



Determinants of the implementation of the Virtual Service Desk in Peruvian municipalities

Determinantes de la implementación de Mesa de Partes Virtual en municipalidades peruanas

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ABSTRACT

The research aimed to determine the main factors for the implementation of a Virtual Service Desk in Peruvian municipalities. A binary logistic regression model (Logit) was used with data from the National Registry of Municipalities (RENAMU) for the year 2023. The research methodology employed a quantitative approach, an explanatory level, and a non-experimental, cross-sectional design. The total number of municipal units was 1,891. In Peru, 47.8% of municipalities have a Virtual Service Desk, while 52.2% have not yet implemented one. Significant factors ($p\text{-value} < 0.05$) for the implementation of a Virtual Service Desk were having a website, broadband connection, a Document Processing Office, a digital system, professionals or technicians, a Municipal Development Plan, and capital expenditure execution. With these factors present, the estimated probability of a municipality having a Virtual Service Desk Center is 83.9%. It is concluded that modernization through the implementation of the virtual document processing system requires investment in digital infrastructure and human talent, demonstrating that strategic planning is the key driver to overcome the digital divide and optimize public management.

Keywords: e-government; public management; digital transformation; municipal modernization; digital platform

RESUMEN

La investigación tuvo como objetivo determinar los principales factores para la implementación de Mesa de Partes Virtual en las Municipalidades del Perú y para ello se empleó un modelo de regresión logística binaria - Logit con datos del Registro Nacional de Municipalidades (RENAMU) del año 2023. La metodología de investigación corresponde a un enfoque cuantitativo, nivel explicativo, diseño no experimental - transversal. El tamaño total de unidades municipales fue de 1891. En el Perú, el 47,8% de municipalidades cuenta con Mesa de Partes Virtual, mientras que el 52,2% aún no la ha implementado. Los coeficientes significativos ($p\text{-valor} < 0,05$) para la implementación de la mesa de partes virtual fueron contar con página web, conexión de banda ancha, Oficina de Trámite Documentario, sistema digital, profesionales o técnicos, Plan de Desarrollo Municipal Concertado y la ejecución de gasto de capital; al contar con estos factores, la probabilidad estimada que una municipalidad posea una mesa de partes virtual es de 83,9%. Se concluye que modernización mediante la implementación de la mesa de partes virtual requiere inversión en infraestructura digital y talento humano, demostrando que la planificación estratégica es el motor clave para superar la brecha digital y optimizar la gestión pública.

Keywords: gobierno digital; gestión pública; modernización municipal; plataforma digital; transformación digital



1. INTRODUCTION

Digitalization within public administration has become increasingly established in the digital era, as it is a key factor in improving citizens' quality of life (Gijón et al., 2025). The use of digital platforms, such as the Virtual Service Desk, increases citizen interaction and strengthens perceptions of transparency in the use of public resources (Hochstetter et al., 2023). The transition from in-person to electronic procedures contributes to reducing bureaucracy and waiting times, promoting more efficient public management while reducing opportunities for corruption through greater information transparency (Tejedo-Romero et al., 2024). The implementation of the Virtual Service Desk requires continuous efforts to expand its adoption and integrate technological innovations (Al Sulaimani & Ozuem, 2022); therefore, understanding the factors that influence its implementation is essential to increasing public trust (Fan et al., 2025).

The implementation of the Virtual Service Desk offers significant advantages; however, local governments continue to face structural and organizational challenges, as substantial levels of investment, skilled personnel, and a solid administrative framework are required (Blasi et al., 2022). A critical issue is digital security due to serious deficiencies in confidentiality protocols. In addition, marked disparities exist between rural and urban municipalities, often associated with technical limitations and the absence of unified policies (Schiavone, 2024). Effective communication also influences its use, and smaller municipalities have been observed to achieve greater engagement through digital channels than large cities, highlighting challenges in building trust and participation (Duygan et al., 2023). Organizational strengthening, guarantees of digital security, and qualified human capital are therefore required (Alruwaia et al., 2020).

Peru faces challenges in implementing the Virtual Service Desk as part of its digital transformation efforts to improve citizen service systems (Flores Farro, 2021). Its adoption also requires adequate infrastructure, sufficient budget, trained personnel, and a regulatory framework that supports its use (Alfaro Castellanos, 2023). Similarly, the importance of budgetary resources, personnel, and an appropriate regulatory framework has been emphasized (Castillo, 2023). According to the National Institute of Statistics and Informatics (INEI, 2023), through the National Registry of Municipalities (RENAMU), 96.1% of municipalities have Internet access. However, this basic infrastructure does not automatically translate into the provision of advanced digital services, since only 47.8% of provincial and district municipalities have implemented the Virtual Service Desk, leaving a 52.2% gap among municipalities that still lack this technological mechanism for delivering services to citizens.

Based on the above, an empirical knowledge gap remains in the Peruvian context regarding the identification and quantification, through rigorous analysis, of the organizational, technological, and financial factors that determine adoption at the municipal level. Accordingly, this study aimed to determine the main factors associated with the implementation of the Virtual Service Desk in Peruvian municipalities using a binary logistic regression (logit) model based on RENAMU data for 2023.

2. MATERIALS AND METHODS

2.1. Study type, approach, and design

Based on the classification proposed by Hernández-Sampieri and Mendoza (2018), the study employed a quantitative approach, as numerical values were analyzed. It was explanatory in scope because it sought to identify the factors that influence and determine the implementation of the Virtual Service Desk. A non-experimental, cross-sectional design was used, since the study did not alter the observed reality and data were collected at a single point in time (2023).

2.2. Population and sample

The study population comprised all municipalities in Peru. Census sampling was applied; that is, the entire population was included. Therefore, the sample consisted of 1,891 Peruvian municipalities.

2.3. Data collection technique and instruments

The data collection technique was documentary analysis through the review of reliable secondary sources, specifically the public RENAMU database available on the INEI web portal. Based on this information, Microsoft Excel data collection forms were used as instruments to compile and summarize the most relevant information.

2.4. Study variables

The dependent variable was the implementation of the Virtual Service Desk, defined as a digital platform implemented by public entities for the remote reception, registration, tracking, and processing of administrative documents submitted by citizens, companies, or other institutions (Law No. 31170, 2021). It replaces or complements the traditional physical service desk by allowing procedures to be initiated and managed electronically without requiring physical presence at the institution (Tanaka, 2022). It is also part of digital government and State modernization strategies and is supported by regulations governing modernization and electronic management (Law No. 27658, 2002). Furthermore, it facilitates access to services during emergencies and in geographical areas located far from administrative centers, serving as an instrument to guarantee citizens' rights and strengthen the relationship between the State and society (Supreme Decree No. 029-2021-PCM, 2021).

Independent variables associated with the implementation of the Virtual Service Desk were also identified, as its adoption depends on several factors (Gijón et al., 2025; Søk & Czarnowski, 2022; Levesque et al., 2024), as detailed below:

- Institutional website: Represents the first level of digitalization in government institutions and constitutes a minimum requirement for providing institutional visibility, offering basic information to citizens, and enabling access to online service systems (Bojdová et al., 2024). The presence of an institutional website is associated with a higher likelihood of adopting digital services (Filipe et al., 2023).
- Broadband connection: This technological infrastructure is essential for the stable and secure operation of virtual platforms (Gijón et al., 2025). High-speed Internet access enables interoperability with other systems and facilitates the efficient processing of information. In rural or low-infrastructure settings, the lack of broadband connectivity severely limits the implementation of digital services (Majid Gilani & Faccia, 2022).
- Document Processing Office: A key organizational component responsible for receiving and routing documents, which facilitates the transition toward electronic platforms. A consolidated document processing structure promotes migration to digital channels with less organizational resistance (Søk & Czarnowski, 2022).
- Pre-existing digital systems: Document management software, administrative platforms, or sector-specific systems indicate a higher degree of digital maturity, enabling the generation of structured data and facilitating interoperability with other platforms (Albuainain, 2022). Governments with pre-existing digital systems exhibit higher levels of technological adoption (Tejedo-Romero et al., 2022).
- Human capital comprising professionals and technicians: Having personnel trained in information technologies is essential (Dhaoui, 2022), as it increases efficiency in the implementation, management, and sustainability of digital systems. The presence of technical and organizational competencies is one of the main determining factors (Doran et al., 2023).
- Government assistance: Refers to the set of actions provided by higher-level government entities to support public institutions in the adoption, implementation, and strengthening of information and

communication technologies (ICTs) within their processes (Duygan et al., 2023). Its purpose is to reduce digital gaps, improve institutional efficiency, and promote modernization through the appropriate and planned use of digital solutions (Miao et al., 2024).

- **Municipal Development Plan:** Serves as a local strategic planning instrument. When it incorporates objectives related to State modernization and the digitalization of services (Lee et al., 2024), the likelihood of implementing technologies increases, as such planning instruments are key determinants of the sustainability of digital initiatives (Rodrigues & Franco, 2021).
- **Capital expenditure:** Capital expenditure executed by local governments reflects their capacity to invest in technological infrastructure and software (Sutisman et al., 2024). Unlike current expenditure, capital expenditure is oriented toward long-term investments; therefore, municipalities that allocate resources to technological infrastructure show greater progress in the provision of digital public services (Ibrahim, 2022).

2.5. Data analysis

Data analysis was performed using binary logistic regression, within the family of logit models that allow the probability of occurrence of a binary event to be analyzed (Greene, 2019). The logit model is fundamental for binary data analysis because it appropriately and efficiently models the probability of an event with two possible outcomes (success or failure) (Hagenaars et al., 2024). In this study, the use of this model was appropriate because RENAMU data indicate whether or not a municipality has implemented a Virtual Service Desk, as well as whether specific requirements are met. Accordingly, the logit model provides clear interpretations through odds and enables the identification of significant factors influencing decisions (Gujarati, 2018). SPSS version 26 was used to analyze the data. Based on the literature review and in accordance with the RENAMU data, the following equation was formulated.

Equation 1. General logit model:

$$\log\text{MPV}\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 PW + \beta_2 CBA + \beta_3 OTD + \beta_4 SD + \beta_5 PT + \beta_6 AG + \beta_7 PD + \beta_8 GC + \varepsilon_i$$

Where:

p : Probability of event success,

MPV: Implementation of the Virtual Service Desk,

β_i : Estimated coefficient for each variable,

PW : Availability of a website,

CBA: Availability of a broadband connection,

OTD: Availability of a Document Processing Office,

PSD : Availability of a digital system,

PT : Availability of professionals or technicians working at the institution,

AG : Government assistance

PD : Availability of a Municipal Development Plan,

GC : Capital expenditure

Likewise, according to Gujarati (2018), the following equation was used to estimate the probability that a municipality has implemented a Virtual Service Desk.

Equation 2. Estimation of the probability of event success

$$p = \frac{1}{1 + e^{-z}}$$

Where:

p: Probability of event success (implementation of the Virtual Service Desk).

z: Logit value (sum of the model coefficients).

3. RESULTS AND DISCUSSION

3.1. Results

The results present a descriptive analysis of the implementation of the Virtual Service Desk in Peruvian municipalities, highlighting its level of adoption at the local level. To better understand the distribution of this digital tool, a specific breakdown was conducted according to municipality type, distinguishing between district and provincial municipalities. The results reveal relevant patterns and are presented below in a structured manner.

Tabla 1. District and provincial municipalities with a Virtual Service Desk

		Virtual Service Desk		Total
		Does not have	Has	
Municipality type	District	Number	961	734
		% of total	56.7%	43.3%
	Provincial	Number	26	170
		% of total	13.3%	86.7%
Total		Number	987	904
		% of total	52.2%	47.8%

Note. Prepared based on RENAMU (2023) data and analyzed using SPSS v.26

Table 1 shows a marked institutional digital divide in the implementation of the Virtual Service Desk across municipalities in 2023. At the aggregate level, 47.8% (904) of the 1,891 municipalities had already implemented a Virtual Service Desk; however, the distribution by municipality type reveals a significant disparity that suggests differences in management capacity. A total of 86.7% of provincial municipalities had implemented the platform, which may reflect greater technological capacity associated with larger budgets, higher administrative hierarchy, and access to specialized human capital. In contrast, adoption was lower among district municipalities, where only 43.3% had implemented the service. This means that more than half (56.7%) of district municipalities still operated using traditional methods, which may be associated with delays in technological infrastructure, budgetary constraints, or lower political priority given to modernization. In this regard, this asymmetry poses an equity challenge in citizens' access to digital services, with district municipalities experiencing greater vulnerability. These findings highlight the need for differentiated public policies that prioritize technical assistance and capital investment in local governments with lower adoption capacity.

Tabla 2. Results of model estimators and their significance

Variable	B	Sig.	Exp (B) - odds	Interpretation
Constant	-2.472	0.000	0.084	Low baseline level with no favorable conditions.
PW	1.580	0.000	4.856	Probability ×4.86 if the municipality has a website.
CBA	0.239	0.048	1.270	Probability ×1.27 if the municipality has a broadband connection.

OTR	0.581	0.000	1.787	Probability ×1.7 if the municipality has a Document Processing Office.
SD	0.322	0.022	1.380	Probability ×1.38 if the municipality uses a digital system.
PT	0.594	0.011	1.811	Probability ×1.81 if the municipality has professional or technical personnel.
AG	-0.025	0.819	0.975	Not significant. Does not influence the probability.
PD	0.355	0.002	1.426	Probability ×1.43 if the municipality has a current Plan.
GC	0.479	0.000	1.615	Probability ×1.62 if the municipality has executed capital expenditure.

Note. Prepared based on RENAMU (2023) data and analyzed using SPSS v.26

The model estimator results reveal important findings. The main factor associated with the implementation of the Virtual Service Desk was having a website (PW), since municipalities with a functional website were 4.86 times more likely to have a Virtual Service Desk than those without one, reflecting a basic level of digital maturity. The second most relevant factor was the availability of Professionals and Technicians (PT) in these areas, as they represent the qualified human capital required. Municipalities with these professional profiles were 1.81 times more likely to have a Virtual Service Desk. Third, having a Document Processing Office (OTD) was identified as a key factor because, in line with the nature of the service, when such a system is already in place, migration to a virtual channel becomes more feasible, increasing the probability by 1.787 times. Other factors that increased the probability of having a Virtual Service Desk were the execution of Capital Expenditure (1.62 times), having a Municipal Development Plan (1.426 times), having digital systems (1.38 times), and having a broadband Internet connection (1.27 times). Government assistance was the only factor that was not statistically significant ($p = 0.819$), indicating that receiving assistance does not guarantee implementation. Based on these findings, the following equation describing the determinants of Virtual Service Desk implementation was developed.

Equation 3. Final equation of the Virtual Service Desk model:

$$\log\text{MPV}\left(\frac{p}{1-p}\right) = -2,472 + 1,58PW + 0,239CBA + 0,581OTD + 0,322SD + 0,594PT + 3,55PD + 0,479GC$$

Based on this equation, the estimated probability of having a Virtual Service Desk when all the previous conditions are met is calculated below.

Equation 4. Estimation of the probability of successfully implementing a Virtual Service Desk

$$p = \frac{1}{1 + e^{-Z}} = \frac{1}{1 + e^{-1.653}} = 0,839$$

Therefore, based on the preceding data, the estimated probability that a municipality has a Virtual Service Desk is approximately 83.9%, considering that the determining factors for its implementation were having a website, a broadband connection, a Document Processing Office, a digital system for its operations, professionals or technicians working in the institution, a Municipal Development Plan, and having executed the capital expenditure allocated in its annual budget.

3.2. Discussion

The study employed a Logit model using RENAMU 2023 data to identify the factors determining the implementation of the Virtual Service Desk, and the findings are consistent with the existing literature. The analysis confirms that technological infrastructure is a fundamental prerequisite, as having a website increases the odds of implementation by 4.856 times. This finding is consistent with Sęk and Czarnowski (2022), who demonstrated in Polish municipalities that digital platforms are essential for the adoption of

electronic document management systems. In addition, the influence of having a Document Processing Office, which increases the odds by 1.79 times, supports the analysis by Ibrahim (2022) regarding the importance of digitalized document management processes and offices in facilitating the transition toward interoperable virtual services.

The relevance of broadband connectivity and the availability of qualified professionals is supported by the study of Ali and Titah (2021), who found that the adoption of advanced digital tools is limited in the absence of stable connectivity and qualified technical personnel. This pattern is reflected in the statistically significant factors (p -value < 0.05) identified in the model used in the present study. At the strategic level, planning emerged as a key factor. Having a Municipal Development Plan increased the odds of implementation by 1.426 times, which is consistent with Levesque et al. (2024), who found that local plans incorporating digital components achieve positive and significant outcomes in the implementation of these services. Therefore, this strategic element is crucial for aligning institutional resources, capacities, and objectives. Finally, the importance of capital expenditure, which increased the odds by 1.62 times, reinforces the evidence presented by Hemesath and Tepe (2024), who emphasize that investment in information and communication technology (ICT) infrastructure is essential for effective and sustainable digital transformation.

A contrasting finding was the absence of a statistically significant effect of digital government assistance on the implementation of the Virtual Service Desk. This result challenges the assumption that external support or regulatory guidelines alone are sufficient. Instead, it complements the analyses of Aguilar Asmat (2021) and Granados Dávila et al. (2021) in the Peruvian context, which show that simply receiving assistance does not guarantee effective implementation when an institution lacks technological infrastructure, administrative management capacity, or the ability to absorb available resources. Therefore, this finding highlights the need for a comprehensive approach in which internal institutional capacity takes precedence over external support when such support is not accompanied by continuous follow-up.

Overall, this study contributes to the literature on digital transformation in the local public sector by reaffirming that the successful implementation of the Virtual Service Desk requires a multidimensional approach. Technological, human, strategic, and financial factors, consistent with the existing literature, emerge as key pillars that should be strengthened to consolidate administrative management and meet citizens' demands.

CONCLUSIONS

In conclusion, the study, based on a Logit model using RENAMU 2023 data, provides empirical quantification and a strategic perspective on digital transformation in municipalities. The main scientific contribution lies in the identification and quantification of the determining factors associated with the implementation of the Virtual Service Desk, demonstrating that successful digitalization is multifactorial and predictable, with an estimated probability of success of 83.9% when the key factors are jointly present. The most relevant factors were initial technological maturity (having a website, which increases the likelihood of implementation by 4.86 times), process capacity (having a document processing system, which increases the likelihood by 79%), and strategic planning (the Municipal Development Plan and the execution of capital expenditure). Based on these findings, municipalities are recommended to prioritize the development of an institutional website and broadband connectivity as foundational elements. In addition, capital expenditure should be efficiently directed toward digital systems and continuous staff training, while the implementation of the Virtual Service Desk should be incorporated as a central objective within the Municipal Development Plan to ensure its sustainability. Finally, one limitation of the study is its cross-sectional nature, which makes it possible to identify associations but not to establish direct causality using historical data. Furthermore, the exclusive use of RENAMU data prevents the inclusion of

qualitative variables, such as institutional leadership or organizational culture, which could also influence implementation.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest related to the subject matter of this study.

AUTHOR CONTRIBUTIONS

Conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, software, supervision, validation, visualization, writing – original draft, and writing – review and editing: Franco-Ulco, R. F.

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