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An Integrated Smart Village Information System for Digital Public Services and BUMDes Marketplace in Temesi Village

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Abstract: *The digital transformation of village governance requires information systems that not only provide administrative services but also support transparency, community participation, and local economic activities. Previous village information systems mostly focused on basic administration or information publication, while integrated public services, community reporting, budget transparency, and village-owned enterprise marketplace features remain limited. This study aims to develop an integrated web-based Village Information System based on the Smart Village concept in Temesi Village, Gianyar Regency. The system was developed using the Software Development Life Cycle with the Waterfall model, including requirements analysis, system design, implementation, testing, deployment, and maintenance. Data were collected through interviews, focus group discussions, and observations involving village officials and community representatives. The system was implemented using Laravel, MySQL, and a Model-View-Controller architecture. The developed system provides population data management, administrative service requests, service status tracking, village information, community complaints, budget transparency, village maps, galleries, and a village-owned enterprise marketplace. Functional testing showed that the main features worked according to the expected scenarios. Usability testing involving 50 respondents, consisting of 6 information technology experts, 4 village officials, and 40 village residents, obtained an average System Usability Scale score of 86.15, categorized as Excellent. These results indicate that the system is feasible, usable, and supports Smart Village implementation in Temesi Village.*

Keywords: *Smart Village, Village Information System, Public Service, SDLC, System Usability Scale.*

1. Introduction

The current development of information technology is an unavoidable factor. Mastery of information technology has become one of the indicators of a country's progress. In Indonesia, the utilization of information technology has expanded into various aspects of life, including government administration and community activities[1].

Preliminary observations showed that the public service workflow in Temesi Village was still conducted through several manual stages. Residents submitted administrative requests or complaints to the hamlet head, and the information was then forwarded to village officials for further processing. This workflow caused several practical problems, such as repeated physical visits to the village office, limited access to service status information, slow dissemination of village announcements, and the absence of a centralized digital record for public complaints. In addition, village economic activities managed through BUMDes had not been optimally supported by a digital marketplace, while budget information was not yet presented in an integrated and easily accessible system [2].

The Smart City concept has become a popular approach in urban development to address various problems, such as urbanization and disparities in regional development[3]. A Smart

City is an innovative effort to respond to these challenges while improving people's quality of life through the integration of technology into urban infrastructure. Thus, the Smart City concept aims to optimize city functions effectively and efficiently. The development of Smart Cities not only serves as a tool for controlling urbanization flows but also encourages stronger linkages between urban and rural areas[4]. Various countries around the world have implemented this concept to help communities manage resources more effectively and improve their quality of life.

In addition to the Smart City concept, there is also a development trend on a smaller scale, namely Smart Village, at the village level. Although there is no standardized agreement on the definition of Smart Village, the concept of a smart village can be understood as a village that utilizes information technology innovatively to improve quality of life, efficiency, and competitiveness in various sectors. The Smart Village concept developed in this study is realized through a web-based Village Information System, which contains various important information about the village, such as the village profile, news, activity agendas, reporting services, and e-commerce features[5]. The implementation of e-commerce is carried out through the BUMDes marketplace, where residents can purchase village products, after which BUMDes will deliver the orders directly to residents' homes[6].

The implementation of this Smart Village concept is carried out in one of the villages in Gianyar Regency, namely Temesi Village, which serves as the research object. Currently, Temesi Village does not yet have a village information system that can assist residents in submitting reports directly[7], [8]. The existing reporting process is still manual, in which residents submit reports to the head of the hamlet, who then forwards them to the sub-district office. Therefore, the development of a web-based village information system is expected to overcome the problems arising from the manual system[9].

Although several previous studies have developed web-based Village Information Systems, most of them focused on basic administrative services, correspondence management, or information publication. Limited studies have integrated administrative service requests, community reporting, budget transparency, village statistical information, and BUMDes marketplace features into a single Smart Village platform. Therefore, this study contributes by developing an integrated Village Information System specifically designed for the service workflow and digital needs of Temesi Village. The proposed system is expected to improve digital public services, strengthen information transparency, facilitate community participation, and support village economic activities through the BUMDes marketplace. This study is expected to contribute to the development of information technology in Temesi Village and help improve the village community's economy through the optimization of efficient and integrated digital services.

2. Literature Review

Relevant previous studies are used as the theoretical and empirical foundation for developing a web-based Village Information System. This section discusses prior research related to Village Information Systems, digital public services, and the implementation of the Smart Village concept. Through this review, the similarities, differences, and research gaps that serve as the basis for system development in Temesi Village can be identified. Thus, the contribution of this study lies in the development of a more comprehensive and integrated Village Information System as a form of implementing the Smart Village concept. This system is expected to improve the quality of public services, accelerate community reporting, and support the village economy through BUMDes digital services as summarized in Table 1.

Table 1. Literature Review

No.	Researcher(s)	Research Focus	Method	Similarities	Differences

1	Pujiantoro et al. (2023)	Design of a web-based Village Information System in Karangsalam Village [10].	Waterfall	Both studies develop a web-based Village Information System to support public services	This study adds community reporting features and BUMDes e-commerce
2	Putra, Satwika, and Putra	Web-based village administrative information system using Laravel [11].	SDLC Waterfall	Both studies use the SDLC approach and focus on improving village services	The previous study focused on correspondence services, while this study covers broader village services
3	Andriyus, Muhammad Arsy Ash Shiddiqy, Septa Juliana, Nova Riyanti, and M. Ridho Azzaki	Evaluation of Village Information System implementation toward independent villages in Singingi Hilir District, Kuantan Singingi Regency [12]	Descriptive qualitative method using data collection, data reduction, data display, and conclusion drawing; analyzed using input, process, output, and outcome indicators	Both studies use Village Information Systems to support village governance, public services, transparency, and information management.	The previous study evaluated an existing Village Information System, while this study develops an integrated Smart Village system with administrative, reporting, transparency, and BUMDes marketplace features.
4	Abdi Syiroh Auliya, Lina Ariyani, and Lolita Deby Mahendra Putri	Analysis of the problems in implementing a website-based Village Information System [13]	Descriptive qualitative method using observation, interviews, documentation, and purposive sampling; analyzed using Edward III's policy implementation theory and Meutiah's transparency theory	Both studies discuss website-based Village Information Systems as a medium to improve public services, information access, village transparency, and community participation	The previous study identified SID implementation problems, while this study develops an integrated Smart Village system with administrative, reporting, transparency, and BUMDes marketplace features.

The reviewed studies indicate that web-based Village Information Systems have been widely used to improve public services and information access. However, each study still has several limitations. Pujiantoro et al. focused on the design of a web-based village information system, but the integration of community reporting, budget transparency, and village economic services was not emphasized. Putra, Satwika, and Putra developed a Laravel-based administrative system, but the scope was mainly limited to correspondence services. Meanwhile, the studies by Saputera et al. and Qushairi et al. focused more on the implementation and analysis of

Village Information Systems rather than the development of an integrated platform with broader Smart Village features. Based on these limitations, this study positions its novelty in the integration of digital administrative services, community complaints, budget transparency, village information, and BUMDes marketplace features within one web-based system for Temesi Village.

3.Methods

This study uses the Software Development Life Cycle (SDLC) method with the Waterfall development model. This model was selected because it has systematic and sequential stages, starting from requirements analysis, system design, implementation, testing, deployment, and maintenance as show Figure 1. This approach is suitable for developing a web-based Village Information System because each system requirement can be analyzed before entering the design and application development stages[14].

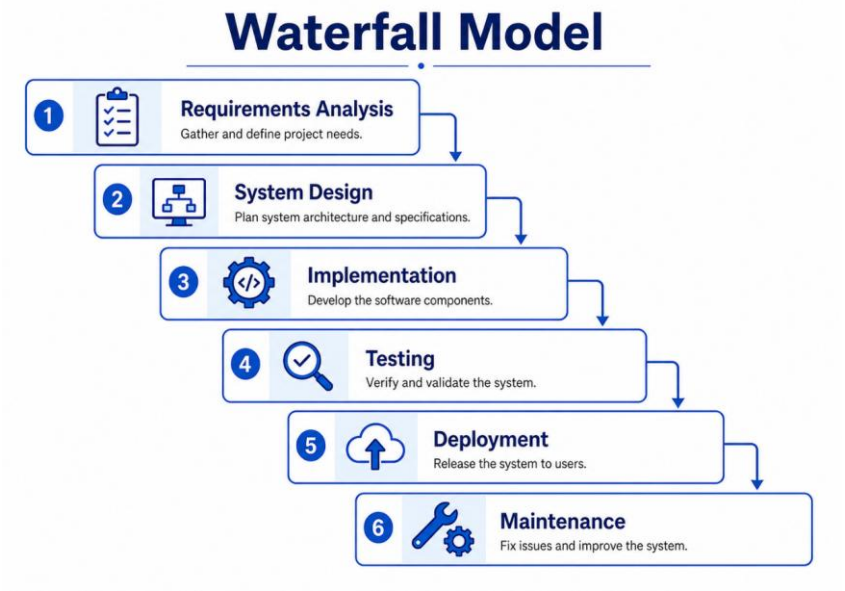

Figure 1. Waterfall development model

A. Research Location. This research was conducted in Temesi Village, Gianyar Regency. This location was selected because the community service and reporting processes in the village are still carried out manually. Residents still submit reports through the head of the hamlet, which are then forwarded to the relevant parties. This condition becomes the basis for developing a web-based Village Information System to support digital public services and the implementation of the Smart Village concept[15], [16].

B. **Research Data.** The data were collected through interviews, Focus Group Discussions, and direct observation of village service processes. Interviews with the Head of Temesi Village and village officials were conducted to identify service workflows, administrative problems, and system requirements. Focus Group Discussions with village officials and community representatives were used to validate user needs, feature priorities, and service issues. Observation was conducted on manual service processes, including administrative requests, community reporting, village information delivery, and BUMDes product management. The usability evaluation involved 50 respondents, consisting of 6 information technology experts, 4 village officials, and 40 village residents. The respondents were selected based on their relevance to system usage. IT experts assessed technical usability, village officials represented system administrators,

and residents represented end users of public services, information access, complaint features, and the BUMDes marketplace[17].

C. System Development Stages. System development was carried out using the Waterfall model, which consists of several main stages: requirements analysis, system design, implementation, testing, deployment, and maintenance. In the requirements analysis stage, the functional and non-functional requirements of the system were identified. Functional requirements included population data management, administrative services, community reporting, village information, and BUMDes e-commerce services. Meanwhile, non-functional requirements included data security, ease of use, system performance, and accessibility for both village officials and residents[18].

The system design stage was carried out by designing the system workflow, database structure, and user interface. The system workflow was designed using a flowchart, while the database design was created using an Entity Relationship Diagram (ERD)[19]. The user interface was designed to be simple and informative so that it could be easily used by village officials and residents.

D. System Implementation. System implementation was carried out by converting the previously designed system into a web-based application. The system was developed using the Laravel framework with a MySQL database. The architecture used was Model-View-Controller (MVC) [20], which separates system logic, interface display, and data management.

The Temesi Village Information System was developed into several main modules, namely the authentication and user management module, population data module, letter service module, request validation module, community reporting module, village information module, and BUMDes e-commerce module. The system interface was developed using HTML, CSS, JavaScript, and Bootstrap to make the website more responsive and user-friendly[21].

Because the system manages population data, several security mechanisms were applied. User authentication was implemented to ensure that only registered users could access the system. Role-based access control was used to separate administrator and resident permissions. Passwords were stored using hashing mechanisms, while input validation was applied to reduce the risk of invalid data submission and injection attacks. The system also applied session management and Cross-Site Request Forgery protection to secure form submissions. In addition, access to sensitive population data was limited to authorized administrators to maintain data confidentiality and integrity.

E. System Testing and Evaluation. System testing was conducted to ensure that the developed system functioned according to user requirements. The testing process consisted of several stages, namely unit testing, integration testing, system testing, and User Acceptance Testing (UAT)[22].

Unit testing was conducted to test each feature or module separately. Integration testing was conducted to ensure that each module could be properly connected and exchange data effectively[23]. System testing was conducted to test the overall system under conditions resembling actual use. The testing method used was black-box testing, which evaluates the suitability of inputs and outputs without directly examining the program code[24]. In addition, UAT was conducted by involving village officials as the main users to determine whether the system met the operational needs of the village.

System usability was evaluated using the System Usability Scale (SUS) instrument. This instrument was used to measure the level of ease of use, convenience, and user acceptance of the system. The system was considered feasible if it obtained a minimum SUS score of 70 or was categorized as good.

F. System Deployment and Maintenance. After the system had been tested, the next stage was system deployment in the village operational environment. The website was uploaded to a server or hosting service so that it could be accessed by village officials and residents. In addition, domain and SSL configuration were carried out to support secure system access.

Village officials were provided with training on how to use the system, such as managing population data, processing administrative services, responding to community reports, managing village news, and managing BUMDes e-commerce services. After the system was implemented, maintenance was carried out periodically to ensure that the system continued to run properly. System maintenance included performance monitoring, error or bug fixing, feature updates, and system adjustments based on village needs. Through these stages, the web-based Village Information System is expected to support digital public services, accelerate community reporting, and promote the implementation of the Smart Village concept in Temesi Village.

4. Results and Discussion

Results of System Requirement Analysis

The requirement analysis was conducted through interviews with the Head of Temesi Village, Focus Group Discussions with village officials, and community representatives. The results showed that village services, including administrative requests, community reporting, and information dissemination, were still managed manually. This condition caused service inefficiency, limited information access, and reduced digital transparency.

Based on these findings, the system was designed to meet functional and non-functional requirements. The functional requirements include user authentication, population data management, administrative letter requests, service validation, village information publication, citizen complaints, BUMDes marketplace, and service status tracking. The non-functional requirements include security, performance, usability, reliability, scalability, portability, and accessibility.

Results of System Design

System design was developed by converting user requirements into technical designs, including system architecture, data flow, database structure, and user interface. The system uses the Model-View-Controller (MVC) architecture in Laravel to separate business logic, data management, and interface display, making the system easier to develop and maintain.

The data flow was modeled using a Context Diagram and Data Flow Diagram (DFD) as show Figure 2. The system involves two main actors: residents and village administrators. Residents can register, submit service requests, provide feedback, access village information, and view BUMDes products. Meanwhile, village administrators manage verification, service processing, village information, and system data updates.

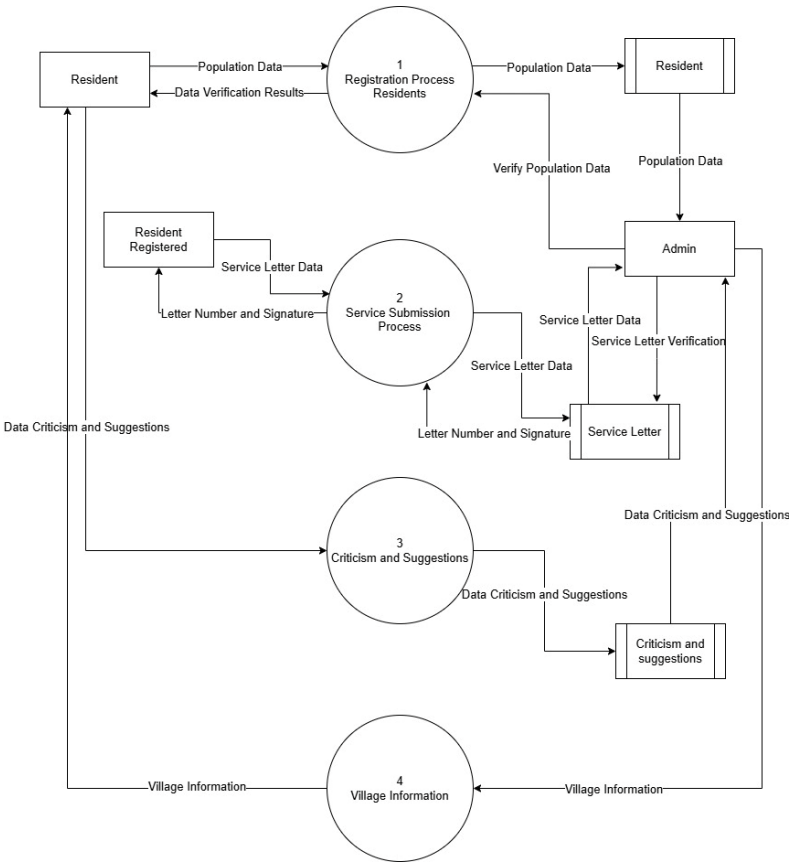

Figure 2. Data Flow Diagram (DFD)

Results of System Implementation

The Temesi Village Information System was successfully implemented as a web-based application using Laravel, MySQL, and MVC architecture. The system was designed with a responsive interface, allowing access through computers and mobile devices as show Figure 3 and 4.

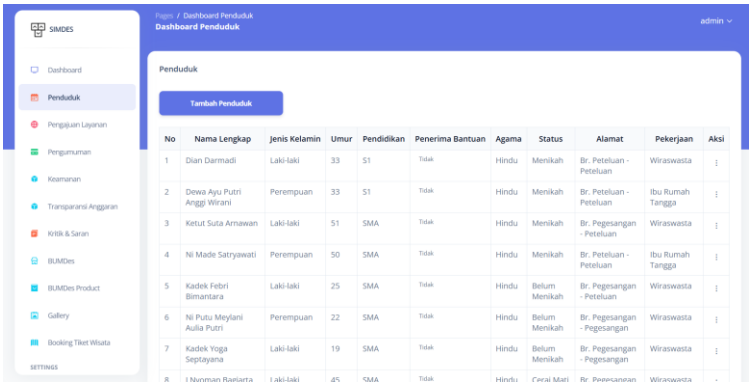

Figure 3. Resident page

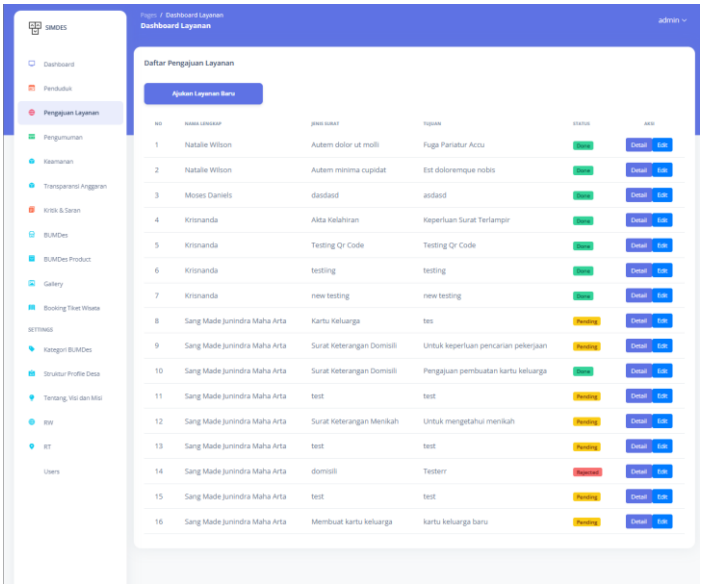

Figure 4. Service page

The implementation of these features shows that the system does not only function as a village information medium, but also as a digital public service platform and a tool to strengthen the village economy through the BUMDes marketplace. Through this system, residents can access village information, submit service requests, monitor request status, and view village products more easily.

Functional Testing Results

Functional testing was conducted using the black-box testing method to ensure that each feature worked according to its intended function. Testing was performed on the login page, administrator page, and user page. The results showed that login validation, role-based access control, administrator features, and user features operated successfully according to the test scenarios. Additional black-box testing was also conducted to evaluate error-handling conditions, including invalid input, failed login, duplicate data, unauthorized access, unsupported file uploads, and incorrect status checking. The results indicated that the system responded properly to both valid and invalid user actions, demonstrating that the system meets functional requirements and provides basic protection against incorrect data entry and unauthorized access summarized in the table 2.

Table 2. Black-box Testing

No.	Tested Feature	Testing Scenario	Expected Result	Status
1	Main Page	The user opens the user main page	The system displays the main page	Successful
2	Population Data	The user opens the population data page	The system displays the population data page	Successful
3	Population Data Search	The user searches for population data	The searched resident's name is displayed	Successful
4	Population Data Filter	The user filters population data	The population data is successfully filtered	Successful
5	Village Statistics	The user opens the village statistics page	The system displays the village statistics page	Successful
6	Announcements	The user opens the announcements page	The system displays the announcements page	Successful
7	Failed Login	User enters incorrect email or password	The system rejects login and displays an error message	Successful
8	Empty Login Field	User submits login form with empty fields	The system displays validation messages	Successful

9	Role-Based Access	Resident attempts to access the administrator page	The system denies access and redirects the user	Successful
10	Duplicate Population Data	Admin inputs an existing resident identification number	The system rejects duplicate data or displays a warning	Successful
11	Invalid Population Data	Admin enters incomplete or invalid resident data	The system displays input validation messages	Successful
12	Empty Service Request Form	User submits a service request without required fields	The system prevents submission and displays required field warnings	Successful
13	Invalid File Upload	User uploads an unsupported file format	The system rejects the file and displays an error message	Successful
14	Request Status Check with Invalid Data	User enters incorrect identity data when checking request status	The system does not display unrelated service data	Successful
15	Community Complaint Submission	User submits a complaint with incomplete information	The system displays validation messages	Successful

Results of Usability Testing

Usability testing was conducted using the System Usability Scale (SUS) to evaluate the ease of use, convenience, and user acceptance of the Temesi Village Information System. The test involved 50 respondents consisting of village residents, village officials, and information technology experts. The SUS instrument used 10 statements with a Likert scale from 1 to 5 summarized in the table 3.

The results showed that the system obtained an average SUS score of 86.15, categorized as Excellent and within the Acceptable level. Based on respondent groups, IT experts gave an average score of 90.83 (Best Imaginable), village officials gave 83.75 (Excellent), and village residents gave 85.69 (Excellent). These results indicate that the system is easy to use, acceptable to users, and highly feasible for supporting digital village services. The SUS score was calculated using the standard procedure, where odd-numbered items were scored by subtracting 1 from the respondent's score, while even-numbered items were scored by subtracting the respondent's score from 5. The total score was then multiplied by 2.5 to obtain the final score on a scale of 0 to 100.[25].

Table 3. Usability testing

Respondent Group	Number of Respondents	Average SUS Score	Interpretation
Respondent Group	6	90.83	Best Imaginable
Information Technology Experts	4	83.75	Excellent
Village Officials	40	85.69	Excellent
Village Residents	**50**	**86.15**	**Excellent**

Discussion

The results indicate that the developed system addresses the main service problems in Temesi Village by transforming manual administrative workflows into integrated digital services. Compared with previous Village Information System studies that mainly focused on correspondence services or information publication, this system provides broader integration by combining administrative service requests, service status tracking, community complaints, budget transparency, village information, and BUMDes marketplace features in one platform.

This integration is the main contribution of the study because it supports not only administrative efficiency but also public transparency, citizen participation, and local economic empowerment.

The SUS score of 86.15 indicates that the system has a high level of usability and user acceptance. The score from information technology experts was the highest, indicating that the system interface and interaction flow were considered technically acceptable. Village officials also gave an Excellent score, showing that the system was suitable for administrative workflows. The score from village residents indicates that the system was generally easy to understand and use by end users. However, several lower individual scores suggest that some users may still need guidance, especially users with limited digital literacy. Therefore, user training and simple user manuals remain necessary during system deployment.

Although the system achieved successful functional and usability results, several limitations should be acknowledged. First, the system was evaluated in a limited village context, so the results may not be directly generalized to other villages with different administrative workflows or infrastructure conditions. Second, black-box testing focused mainly on functional behavior and basic error handling, while advanced security, performance, and load testing were not yet conducted. Third, BUMDes transactions were still directed through WhatsApp, so the system has not yet provided a complete end-to-end e-commerce transaction mechanism. These limitations provide opportunities for future development, including mobile application development, integration with government systems, real-time notifications, stronger security testing, and artificial intelligence-based service assistance.

5. Conclusions

This study developed an integrated web-based Village Information System based on the Smart Village concept for Temesi Village. The system was designed to address manual public service processes, limited information access, and the absence of integrated community reporting and village economic service features. The main contribution of this study lies in the integration of administrative service requests, service status tracking, community complaints, village information, budget transparency, and BUMDes marketplace features within a single platform.

The functional testing results showed that the main system features worked according to the expected scenarios. In addition, usability testing involving 50 respondents obtained an average System Usability Scale score of 86.15, categorized as Excellent. These findings indicate that the system is functionally feasible, easy to use, and acceptable to village officials, residents, and information technology experts.

Practically, the system can support Temesi Village in improving service efficiency, strengthening information transparency, facilitating community participation, and promoting village economic activities through digital BUMDes services. However, this study is limited to functional and usability evaluation in one village context. Future development should include mobile application implementation, integration with regional or national government systems, real-time notifications, stronger data security testing, user experience evaluation, and artificial intelligence-based chatbot assistance for digital public services.

References

[1] S. Abubakr Muntaka, J. K Appiah, and H. Said, “Evolution of Information Technology in Industry: A Systematic Literature Review,” *Issues in Informing Science and Information Technology*, vol. 21, p. 007, 2024, doi: 10.28945/5316.

[2] I. M. Suardika Dedi, I. Made Candiasa, and D. G. H. Divayana, “Analisis Kesuksesan Sistem E-Kinerja Pada Satuan Kerja Menggunakan Enhanced Information System Success Model,” *KLIK: Kajian Ilmiah Informatika dan Komputer*, vol. 4, no. 4, 2024, doi: 10.30865/klik.v4i4.1634.

[3] I. P. Y. Agus Ariwanta, I. G. T. Eka Saputra, N. P. E. Apriyanthi, I. M. A. O. Gunawan, and G. Indrawan, "Analisis Kepuasan Pengguna Menggunakan Metode EUCS Pada Sistem Computer Based Test di Institusi Pendidikan," *Journal of Computer System and Informatics (JoSYC)*, vol. 4, no. 4, pp. 942–951, Aug. 2023, doi: 10.47065/josyc.v4i4.3752.

[4] M. Ariansidi, I. M. Candiasa, I. Made, and G. Sunarya, "Analisis Usability Pada Sistem Informasi LAPORBUP Menggunakan Performance Measurement, Retrospective Think Aloud dan User Experience Questionnaire," *KLIK: Kajian Ilmiah Informatika dan Komputer*, vol. 3, no. 6, pp. 754–764, 2023, doi: 10.30865/klik.v3i6.807.

[5] I. G. P. A. A. Putra, I. M. Candiasa, and I. N. Sukajaya, "Usability Evaluation of the Undiksha Letter Management System Website Using Performance Measurement, Think Aloud, And Mouse Tracking Methods," *Jurnal Nasional Pendidikan Teknik Informatika (JANAPATI)*, vol. 14, no. 3, pp. 616–624, Dec. 2025, doi: 10.23887/janapati.v14i3.100659.

[6] A. S. Madaki, K. Ahmad, and D. Singh, "Information technology integration implementation in public sector organizations: Exploring challenges, opportunities, and future trends," *Information Development*, May 2024, doi: 10.1177/02666669241255661.

[7] I. G. M. S. Dwipayana, I. M. Candiasa, and L. J. E. Dewi, "Usability Evaluation of Lecturer Information System in ITB STIKOM Bali," *sinkron*, vol. 9, no. 1, pp. 149–159, Jan. 2025, doi: 10.33395/sinkron.v9i1.14315.

[8] I. N. G. A. Y. Putra, I. M. Candiasa, and L. J. E. Dewi, "Usability Evaluation of SIDUMAS Badung Using Think Aloud, Heuristic Evaluation and SUS," *Sinkron*, vol. 8, no. 1, pp. 368–379, Jan. 2023, doi: 10.33395/sinkron.v8i1.12034.

[9] Z. Avtalion, I. Aviv, I. Hadar, G. Luria, and O. Bar-Gil, "Digital Infrastructure as a New Organizational Digital Climate Dimension," *Applied Sciences*, vol. 14, no. 19, p. 8592, Sep. 2024, doi: 10.3390/app14198592.

[10] J. E. Pujiantoro, A. N. Saputra, A. M. Leksono, and S. Setiawan, "Perancangan Sistem Informasi Desa (Sidesaka) Berbasis Web Pada Desa Karangsalam Kecamatan Kemranjen Kabupaten Banyumas," *Abditeknika Jurnal Pengabdian Masyarakat*, vol. 3, no. 1, pp. 23–31, Apr. 2023, doi: 10.31294/abditeknika.v3i1.1756.

[11] I. G. N. Swala Putra, I. P. Satwika, and I. G. J. Eka Putra, "Rancang Bangun Sistem Informasi Manajemen Administrasi Desa Berbasis Web Menggunakanan Framework Laravel," *Jutisi : Jurnal Ilmiah Teknik Informatika dan Sistem Informasi*, vol. 9, no. 2, p. 163, Aug. 2020, doi: 10.35889/jutisi.v9i2.522.

[12] A. Andriyus, M. A. Ash Shiddiqy, S. Juliana, N. Riyanti, and M. R. Azzaki, "Evaluasi Sistem Informasi Desa Menuju Desa Mandiri di Kecamatan Singingi Hilir Kabupaten Kuantan Singingi," *Jurnal Ilmiah Muqoddimah : Jurnal Ilmu Sosial, Politik, dan Humaniora*, vol. 9, no. 2, p. 613, May 2025, doi: 10.31604/jim.v9i2.2025.613-620.

[13] A. Syiroh Auliya, L. Ariyani, L. Deby, and M. Putri, "PROBLEMATIKA SISTEM INFORMASI DESA DALAM KETERBUKAAN INFORMASI PUBLIK," *Jurnal Ilmu Administrasi dan Studi Kebijakan (JIASK)*, 2025, doi: https://doi.org/10.48093/jiask.v8i1.327.

[14] R. S. Ghumatkar and A. Date, "Software Development Life Cycle (SDLC)," *Int. J. Res. Appl. Sci. Eng. Technol.*, vol. 11, no. 11, pp. 1162–1165, Nov. 2023, doi: 10.22214/ijraset.2023.56554.

[15] A. I. Stoumpos, F. Kitsios, and M. A. Talias, "Digital Transformation in Healthcare: Technology Acceptance and Its Applications," *Int. J. Environ. Res. Public Health*, vol. 20, no. 4, p. 3407, Feb. 2023, doi: 10.3390/ijerph20043407.

[16] K. Mahendra, I. M. A. Wirawan, and I. M. G. Sunarya, "OPTIMALISASI SISTEM PENDUKUNG KEPUTUSAN BERBASIS WEBSITE UNTUK PENENTUAN PRIORITAS PENERIMA BANTUAN BENIH DENGAN KOMBINASI METODE ROC DAN WPM," *Jurnal Informatika dan Teknik Elektro Terapan*, vol. 13, no. 3S1, Oct. 2025, doi: 10.23960/jitet.v13i3S1.7693.

[17] P. A. Antara, I Gede Sudirtha, and Made Agus Wirawan, "Digitalisasi Manajemen dan Pemasaran Produk Seni Kerajinan Songket dan Endek Penglatan," *International Journal of Community Service Learning*, vol. 9, no. 1, pp. 150–157, Feb. 2025, doi: 10.23887/ijcsl.v9i1.89277.

[18] P. Made, M. Pramadewi, I. Made, A. Wirawan, and G. Indrawan, "Bulletin of Social Informatics Theory and Application Website quality evaluation using fuzzy AHP and importance-performance analysis," vol. 9, no. 1, pp. 13–27, 2025, doi: 10.31763/businta.v9i1.769.

[19] P. Skavantzos and S. Link, "Entity/Relationship Graphs: Principled Design, Modeling, and Data Integrity Management of Graph Databases," *Proceedings of the ACM on Management of Data*, vol. 3, no. 1, pp. 1–26, Feb. 2025, doi: 10.1145/3709690.

[20] M. H. Rahman, M. Naderuzzaman, M. A. Kashem, B. M. Salahuddin, and Z. Mahmud, "Comparative Study: Performance of MVC Frameworks on RDBMS," *International Journal of Information Technology and Computer Science*, vol. 16, no. 1, pp. 26–34, Feb. 2024, doi: 10.5815/ijitcs.2024.01.03.

[21] R. Y. Kasenda, J. O. Tenda, E. W. R. Iman, J. A. M. Manantung, Z. J. S. Moekari, and M. C. Pantas, "The Role and Evolution of Frontend Developers in the Software Development Industry," *Jurnal Syntax Admiration*, vol. 5, no. 11, pp. 5191–5196, Dec. 2024, doi: 10.46799/jsa.v5i11.1852.

[22] D. Febrianti, A. Hadi, Y. Hendriyani, and G. Farell, "Rancang Bangun Sistem Informasi Quality Control Berbasis User Acceptance Testing (UAT) Untuk Project Digital Pada PT ARG Solusi Teknologi," *Voteteknika (Vocational Teknik Elektronika dan Informatika)*, vol. 12, no. 2, p. 225, Jun. 2024, doi: 10.24036/voteteknika.v12i2.128680.

[23] I. G. P. Yada Giri, L. J. E. Dewi, and I. M. G. Sunarya, "The Evaluation of Usability and Website Development using Cognitive Walkthrough, Performance Measurement, and System Usability Scale," *Journal of Computer Networks, Architecture and High Performance Computing*, vol. 5, no. 2, pp. 503–514, Jul. 2023, doi: 10.47709/cnahpc.v5i2.2511.

[24] S. O. Barraood, H. Mohd, F. Baharom, and A. Almogahed, "Verifying Agile Black-Box Test Case Quality Measurements: Expert Review," *IEEE Access*, vol. 11, pp. 106987–107003, 2023, doi: 10.1109/ACCESS.2023.3320576.

[25] R. M. A. Putri, W. G. S. Parwita, I. P. S. Handika, I. G. I. Sudipa, and P. P. Santika, "Evaluation of Accounting Information System Using Usability Testing Method and System Usability Scale," *Sinkron*, vol. 9, no. 1, pp. 32–43, Jan. 2024, doi: 10.33395/sinkron.v9i1.13129.