

Development of a Web-Based Administrative Document Service Information System to Enhance Service Effectiveness at the Village Level

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ABSTRACT

Purpose of the study: This study aims to develop a web-based administrative correspondence service information system, SI-PAKAR, at Pagar Village Office using the Waterfall model and to evaluate its feasibility, effectiveness, and functionality in supporting administrative letter services for village officials and residents.

Methodology: This study employed a Research and Development (R&D) approach using the Waterfall model, consisting of requirements analysis, system design, implementation, integration and testing, and operation and maintenance. Data were collected through observation, interviews, documentation, expert validation, user questionnaires, and Blackbox Testing. Data were analyzed descriptively using percentage scores.

Main Findings: The system expert validation produced a feasibility score of 98.10%, categorized as very feasible. Administrative staff evaluation resulted in an effectiveness score of 95.19%, while villager evaluation reached 94.82%, both categorized as very effective. Blackbox Testing confirmed that all tested system functions operated according to the expected specifications. These findings indicate that SI-PAKAR met the feasibility, effectiveness, and functional requirements.

Novelty/Originality of this study: The novelty of this study lies in integrating resident data management with administrative correspondence services through a Waterfall-based web system specifically adapted to Pagar Village Office. The study also combines expert validation, administrative staff evaluation, villager evaluation, and Blackbox Testing, providing a multi-perspective evaluation of system feasibility, effectiveness, and functionality.

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1. INTRODUCTION

Development of information technology has encouraged changes in various areas of public services, including administrative services at the village government level [1]. Information systems can support data management, information delivery, and administrative processes in a more structured and accessible manner. Administrative correspondence services are closely related to community needs and therefore require effective, fast, and well-documented management [2]. Implementation of information systems at the village government level can facilitate administrative processes while reducing dependence on conventional procedures. Such

implementation also represents an important effort to adapt village administration to technological developments and support improvements in public service quality.

Administrative correspondence services at Pagar Village Office still face several challenges, particularly because letter submission and preparation were previously conducted manually [3]. Observations conducted in this study found that the manual process resulted in longer service times and increased the potential for errors in data recording. Document searching and management also became more difficult because administrative records were not managed through an integrated system. Such conditions reduced the effectiveness of the administrative correspondence process and limited the efficiency of public services [4]. Therefore, an integrated information system is needed to support structured data management and improve the efficiency and accessibility of administrative correspondence services.

Several previous studies have developed information systems to support village administrative correspondence and web-based public services [5]. Research on administrative correspondence information systems at village offices has shown that web-based systems can support the preparation and delivery of administrative letters more efficiently [6]. Other studies have developed web-based public service information systems using the Prototype method, while other research on village administrative correspondence services has employed the Unified Approach method [7]. These studies demonstrate that the digitalization of administrative services can provide a solution to manually conducted service processes. However, previous studies differ in terms of development methods, system characteristics, and service mechanisms implemented in each research setting.

Although various studies have discussed the development of information systems for village administrative services, a research gap remains, particularly in the implementation of an administrative correspondence service system adapted to the specific needs of Pagar Village Office [8]. Some previous studies employed Prototype or Unified Approach methods, whereas this study applies the Waterfall development model through systematic stages of problem identification, requirements analysis, system design, implementation, and testing. Furthermore, the system developed in this study does not only focus on letter preparation but also integrates resident data into the system, allowing users to submit administrative letters without repeatedly entering the same personal information [9]. Thus, there is an opportunity to develop a more integrated administrative correspondence service system based on the specific needs of a village government.

The development of an administrative correspondence information system is important because administrative services are among the village government's services that are directly related to community needs [10]. An integrated system is expected to assist village officials in managing data and completing administrative processes in a more structured manner while providing greater convenience for residents when submitting administrative letters [11]. In this study, these needs are addressed through the development of the Web-Based Administrative Correspondence Service Information System at Pagar Village Office, known as SI-PAKAR. Therefore, this research is not only oriented toward producing a functional information system but also toward evaluating its feasibility and effectiveness through expert assessment, administrator assessment, resident assessment, and functional testing using Blackbox Testing.

Based on these problems, this study aims to design and implement a web-based Administrative Correspondence Service Information System at Pagar Village Office, referred to as SI-PAKAR, and evaluate the effectiveness of the developed system. The system was developed using the Waterfall model, which consists of requirements analysis, system design, implementation, and testing stages [12]. Requirements analysis was conducted to identify the existing administrative correspondence procedures and determine the functional requirements of the proposed system. System design and implementation were then carried out to integrate resident data management with various administrative letter submission services. Evaluation was conducted to determine the feasibility of the system from the experts' perspective and its effectiveness from the perspectives of administrators and residents [13]. Functional testing was also performed to verify that each system feature operated according to the specified requirements and supported the intended administrative processes. Through this research, SI-PAKAR is expected to meet the administrative correspondence service needs of Pagar Village Office, improve the organization and accessibility of administrative data, and support more effective and efficient public service processes.

Novelty of this study lies in the development of a web-based administrative correspondence service system specifically adapted to the operational needs of Pagar Village Office using the Waterfall development model. Integration of resident data into the letter submission process represents an important feature that connects population information with administrative correspondence services. The developed system, SI-PAKAR, integrates resident data management with various administrative letter submission services, thereby reducing dependence on fully manual administrative procedures [14]. Another aspect of the novelty is the comprehensive evaluation of the system involving experts, administrators, and residents to assess its suitability for practical use. Functional testing using Black Box Testing is also applied to verify whether the developed system operates according to the specified requirements [15]. This approach provides a practical model of an administrative correspondence service system that combines integrated data management, functional testing, and

user-oriented evaluation. Therefore, this study aims to develop and evaluate SI-PAKAR as a web-based administrative correspondence service system that can improve the efficiency, accessibility, and organization of administrative services at Pagar Village Office.

2. RESEARCH METHOD

2.1 Research Design and Approach

This study employed a Research and Development (R&D) approach aimed at developing a web-based information system for administrative letter services at the Pagar Village Office. The development process adopted the Waterfall model, which provides a systematic and sequential framework for software development. The model was selected because the system requirements could be identified through direct observation and interviews before proceeding to the design, implementation, testing, and maintenance stages.

The development process consisted of five main stages: (1) requirement analysis, (2) system design, (3) implementation, (4) integration and testing, and (5) operation and maintenance. The development stages were conducted sequentially to ensure that the resulting system corresponded to the administrative service requirements of the Pagar Village Office. The research design is illustrated in Figure 1.



Figure 1. Research and Development Procedure Using the Waterfall Model

2.2 Research Subject and Object

The research subject consisted of the users and evaluator involved in the development and testing of the SI-PAKAR system. The subjects included a system expert, administrative staff (admin), and villagers as system users. The system expert was involved in assessing the technical feasibility of the developed system, while the admin and villagers participated in evaluating the effectiveness and usability of the system. The research object was the web-based SI-PAKAR (Sistem Informasi Pelayanan Administrasi Surat) developed to support administrative letter services at the Pagar Village Office. The system provides facilities for managing population data, submitting administrative letters, processing letters, printing documents, and managing administrative reports.

2.3 Population and Sample

As this study employed a Research and Development (R&D) approach, population and sampling procedures were not applied in the same manner as in experimental or correlational research. Instead, selected research subjects were involved to represent the primary users and technical evaluator of the developed system [16]. The subjects consisted of a system expert, administrative staff, and villagers who were directly involved in the implementation and use of administrative services. Each group was assigned a specific role based on its involvement in system validation and evaluation. The research subjects and their respective roles are presented in Table 1.

Table 1. Research Subjects

No.	Research Subject	Role in the Study	Evaluation
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Title...(First author)

1	System Expert	Evaluates the technical and functional feasibility of the system	Feasibility validation
2	Administrative Staff	Uses and evaluates the system from the administrative perspective	Effectiveness evaluation
3	Villagers	Uses and evaluates the system as service recipients	Effectiveness evaluation

Table 1 indicates that the system was evaluated from technical, administrative, and user perspectives. The system expert assessed technical and functional feasibility, while administrative staff and villagers evaluated the system based on their respective experiences. These evaluations provided complementary evidence regarding the feasibility and effectiveness of the developed system.

2.4 Research Instruments

The instruments used in this study consisted of observation guidelines, interview guidelines, documentation, an expert validation questionnaire, user questionnaires, and a black-box testing instrument [17]. Observation and interviews were conducted during the requirements analysis stage to identify problems in the existing administrative letter service and determine the functional requirements of the proposed system. Documentation was used to collect supporting administrative records and information related to the existing service procedures. The questionnaires were developed using a five-point Likert scale, with the expert validation questionnaire used to assess system feasibility and the user questionnaires used to evaluate system effectiveness from the perspectives of administrative staff and villagers. Black-box testing was conducted to verify whether the developed system functions operated according to the specified requirements, as summarized in Table 2.

Table 2. Research Instruments and Their Functions

No.	Instrument	Respondent/Source	Purpose
1	Observation Guideline	Pagar Village Office	Identify the existing administrative service process
2	Interview Guideline	Village Officials	Identify problems and system requirements
3	Documentation	Village Office	Collect supporting administrative documents and service information
4	Expert Validation Questionnaire	System Expert	Assess system feasibility
5	Admin Questionnaire	Administrative Staff	Assess system effectiveness from the administrative perspective
6	Villager Questionnaire	Villagers	Assess system effectiveness from the user perspective
7	Black-box Testing	Admin and Villagers	Test system functionality

Table 2 shows that each instrument was assigned a specific function according to the stage and purpose of the research. Observation, interviews, and documentation supported the requirements analysis by providing information about the existing administrative service process and its problems. Expert validation provided evidence regarding the feasibility of the developed system, while questionnaires for administrative staff and villagers were used to evaluate its effectiveness from different user perspectives. Black-box testing complemented the user evaluations by verifying whether the main system functions operated according to the specified requirements. The combination of these instruments provided data for assessing the developed system from both technical and user-oriented perspectives.

2.5 Validation and Reliability

The validity of the developed system was evaluated through expert validation. A system expert assessed whether the developed SI-PAKAR system met the expected technical and functional requirements. The validation covered aspects related to the functionality and feasibility of the developed system [18]. User evaluation was conducted by administrative staff and villagers after the system had been implemented. The assessment used a five-point Likert scale. The results were converted into percentages to determine the level of system feasibility and effectiveness. The percentage score was calculated using the following formula:

$$P = \frac{\sum X}{\sum X_{\max}} \times 100\%$$

Where P represents the percentage score, $\sum X$ represents the total score obtained, and $\sum X_{\max}$ represents the maximum possible score. The interpretation criteria used in the study are presented in Table 3.

Table 3. Interpretation Criteria for System Feasibility and Effectiveness

Percentage	Interpretation
81–100%	Very Feasible / Very Effective
61–80%	Feasible / Effective
41–60%	Moderately Feasible / Moderately Effective
21–40%	Less Feasible / Less Effective
0–20%	Not Feasible / Not Effective

Reliability testing was not conducted as a separate statistical reliability test for a psychometric research instrument. Instead, the consistency of the developed system was examined through functional testing and user evaluation [19]. Therefore, the main quality assurance procedures in this study were expert validation, user assessment, and Blackbox Testing.

2.6 Data Analysis

The data analysis combined qualitative and quantitative descriptive analysis. Qualitative data obtained from observations and interviews were analyzed descriptively to identify problems in the existing administrative service and determine the functional requirements of the system [20]. Quantitative data obtained from expert and user questionnaires were analyzed by calculating the percentage of the obtained score against the maximum possible score [21]. The resulting percentage was then interpreted according to the feasibility and effectiveness criteria. In addition, Blackbox Testing was used to analyze the functionality of the developed system. The test focused on the input, process, and output of each major system feature without examining the internal source code. A system function was considered successful when the actual output corresponded to the expected output.

2.7 Data Sources and Data Collection Techniques

The data sources consisted of primary and secondary data. Primary data were obtained directly from the Pagar Village Office through observation, interviews, system testing, expert validation, and user evaluation. Secondary data consisted of administrative documents and supporting information related to village administrative letter services [22]. Data collection was conducted through four techniques: observation, interviews, documentation, and questionnaires. Observation was conducted to understand the existing administrative procedures [23]. Interviews were conducted with village officials to identify problems and system requirements. Documentation was used to collect information related to administrative documents and service procedures. Questionnaires were distributed to the system expert, administrative staff, and villagers to evaluate the developed system.

2.8 Development Procedure

The development procedure employed the Waterfall model and was adapted to the requirements of the SI-PAKAR system. The model consists of sequential stages in which each stage is completed before proceeding to the next stage. The development process included five stages: requirement analysis, system design, implementation, integration and testing, and operation and maintenance. Each stage produced outputs that served as a basis for the subsequent stage, ensuring a structured and systematic development process. The activities performed at each stage are presented in Table 4.

Table 4. Waterfall Development Stages

Stage	Activities
Requirement Analysis	Identifying problems in the existing administrative letter service through observation and interviews and determining user and system requirements.
System Design	Designing the system architecture, database, user interface, and system processes based on the identified requirements.
Implementation	Translating the system design into a web-based information system and developing the required system features.

Integration and Testing	and	Integrating system components and testing the functionality of the system using Black-box Testing.
Operation and Maintenance	and	Implementing the completed system, identifying possible errors, and conducting maintenance and improvements when required.

Table 4 shows that the development process progressed systematically from requirements identification to system operation and maintenance. Requirement analysis provided the basis for designing the system, while the implementation stage transformed the design into a functional web-based application. Integration and testing were conducted to verify that the developed components functioned according to the specified requirements. The final stage focused on system operation and maintenance to address potential errors and accommodate future improvements. This sequential process supported the development of SI-PAKAR in accordance with the identified administrative service requirements.

The overall research procedure can therefore be summarized as follows:

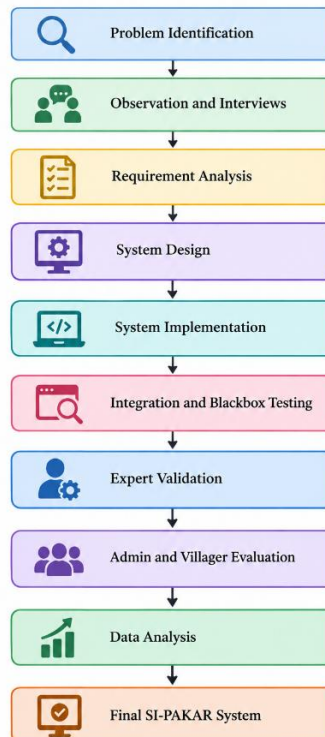


Figure 2. Research Procedure

The developed system was considered feasible and effective based on the results of expert validation and user evaluation. The final assessment was supported by Blackbox Testing to ensure that the developed features functioned according to the specified requirements.

3. RESULTS AND DISCUSSION

The results of this study present the outcomes of the development and evaluation of the SI-PAKAR (Information System for Administrative Letter Services) at the Pagar Village Office. Since this study employed a Research and Development (R&D) approach, the results focus on the developed product, expert validation, user evaluation, and functional testing rather than hypothesis or assumption testing. The evaluation was conducted to determine whether the developed system met the required feasibility and effectiveness criteria and whether its main functions operated according to the predetermined specifications.

Development process resulted in a web-based information system designed to support administrative letter services at the Pagar Village Office. SI-PAKAR integrates several administrative functions into a single system, including user login, population data management, administrative letter submission, letter processing, document printing, and administrative data management. The system was developed based on the requirements identified through observation and interviews with the village administration. The integration of population data also enables resident information to be managed within the system, so that the same basic information does not have to be repeatedly entered for different administrative services.

The first evaluation was conducted through system expert validation. The results showed that SI-PAKAR obtained a feasibility score of 98.10%. Based on the feasibility criteria applied in the study, this score

was categorized as very feasible. The result indicates that the developed system met the technical and functional requirements assessed by the system expert. The validation therefore provided evidence that the system was sufficiently appropriate to proceed to the subsequent user evaluation stage.

The second evaluation involved administrative staff as system users. The results showed that the system obtained an effectiveness score of 95.19% from the administrative user. This score was categorized as very effective. The assessment indicates that SI-PAKAR was considered capable of supporting administrative activities, particularly in managing resident information, processing administrative letters, and organizing administrative documentation. The result also demonstrates that the system could be used from the perspective of the personnel responsible for providing administrative services.

The third evaluation involved villagers as recipients of administrative services. The results showed that SI-PAKAR obtained an effectiveness score of 94.82% from the villager evaluation. This score was categorized as very effective. The result indicates that the system was considered capable of supporting residents in accessing administrative letter services. The evaluation also demonstrates that the developed system was not only assessed positively by internal administrative users but also by members of the community who represented the recipients of the services.

Developed system was subsequently subjected to Blackbox Testing to determine whether each function operated according to the specified requirements. Testing was conducted on the functions available to administrative staff and villagers, including data input, data processing, editing, deletion, updating, administrative letter submission, and output generation. The results indicated that the tested functions produced outputs corresponding to the expected results. Thus, the functional testing confirmed that the main features of SI-PAKAR operated according to the system specifications. The overall evaluation results are presented in Table 1

Table 5. Summary of SI-PAKAR Evaluation Results

No.	Evaluation Component	Result	Category
1	System Expert Validation	98.10%	Very Feasible
2	Administrative Staff Evaluation	95.19%	Very Effective
3	Villager Evaluation	94.82%	Very Effective
4	Black-box Testing	All tested functions operated as expected	Functional

Overall, the results demonstrate that the two main objectives of the study were achieved. The first objective, namely developing and implementing a web-based information system for administrative letter services at the Pagar Village Office, was achieved through the development of SI-PAKAR. The second objective, namely evaluating the effectiveness of the developed system, was supported by the high scores obtained from the system expert, administrative staff, and villagers, as well as the successful results of Blackbox Testing. These results provide the empirical basis for discussing the contribution of SI-PAKAR in relation to previous research on digital village administrative services. Developing SI-PAKAR provides a digital solution for administrative letter services at the Pagar Village Office. The system was developed in response to problems identified in the existing administrative process, particularly the use of manual procedures, difficulties in managing documents, and the need for more structured administrative services. This result is consistent with previous research on web-based village administration systems, which has demonstrated that digitalization can support data management, document processing, and administrative service delivery. Previous studies have developed web-based administrative systems using different development approaches, including Prototype, Unified Approach, and Waterfall [24]. Similarities between these studies and the present research lie in the use of information technology to improve administrative services, while the present study specifically applies the Waterfall model to the administrative letter service environment of Pagar Village.

A 98.10% feasibility score obtained from the system expert indicates that SI-PAKAR was considered highly feasible from the technical and functional perspective. This finding suggests that the system components and functions developed through the Waterfall stages were sufficiently aligned with the requirements identified during the analysis stage [25]. Similar results have been reported in previous research using the Waterfall model to develop village administrative information systems, followed by functional testing to ensure that the developed features operated according to their specifications [26]. However, system development should not be evaluated solely based on whether the system has been successfully programmed. Expert validation remains important for determining whether the resulting product is technically appropriate before it is implemented and used by actual users. An effectiveness score of 95.19% obtained from administrative staff indicates that SI-PAKAR was considered effective in supporting the internal administrative process. This result can be associated with the integration of population data and administrative letter processing within one system. Previous studies

have similarly reported that web-based administrative systems can facilitate the management of population information and correspondence while reducing difficulties associated with manual document management [27]. Research on the automation of village certificate services, for example, has shown that digital systems can support more efficient administrative processing. Findings from the present study support these previous results while applying the approach specifically to administrative letter services at the Pagar Village Office.

An effectiveness score of 94.82% obtained from villagers demonstrates that the positive evaluation was not limited to administrative staff. This result indicates that the developed system was also considered effective by residents as recipients of administrative services. Previous research on web-based village services has similarly shown that digital administrative systems can provide residents with easier access to administrative services. An important feature of SI-PAKAR is the integration of resident data into the system [28]. Unlike administrative procedures that require residents to repeatedly provide the same basic information for different types of administrative letters, the developed system stores resident information within the administrative database. This feature provides a practical contribution to simplifying administrative service procedures and reducing repetitive data entry.

A research gap can be identified between previous studies and the present development. Earlier research has generally focused on developing web-based administrative systems to replace manual procedures or on applying particular software-development methods. Some studies have employed Prototype, while others have applied Unified Approach or Waterfall. The present study extends this line of research by combining several evaluation perspectives. SI-PAKAR was evaluated by a system expert, administrative staff, and villagers, while its functionality was also examined through Blackbox Testing [29]. Consequently, the evaluation does not rely solely on technical assessment or user perception but combines technical feasibility, administrative effectiveness, community effectiveness, and functional performance.

An important novelty of this study lies in the integration of these elements within a single village administrative service system. The novelty does not simply lie in the use of the Waterfall model because this development model has also been employed in previous studies. Rather, the contribution lies in combining a Waterfall-based development process, integrated resident data, administrative letter service functionality, multi-stakeholder evaluation, and Blackbox functional testing. Integration of resident data is particularly relevant because it reduces repetitive data management and supports a more centralized administrative process. This configuration provides a development model adapted to the operational needs of village-level administrative letter services. Several practical implications emerge from these findings. For administrative staff, SI-PAKAR can support more structured management of resident data, administrative letters, and documentation. For villagers, the system provides an alternative digital mechanism for accessing administrative services and can reduce dependence on conventional administrative procedures [30]. For the village institution, the system can support more systematic documentation and retrieval of administrative information. From a development perspective, these findings also demonstrate the importance of evaluating digital public-service systems from both service-provider and service-recipient perspectives. Implementation of similar systems in other village offices should therefore consider not only technical design but also administrative workflows, user characteristics, data requirements, and available technological infrastructure.

Several limitations should also be considered when interpreting the findings. First, the development and evaluation were conducted within the specific administrative environment of Pagar Village, so the results cannot automatically be generalized to all village offices with different administrative structures and technological conditions. Second, the evaluation focused primarily on feasibility, perceived effectiveness, and functional performance. The study did not provide a longitudinal comparison of objective indicators such as service completion time, operational cost, or changes in the number of administrative errors before and after implementation. Third, Blackbox Testing verifies whether system functions produce the expected outputs but does not comprehensively evaluate source-code quality, cybersecurity, scalability, or interoperability with broader government information systems. Future research can address these limitations by conducting longer-term implementation evaluations, measuring objective service-performance indicators, and examining usability, security, scalability, and integration with other government administrative systems.

4. CONCLUSION

SI-PAKAR was successfully developed as a web-based information system for administrative letter services at the Pagar Village Office using the Research and Development approach with the Waterfall model. The system expert validation produced a feasibility score of 98.10%, while administrative staff and villager evaluations produced effectiveness scores of 95.19% and 94.82%, respectively. Blackbox Testing also confirmed that the tested system functions operated according to the expected specifications. These findings indicate that SI-PAKAR is feasible and effective for supporting village administrative services. Practically, the system can assist administrative staff in managing resident data, administrative letters, and documentation while providing

villagers with a more structured mechanism for accessing administrative services. The integration of resident data also helps reduce repetitive data entry during administrative services.

Despite these results, the study was conducted specifically within the administrative environment of Pagar Village, so the findings may not be directly generalizable to other villages with different administrative procedures, infrastructure, and user characteristics. The evaluation also focused on feasibility, perceived effectiveness, and functional performance without conducting a longitudinal comparison of objective indicators such as service processing time, operational costs, or administrative errors before and after implementation. Future research is therefore recommended to evaluate the system over a longer implementation period and measure objective service-performance indicators. Further development may also examine usability, information security, scalability, data backup, and integration with other government information systems to strengthen the sustainability and applicability of web-based village administrative services.

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REFERENCES

- [1] S. Kuhlmann and M. Heuberger, "Digital transformation going local: implementation, impacts and constraints from a German perspective," *Public Money Manag.*, vol. 43, no. 2, pp. 147–155, Feb. 2023, doi: 10.1080/09540962.2021.1939584.
- [2] M. Indriani, Nadirsyah, R. Fuadi, and Evayani, "Can Siskeudes support village governance in Aceh Province of Indonesia?," *Cogent Bus. Manag.*, vol. 7, no. 1, pp. 1–10, Jan. 2020, doi: 10.1080/23311975.2020.1743617.
- [3] J. Osah and C. Pade-Khene, "E-government strategy formulation in resource-constrained local government in South Africa," *J. Inf. Technol. Polit.*, vol. 17, no. 4, pp. 426–451, Oct. 2020, doi: 10.1080/19331681.2020.1715907.
- [4] C. S. Yap, R. Ahmad, F. T. Newaz, and C. Mason, "Continuous Use and Extended Use of E-Government Portals in Malaysia," *Int. J. Public Adm.*, vol. 44, no. 15, pp. 1329–1340, Nov. 2021, doi: 10.1080/01900692.2020.1759626.
- [5] S. R. Chohan and G. Hu, "Strengthening digital inclusion through e-government: cohesive ICT training programs to intensify digital competency," *Inf. Technol. Dev.*, vol. 28, no. 1, pp. 16–38, Jan. 2022, doi: 10.1080/02681102.2020.1841713.
- [6] I. K. Mensah, C. Luo, and X. C. Thani, "The Moderating Impact of Technical Support and Internet Self-Efficacy on the Adoption of Electronic Government Services," *Int. J. Public Adm.*, vol. 45, no. 14, pp. 1039–1052, Oct. 2022, doi: 10.1080/01900692.2021.1961150.
- [7] K. K. Larsson and T. Skjølsvik, "Making sense of the digital co-production of welfare services: using digital technology to simplify or tailor the co-production of services," *Public Manag. Rev.*, vol. 25, no. 6, pp. 1169–1186, Jun. 2023, doi: 10.1080/14719037.2021.2010402.
- [8] S. P. Osborne, M. Powell, T. Cui, and K. Strokosch, "New development: 'Appreciate–Engage–Facilitate'—The role of public managers in value creation in public service ecosystems," *Public Money Manag.*, vol. 41, no. 8, pp. 668–671, Nov. 2021, doi: 10.1080/09540962.2021.1916189.
- [9] C. Devlin and J. Coaffee, "Planning and technological innovation: the governance challenges faced by English local authorities in adopting planning technologies," *Int. J. Urban Sci.*, vol. 27, no. sup1, pp. 149–163, Jan. 2023, doi: 10.1080/12265934.2021.1997632.
- [10] L. Khamiliyah, A. Rahayu, P. D. Dirgantari, L. A. Wibowo, and E. Susanto, "Digitalization of government organizations: an empirical study of strategic factors of H.R. resources," *Cogent Bus. Manag.*, vol. 12, no. 1, pp. 1–24, Dec. 2025, doi: 10.1080/23311975.2025.2457442.
- [11] A. Kud, "Decentralized Information Platforms in Public Governance: Reconstruction of the Modern Democracy or Comfort Blinding?," *Int. J. Public Adm.*, vol. 46, no. 3, pp. 195–221, Feb. 2023, doi: 10.1080/01900692.2021.1993905.
- [12] L. Tangi, M. Gaeta, M. Benedetti, L. Gastaldi, and G. Noci, "Assessing the effect of organisational factors and ICT expenditures on e-maturity: empirical results in Italian municipalities," *Local Gov. Stud.*, vol. 49, no. 6, pp. 1333–1358, Nov. 2023, doi: 10.1080/03003930.2022.2078807.
- [13] J. Willems, M. J. Schmid, D. Vanderelst, D. Vogel, and F. Ebinger, "AI-driven public services and the privacy paradox: do citizens really care about their privacy?," *Public Manag. Rev.*, vol. 25, no. 11, pp. 2116–2134, Nov. 2023, doi: 10.1080/14719037.2022.2063934.
- [14] E. R. Sadik-Zada, A. Gatto, and I. Niftiyev, "E-government and petty corruption in public sector service delivery," *Technol. Anal. Strateg. Manag.*, vol. 36, no. 12, pp. 3987–4003, Dec. 2024, doi: 10.1080/09537325.2022.2067037.
- [15] M. Sebő and G. Bel, "E-Government and provision of public services: economic, social, and political determinants of citizen complaints," *Int. Public Manag. J.*, vol. 27, no. 4, pp. 659–679, Jul. 2024, doi: 10.1080/10967494.2023.2273343.
- [16] A. Desai and A. P. Manoharan, "Digital Transformation and Public Administration: The Impacts of India's Digital Public Infrastructure," *Int. J. Public Adm.*, vol. 47, no. 9, pp. 575–578, Jul. 2024, doi: 10.1080/01900692.2024.2350762.
- [17] M. Gasco Hernandez, "Reflections on three decades of digital transformation in local governments," *Local Gov. Stud.*,

- vol. 50, no. 6, pp. 1028–1040, Nov. 2024, doi: 10.1080/03003930.2024.2410830.
- [18] B. Zyzak and P. E. Martinussen, “OK computer: applying the public service logic on digital health services,” *Public Manag. Rev.*, vol. 26, no. 11, pp. 3342–3364, Nov. 2024, doi: 10.1080/14719037.2024.2337080.
- [19] F. Jahani Chehrehbargh, A. Rajabifard, B. Atazadeh, D. Steudler, and B. W. Nugraha, “Advancing sustainable land governance: extending LADM for integrating global initiatives – a case study in Indonesia,” *Surv. Rev.*, vol. 57, no. 405, pp. 586–600, Nov. 2025, doi: 10.1080/00396265.2025.2543615.
- [20] A. Aidi, I. Avianti, P. S. Koeswayo, S. Poulus, and S. Mariam, “The effect of an inclusive approach to collaborative governance and its impact on digitizing the quality of public services,” *Cogent Bus. Manag.*, vol. 11, no. 1, pp. 1–10, Dec. 2024, doi: 10.1080/23311975.2024.2392324.
- [21] S. B. G. C., S. K. Gurung, S. B. Jung Bahadur Rana, and B. R. Dhungana, “e-Governance, citizen satisfaction and net benefits: the moderating effect of digital divide,” *Cogent Bus. Manag.*, vol. 11, no. 1, pp. 1–22, Dec. 2024, doi: 10.1080/23311975.2024.2402512.
- [22] H. M. Elmatrani, I. Widianingsih, H. Nurasa, M. D. E. Munajat, and S. Suwanda, “Exploring the evolution of leadership in government: a bibliometric study from e-government era into the digital age,” *Cogent Soc. Sci.*, vol. 10, no. 1, pp. 1–23, Dec. 2024, doi: 10.1080/23311886.2024.2414877.
- [23] H. Pol, E. Besseling, T. Timmerman, M. van Steenberg, and J. van Grondelle, “Public Services in Digital Transition: The Driving Force of Customer Experience,” *Int. J. Public Adm.*, vol. 49, no. 7, pp. 442–456, May 2026, doi: 10.1080/01900692.2025.2488149.
- [24] J. Magnusson, T. Lindroth, N. B. Lindström, and J. Torell, “The vicious circle of ambiguity: how governance deters digital transformation in municipal conglomerates,” *Public Money Manag.*, vol. 45, no. 7, pp. 828–836, Oct. 2025, doi: 10.1080/09540962.2025.2466489.
- [25] M. Lucchese, M. C. Pucheta-Martínez, F. Di Carlo, and S. Solimene, “The degree of digital transformation in Italian local government: the impact of their governance characteristics,” *Public Money Manag.*, vol. 1, no. 2, pp. 1–11, Nov. 2025, doi: 10.1080/09540962.2025.2580556.
- [26] Y. Yang, “Heterogeneous effects of e-government on urban and rural public services: the perspective of the digital divide,” *Appl. Econ.*, vol. 58, no. 21, pp. 3989–4004, May 2026, doi: 10.1080/00036846.2025.2586293.
- [27] J. Marienfeldt, L. M. Wehmeier, and S. Kuhlmann, “Top-down or bottom-up digital transformation? A comparison of institutional changes and outcomes,” *Public Money Manag.*, vol. 45, no. 5, pp. 456–465, Jul. 2025, doi: 10.1080/09540962.2024.2365351.
- [28] D. Salazar Morales, “A Set-Theoretical Analysis of the Pathway(s) to Digital Innovation in Developing Democracies,” *J. Comp. Policy Anal. Res. Pract.*, vol. 27, no. 5–6, pp. 671–705, Nov. 2025, doi: 10.1080/13876988.2025.2566735.
- [29] I. Fiestiandani, E. Setijaningrum, E. Supeno, and S. Samad, “Between bytes, being, and the bridging of boundaries: the human dimension of policy capacity in rural Indonesia’s digital public service delivery,” *Cogent Soc. Sci.*, vol. 12, no. 1, pp. 1–29, Dec. 2026, doi: 10.1080/23311886.2026.2624790.
- [30] N. Rahman, Juharni, D. Mustafa, Mustaking, and Suprpto, “Digital governance, public leadership and social inequality in Indonesia: a mixed-methods study,” *Cogent Soc. Sci.*, vol. 12, no. 1, pp. 1–35, Dec. 2026, doi: 10.1080/23311886.2026.2717876.