibles and reliability, as personal assistance from officials can assist people who have difficulty accessing digital services independently. This dimension aligns with (Osborne's, 2021) argument regarding public service logic, which emphasizes that the value of public services is created through interactions oriented toward the community's real needs, not simply the provision of technology.

Cross-dimensional synthesis reveals a close relationship between SERVQUAL dimensions in the rural context. Limitations in the tangibles dimension have the potential to reduce reliability and responsiveness, while strengthening the assurance and empathy dimensions can serve as a compensatory factor, bridging the technical gap. This pattern suggests that digital service quality in rural areas is systemic, not an accumulation of five stand-alone dimensions, so that interventions in one dimension will impact the overall performance of the others.

DISCUSSION

Supporting and Inhibiting Factors for the Digitalization of Population Administration Services in Rural Areas

The literature synthesis identified several supporting and inhibiting factors that consistently emerged in various studies on the digitalization of public services in rural areas. These factors were grouped into three clusters, consistent with the research's conceptual framework: technical readiness, institutional capacity, and social readiness.

Supporting Factors

In the technical readiness cluster, the main supporting factor is the existence of a national policy mandating the integration of information technology into public services, as stipulated in Presidential Regulation Number 95 of 2018 concerning SPBE. This policy provides a strong legal basis for local governments, including sub-district governments, to develop digital services despite limited resources. Furthermore, the existence of the Population Administration Information System (SIAK), as a standardized national system, provides a technical framework that can be adopted uniformly by all sub-districts, including rural areas, without the need to build an entirely new system.

In the institutional capacity cluster, a relevant supporting factor is the push for bureaucratic reform, which directs sub-district officials to improve digital competency through training and mentoring from the district government and the Ministry of Home Affairs. (Mergel et al., 2019) emphasize that the involvement of work unit leaders in encouraging technology adoption is a crucial supporting factor for the success of digital transformation, including at the sub-district government level, which has limited resources.

In the social readiness cluster, an identifiable supporting factor is the increasing use of mobile phones and messaging apps among rural communities, which have the potential to be used as alternative channels for delivering service information even though internet access remains limited. The involvement of village officials and community leaders as information liaisons is also a social supporting factor unique to the rural context, where close social relationships can be leveraged to accelerate the dissemination of government digital services.

Inhibiting Factors

In the technical readiness cluster, the main inhibiting factors are limited internet networks and unstable telecommunications signals in geographically challenging areas like Cisewu. This leads to consistently unreliable digital services, forcing both the public and government officials to frequently revert to conventional service mechanisms. (Criado & Gil-Garcia, 2019) emphasized that without basic infrastructure readiness, investments in digital systems and applications will not provide optimal benefits to users.

In the institutional capacity cluster, inhibiting factors include the limited number of personnel proficient in information technology, the lack of adequate computer equipment in sub-district offices, and a limited budget for system maintenance. (Manik & Juwono, 2024) explain that limited organizational capacity is often a hidden obstacle that is not visible at the policy level but is crucial for successful implementation in the field.

In the social readiness cluster, the dominant inhibiting factor is low digital literacy among some communities, particularly the elderly and those with limited formal education. The United Nations Department of Economic and Social Affairs (2024) emphasized that the digital literacy gap is a structural barrier to equitable e-government benefits, difficult to overcome through infrastructure and application provision alone, as it requires ongoing social and educational intervention.

A synthesis of these supporting and inhibiting factors reveals a consistent pattern: supporting factors are generally top-down and originate from national policies and systems, while inhibiting factors are more structural and contextual at the local level. This pattern indicates that the success of digitizing population administration services in rural areas cannot rely solely on national policies but requires adaptive strategies that consider the specific conditions of each region.

Theoretical Discussion and Discussion

The synthesis results in the previous subsection indicate that the quality of digital-based population administration services in rural areas is a phenomenon that cannot be adequately explained by a single theoretical framework. SERVQUAL provides a robust framework for understanding the quality of service interactions from a user perspective, but it falls short in explaining why these interactions develop in particular patterns in areas with limited infrastructure. In contrast, digitalization and e-government theories explain the structural and institutional aspects of digital transformation but do not specifically measure how citizens perceive the quality of the services they receive. The integration of these two theoretical frameworks in this study shows that the five dimensions of SERVQUAL in the rural context are manifestations of three structural clusters: technical readiness, institutional capacity, and social readiness, as formulated in Figure 1.

These findings reinforce (Criado & Gil-Garcia, 2019) view that the success of public sector digitalization is multidimensional and cannot be reduced solely to the availability of technology. In the illustrative context of Cisewu, this synthesis demonstrates that the tangible dimension of SERVQUAL serves as a necessary condition for the realization of the other dimensions. Without adequate network infrastructure, the reliability and responsiveness dimensions cannot be optimally realized, even if the apparatus possesses strong digital competencies. This hierarchical interrelationship pattern has not been explicitly explained in conventional SERVQUAL literature, which generally treats the five dimensions as relatively equal and independent variables (Ladhari, 2009). The macro-level findings of (Mao & Zhu, 2025) also reinforce this pattern: the technical integration of e-government in China has been shown to reduce inter-regional inequality through improvements in administrative efficiency, which is conceptually in line with the argument that strengthening technical and institutional readiness clusters has a systemic impact on the distribution of service quality, although these findings come from an empirical context at the provincial level, not the rural sub-district level as the focus of this study.

This discussion also identified a phenomenon known as a social compensation mechanism, where limitations in the technical dimension (tangibles and reliability) are compensated for by strengthening the relational dimension (assurance and empathy)

through the active role of civil servants and community leaders. This mechanism aligns with Osborne's (2021) public service logic perspective, which emphasizes that the value of public services is created through interaction, not solely through the provision of technological products or systems. This is reinforced by (Mesa, 2023) findings that public trust in government digital services is strongly influenced by socio-educational factors, not just technical assurance. In rural areas, the role of civil servants as mediators between digital systems and the public becomes increasingly important precisely because of limited infrastructure, so that the quality of service perceived by the public does not always correlate linearly with the level of technological sophistication used.

From the perspective of digitalization theory, these findings also reinforce the arguments of (Mergel et al., 2019) (Janowski, 2015) that digital transformation in government is evolutionary and contextual, not linear and universal. Rural areas like Cisewu cannot be equated with urban areas in their stages of digital transformation, as both start from different initial infrastructure and institutional capacities. This is relevant to the concept of contextualization proposed by (Janowski, 2015), which emphasizes that digital government strategies need to be tailored to the social, economic, and geographic context in which the services are implemented, an argument echoed by Misra and Singh's (2024) findings that rural digital readiness policies require different indicators and strategies than generic policies based on urban contexts.

This theoretical discussion also opens up room for criticism of the application of the Technology Acceptance Model (TAM) solely to rural contexts. TAM, which explains technology acceptance through perceived ease of use and usefulness (Davis, 1989), tends to assume that individuals have equal access to the technology being evaluated. In areas with limited infrastructure, perceived ease of use of a technology becomes less relevant if the technology is in fact inaccessible due to network limitations. Thus, this synthesis suggests that TAM requires a complementary structural perspective, such as that offered by the integration of SERVQUAL and digitalization theory in this study, to more fully explain the phenomenon of digital service acceptance in rural areas.

Overall, this theoretical discussion confirms that the quality of digital-based population administration services in rural areas should be understood as the result of a dynamic interaction between technical readiness, institutional capacity, and social readiness, each of which can be mapped through the SERVQUAL dimensions but requires contextual interpretation according to the geographical and social characteristics of the area being studied.

Theoretical Contributions

This research provides several theoretical contributions to the development of studies on public service management and digital governance, while explicitly answering the three research gaps formulated in the Introduction (A).

First, addressing the first gap regarding the limitations of studies that synthesize the digitalization of population administration in remote rural areas, this study offers an integrative framework of SERVQUAL-digital governance that positions the five dimensions of SERVQUAL into three structural clusters, namely technical readiness, institutional capacity, and social readiness. This framework complements the conventional SERVQUAL model that tends to treat the five dimensions equally by showing the existence of a hierarchical relationship where the tangible dimension functions as a structural prerequisite for the realization of other dimensions in the context of digital services in areas with limited infrastructure such as Cisewu.

Second, addressing the second gap regarding the integration of SERVQUAL service quality dimensions with digitalization theory, this study introduces the concept of

a social compensation mechanism as a theoretical elaboration of the assurance and empathy dimensions in SERVQUAL, which explains how the role of the apparatus and community social capital can bridge the gap in the technical dimension of digital services. This concept enriches the understanding of how the quality of public services can be maintained amidst limited infrastructure, a phenomenon that is relevant to many rural areas in developing countries but has not been explicitly explored in the SERVQUAL and digital governance literature, which is largely based on the context of developed countries.

Third, to address the third gap regarding the conceptual relationship between infrastructure readiness, apparatus capacity, and community digital literacy at the sub-district operational level, this study expands the application of digitalization and e-government theory, including the contextualization perspective from Janowski (2015), at the sub-district level as a government unit that interacts directly with the community. Most digital governance literature, including large-scale studies such as Mao and Zhu (2025), focuses on the national, provincial, or ministerial levels, so the synthesis at the rural sub-district level as conducted in this study provides a new perspective on how national digital policies are translated and interpreted at the smallest government unit that directly serves the community.

As a fourth complementary contribution, this study demonstrates the limitations of applying the Technology Acceptance Model (TAM) alone in rural contexts with limited infrastructure, and proposes that TAM be combined with structural perspectives such as SERVQUAL and digitalization theory to gain a more comprehensive understanding of technology acceptance in areas with specific geographic and social conditions.

Practical and Policy Contributions

Practically, the results of this research synthesis provide a number of implications for local governments, particularly sub-district governments in rural areas with characteristics similar to Cisewu Sub-district.

First, strengthening the tangible dimension through improving internet network infrastructure and providing adequate technological devices at sub-district offices needs to be an initial priority before encouraging broader service digitalization, considering that this dimension functions as a structural prerequisite for other SERVQUAL dimensions.

Second, given that infrastructure limitations cannot be overcome quickly, this study recommends a hybrid public service model that combines digital services with direct assistance from government officials. This model allows communities without optimal access to technology to still receive adequate population administration services, while gradually improving digital literacy through the assistance process. This hybrid model aligns with the concept of contextualization, which emphasizes adapting digital strategies to local conditions (Janowski, 2015).

Third, district governments need to strengthen their capacity-building programs for sub-district officials through ongoing technical training, given that staff competency is a key determinant of reliability, responsiveness, and assurance in digital services. This program should be complemented by a mentoring mechanism from the district government and the Ministry of Home Affairs, particularly for sub-districts with limited human resources in the information technology sector.

Fourth, strengthening community digital literacy needs to be done collaboratively between sub-district governments, village governments, and local community leaders, leveraging the strong social capital within rural communities as a channel for delivering information about digital services. This approach is relevant to the finding that social

readiness factors in rural areas are strongly influenced by the role of community leaders and close social relations between residents, as also emphasized by (Mesa, 2023) regarding the role of education in building trust in digital services.

Fifth, for policymakers at the district and national levels, the results of this synthesis emphasize the importance of a differentiated SPBE policy, namely providing room for implementation adjustments for sub-districts with different geographic and social characteristics, rather than applying uniform implementation standards for all regions without considering the gaps in infrastructure and institutional capacity between regions.

CONCLUSIONS

This research demonstrates that the quality of digital-based population administration services in rural areas is determined not only by technology utilization, but also by the interaction between technical readiness, institutional capacity, and community social readiness. Integrating the SERVQUAL perspective with digital governance theory yields a more comprehensive understanding of the factors influencing the success of digital transformation of public services in areas with limited infrastructure.

The synthesis results indicate that the tangible dimension plays a key role in the effectiveness of the reliability, responsiveness, assurance, and empathy dimensions. When digital infrastructure is inadequate, improving staff competency, strengthening public trust, and providing service support are crucial factors in maintaining service quality. These findings give rise to the concept of a social compensation mechanism, which utilizes staff capacity and community social capital to mitigate the impact of technical limitations in digital service delivery.

This study also shows that the implementation of population administration digitalization in rural areas is influenced by a combination of supporting factors, such as the SPBE policy, the development of the Population Administration Information System (SIAK), and bureaucratic reform, as well as inhibiting factors, such as limited infrastructure, human resource capacity, budget, and community digital literacy. These conditions emphasize that digital transformation cannot be implemented uniformly, but requires an adaptive approach tailored to the geographic, institutional, and social characteristics of each region.

Theoretically, this research enriches the study of digital governance by developing a conceptual framework that integrates SERVQUAL with a digital transformation perspective in the context of population administration services in rural areas. Practically, the research results support the implementation of a hybrid public service model that combines digital services with direct assistance from officials as a more inclusive strategy to improve access, quality, and sustainability of public services in areas with limited infrastructure.

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