

Original Paper

Empowering Rural Service Governance Through Digital Transformation of the BUMDESA Administration System (SIDARSA) in Sumbersekar Village

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Abstract

Village-Owned Enterprises (BUMDes) governance in Indonesia often faces obstacles, including limited human resource capacity, unclear division of labor, and manual, paper-based archiving and financial recording. These constraints create inefficiency, increase document-damage risks, and weaken operational accountability, as observed at BUMDes Sumbersekar, Dau Subdistrict, Malang Regency. This study designs, tests, and analyzes the web-based BUMDESA Administration System (SIDARSA) to modernize administrative governance and improve rural public services. The study employed Research and Development (R&D) combined with a descriptive qualitative approach through four stages: preliminary study and needs analysis; product design, including governance and software architecture; product testing and validation; and evaluation and refinement based on six pillars of good governance: cooperative, participatory, emancipative, transparent, accountable, and sustainable. Media and material expert validation confirmed that SIDARSA is feasible for implementation. User acceptance testing showed that SIDARSA reduced daily administrative processing time by 79.07%, from an average of 6.45 minutes to 1.35 minutes. It also reduced monthly paper consumption by 84%, from approximately 1,250 sheets to 200 sheets. These findings demonstrate improved efficiency, transparency, financial accountability, and administrative service effectiveness at BUMDes Sumbersekar, while reducing dependence on physical documentation and supporting more sustainable village enterprise governance.

Keywords: BUMDes, E-Service, Good Governance, Paperless, SIDARSA, Village Governance.

JEL Classification: H83, L32, L86

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1. Introduction

Law Number 6 of 2014 on Villages and Government Regulation Number 43 of 2014, subsequently revised by Government Regulation Number 47 of 2015, provide a strong legal foundation and financial support for village governments in Indonesia (Latif et al., 2025).

Through the Village Fund (DD) sourced from the State Revenue and Expenditure Budget (APBN) and the Village Fund Allocation (ADD) sourced from the Regional Revenue and Expenditure Budget (APBD) of regencies/cities, the government encourages villages to optimize local economic potential and improve community welfare (Andrini et al., 2024). One strategic instrument within this framework is the Village-Owned Enterprise (BUMDESA), which supports economic development and provides services for village communities (Akbar et al., 2022; Mudrifah & Widyastuti, 2020).

Institutionally, BUMDESA has dual characteristics: a social entity that provides services to the community and a business entity oriented toward increasing Village Original Revenue (PADes) (Madjid et al., 2022). This dual role demands effective governance, a clear organizational structure and division of tasks, and adequate management capacity so BUMDESA activities can run sustainably (Latif et al., 2025; Mudrifah & Widyastuti, 2020; D. W. Prasetyo, 2020; Titania & Utami, 2021).

Several empirical studies show that applying BUMDESA governance principles in Indonesia still faces obstacles, particularly in sustainability, community participation, and financial reporting accountability (Titania & Utami, 2021). Limited innovation, operational inefficiency, and weak transparency and administrative management can hinder BUMDESA development and reduce community trust (Madjid et al., 2022). Therefore, strengthening Governance and modernizing the administrative system are needed to support BUMDESA's operational sustainability (P. C. A. Sari & Wijayanti, 2022).

This governance problem was also found in Village-Owned Enterprises (BUMDES) Sumbersekar, Dau District, Malang Regency, since the initial planning stage of its establishment (Abbas et al., 2024). The results of the partner condition identification show several main obstacles: low community interest in responding to the socialization process, differences in perception among community elements, limited governance documents, and the absence of an optimally functioning technical supervision mechanism (Mudrifah & Widyastuti, 2020). This condition shows that the problem of BUMDes Sumbersekar is not only institutional but also reflects the fact that a structured administrative and management system has not yet been built. In the administrative aspect, transaction recording and archiving at BUMDes Sumbersekar still rely on paper-based documents. This system causes documents to pile up, become difficult to trace, and risk damage or loss. This can ultimately slow administrative processes, limit access to information, and reduce the transparency of BUMDes services to the community (Rachmi et al., 2022).

To address these institutional and administrative obstacles, digital transformation through a web-based service system is a strategic approach to modernizing BUMDESA governance (Maharani & Ulfa, 2022). Digital platforms can simplify administrative processes, speed up data processing, integrate transaction recording, and improve access to information for village governments, BUMDESA managers, and communities (Hidayat et al., 2026). Implementing a structured digital system can also reduce dependence on physical archives and build a more sustainable administrative mechanism. In addition to improving service efficiency, this system can be developed and applied to other BUMDESA facing similar governance and administrative problems. Thus, digitalization is not only a technical solution but can also support stronger institutional capacity and sustainable community empowerment (N. M. P. Sari et al., 2025).

Based on these problems, this research designs and analyzes the implementation of a web-based BUMDESA Administration System (SIDARSA) to address governance challenges and archive modernization at BUMDes Sumbersekar. The development of SIDARSA integrates structured governance design, including the preparation of a payment structure, clarity in the division of tasks, and supervision indicators, with a web-based application interface consisting of back-end and front-end components. Through the implementation of SIDARSA, BUMDes Sumbersekar is expected to be able to strengthen good governance principles, namely cooperative, participatory, emancipative, transparent, accountable, and sustainable, while reducing the risk of manual recording errors and improving the quality of administrative services to the community.

2. Literature Review

The Concept of BUMDes Governance

Conceptually, BUMDes is a legal entity formed by the village government and the community to manage local business potential, utilize assets, and provide public services (Latif et al., 2025). Unlike purely private business entities, BUMDes has a dual role: profit-oriented to generate Village Original Revenue (PADes) and socially oriented to improve resident welfare (Madjid et al., 2021). The legal basis for establishing BUMDes is Government Regulation Number 11 of 2021 and other technical village institutional regulations that require clear organizational structures (Mudrifah & Widyastuti, 2020). However, empirical findings confirm that BUMDes effectiveness is often hindered by internal problems such as stagnant administrator performance, a lack of business-unit initiative, and weak planning based on village potential (Titania & Utami, 2021). Therefore, strengthening governance is the most crucial foundation for this institution to drive the rural economy sustainably. Thus, the dualism of BUMDes's role as both profit-oriented and social-oriented is not unique to Indonesia, but aligns with the global trend of "hybrid organization" in rural economic development (Wulandari & Wardani, 2024). Nevertheless, this convergence between business logic and social logic often creates internal tension because limited institutional capacity and human capital at the village level make it difficult for many BUMDes to balance these two orientations effectively (Fauzi & Ramadhan, 2024).

Good Governance Principles in the Village Sector

Good governance principles are the main benchmark for assessing the quality of BUMDes institutional governance (Latif et al., 2025). The ideal governance concept integrates six main pillars, namely cooperative, participatory, emancipative, transparent, accountable, and sustainable (Mudrifah & Widyastuti, 2020). Grindle (2004), in his highly influential article in the journal governance, argues that a comprehensive good governance agenda often exceeds the real institutional capacity in developing countries, so he proposes the concept of good enough governance: the prioritization of the most essential governance elements according to local readiness and resources, instead of forcing all pillars simultaneously and ideally. This perspective is relevant for BUMDes, given that limited human resources and institutional capacity at the village level make simultaneous application of the six governance pillars difficult in the short term, so the strengthening strategy needs to be gradual. The division of structural functions, including supervisory, managerial, compliance, internal audit, advisory, external audit, and monitoring functions, must be documented in a job description (P. C. A. Sari & Wijayanti, 2022). A study by Widiastuti et al. (2019) revealed that most BUMDes failures are triggered by the low level of applicability of governance documents, particularly financial accountability and internal supervision documents. The availability of structured governance guidelines, balanced with compliance by operational implementers, has been shown to prevent potential irregularities and increase public trust.

Digitalization of E-Service Public Services

Developing electronic government (e-government) at the village level through a web-based e-service system is a transformative step toward modernizing archiving and community services (Millah et al., 2023). Conventional paper-based recording methods have proven inefficient because they take a long time to process files and are prone to damage, document loss, and archive buildup. A web-based village service information system facilitates direct interaction between the community and officials through an integrated mechanism (Koswara, 2025; Tsaqif et al., 2025). Implementing an integrated digital platform also shortens the system development workflow, eases database management, and improves access to village announcements and services (Prasetyo & Dhaniawaty, 2020).

E-service is academically defined as an act, effort, or performance delivered through information technology (Rowley, 2006), including services provided through electronic networks with interactivity and integration with the service provider's organizational processes. In the public sector, e-service positions government institutions as service providers and the community as service recipients, with the internet as the main distribution channel (Rowley, 2006). Theoretically,

this transition can be explained through the four-stage model (Layne & Lee, 2001), one of the most widely cited frameworks in the international e-government literature, which divides the evolution of government digitalization into the stages of cataloging (online information provision), transaction (electronic service processing), vertical integration, and horizontal integration between institutions. In this framework, paperless is not the final goal of digitalization, but a prerequisite at the initial stage that opens the way to more mature data integration. Nevertheless, it is important to question the assumption that implementing a digital system automatically eliminates dependence on physical documents. Sellen and Harper (2003), in their classic study on the myth of the paperless office, show that the transition to paperless is often more complex than assumed, because bureaucratic work practices tend to keep physical documents as tools of verification and social legitimacy even when digital systems are already available.

Institutional Financial Accountability Transparency

Transparency and accountability in reporting are two fundamental aspects that determine the success of public administration governance at the village level (Arifin & Permana, 2025). Transparency is realized through open access to information on program preparation, business activity implementation, and financial performance results (N. M. P. Sari et al., 2025). Meanwhile, accountability demands real-time transaction recording, a clear separation of financial functions, and a periodic accountability mechanism in the Village Deliberation forum (Putri et al., 2022). An integrated, technology-based recording system can eliminate data-manipulation loopholes, ease supervision by the Village Consultative Body (BPD) and village government, and ensure that BUMDes can make a real contribution to regional revenue and community independence (Akbar et al., 2022).

Village Governance

Village governance refers to the exercise of political, administrative, and economic authority at the smallest level of government closest to the community. Theoretically, this concept is rooted in the broader decentralization literature. Faguet (2014) argues that decentralizing authority to the local level can increase government accountability and responsiveness to the community. However, this effect depends on the extent to which local political competition and institutional capacity function. In the Indonesian context, Bebbington et al. (2006) show that the effectiveness of village governance largely depends on local capacity, including leadership quality, social capital, and the administrative capability of the village apparatus, which interacts with the broader economic-political structure. This finding is reinforced by Antlöv et al. (2016), who analyzed longitudinal data from forty villages in Indonesia and concluded that the Village Law (Law No. 6/2014) has the potential to increase the responsiveness of village governments, but only if supported by a strong financial management system, new national institutions, and citizen participation that is genuinely empowered, not merely the formal granting of authority.

Critically, these two studies affirm that decentralizing authority to villages does not automatically produce good governance if it is not balanced by strengthening local institutional capacity. This perspective also aligns with the findings of Annahar et al. (2023), who found that the inclusiveness of decentralized village governance in Indonesia is still hindered by limited accessibility, unequal space for participation, and uneven village government effectiveness across regions. This critical view is relevant for understanding why the existence of formal regulations (such as Government Regulation Number 11 of 2021 concerning BUMDes) does not necessarily guarantee the effectiveness of BUMDes governance or village digital service systems, because both equally depend on the real capacity of village apparatus and communities to carry out this governance mandate. In other words, village governance serves as the conceptual umbrella covering both BUMDes institutional governance and the transformation of digital-based public services, because both are operational instruments in strengthening village government capacity as a whole.

3. Method

Research Model and Approach

This study uses a Research and Development (R&D) approach combined with a descriptive qualitative method (Wang & Hannafin, 2005). The R&D approach is applied to design, develop,

test, and evaluate a product in the form of the web-based BUMDESA Administration System (SIDARSA) at the BUMDes Sumbersekar office, Dau Subdistrict, Malang Regency. This study uses a descriptive qualitative method to map the objective conditions of institutional governance, identify obstacles in conventional paper-based archiving, and analyze the readiness of local human resources (HR).

R&D Development Procedure

The R&D procedure in the development of the SIDARSA product was carried out through 4 (four) main stages adapted to the needs of developing a rural information system (Rachmi et al., 2022):

- A. Preliminary Study and Needs Analysis (Research and Information Collecting): This stage focuses on analyzing the initial conditions of BUMDes Sumbersekar's administration and governance. Activities include identifying manual recording inefficiencies, building up paper-based documents, analyzing communication obstacles between admin and technicians, and mapping functional needs for the front-end interface (BUMDes technicians) and back-end (BUMDes admin).
- B. Product Planning and Design: At this stage, the main system components are designed, namely the SIDARSA software architecture, including UML modeling (use case and activity diagrams), database design using an Entity Relationship Diagram (ERD), and a prototype of the e-service web application interface.
- C. Product Testing and Implementation: The developed information system product was tested directly at the operational scale of BUMDes Sumbersekar. Testing covered the front-end interface to measure ease of access for technicians, as well as back-end testing by BUMDes admin managers to ensure transaction recording occurs in real time, transparently, and without the risk of file damage.
- D. Product Revision and Evaluation: The final R&D stage measures the effectiveness of product applicability based on the six pillars of good governance, namely cooperative, participatory, emancipative, transparent, accountable, and sustainable. User input during the trial serves as the basis for revising the program algorithm, refining the digital archiving flow, and clarifying managers' job descriptions.

Data Collection Techniques

Research data were collected comprehensively using three main techniques, namely:

- A. Observation: Direct observation of the public service workflow, BUMDes business transaction recording, and paper-based archive management at BUMDes Sumbersekar to document operational obstacles and digitalization needs.
- B. In-depth Interview: Conduct structured and unstructured interviews with village officials, business unit heads, and BUMDes Sumbersekar managers to gather aspirations on system needs and the effectiveness of the division of labor.
- C. Documentation and Literature Study: Systematically reviewing national regulatory documents (Law No. 6 of 2014, Ministerial Regulation of Villages No. 4 of 2015, and Government Regulation No. 11 of 2021).

Data Analysis Technique

Qualitative data were analyzed through data reduction, data presentation, and conclusion drawing/verification (Miles & Huberman, 1984). The R&D product was evaluated by comparing transparency, archiving accountability, and administrative service effectiveness before and after implementing the SIDARSA system at BUMDes Sumbersekar.

Quantitative Pre- and Post-Test Assessment

Quantitative measurement used a pre-test and post-test design with Task Completion Time (TCT) to compare the time to complete administrative tasks before and after implementing SIDARSA. Testing was conducted in 30 trials ($n = 30$) using the same tasks, including customer data search, meter recording, transaction verification, and document completion. Completion time was recorded in minutes and compared using the mean, standard deviation, time range, and percentage reduction. We then tested the difference in time before and after using a paired-samples t-test at α

= 0.05. To assess ease of use and user acceptance, we administered a System Usability Scale (SUS) after users completed tasks using SIDARSA. The SUS consists of 10 statements with a 1 to 5 Likert scale and produces a score of 0 to 100, with a higher score indicating better system usability and acceptance. Thus, the evaluation includes an objective indicator in the form of time efficiency and a user indicator in the form of system usability.

4. Results

Development Product Outcomes

The BUMDESA Administration System (SIDARSA) was designed as an innovative web-based solution to modernize the administrative and operational governance of business units at BUMDes Sumbersekar. The transformation from a conventional recording system to a centralized digital platform enables customer data management, transaction document recording, and financial reporting to be carried out in real time and in an integrated manner. The SIDARSA portal reinforces the village government's commitment to responsive, efficient service governance, and Maharani & Ulfa (2022) emphasize that the readiness and ease of access of the technology interface are key determinants of the success of adopting public service information systems at the rural level.

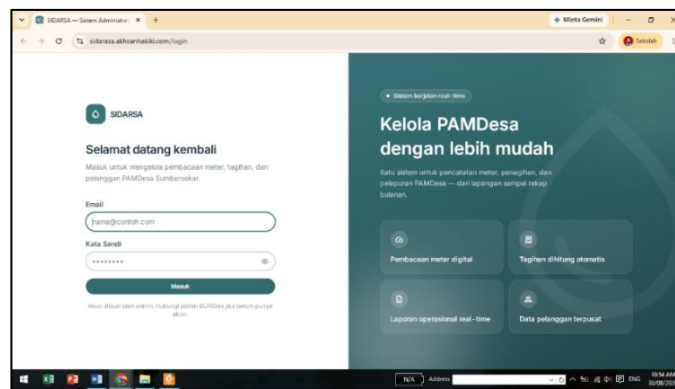


Figure 1. Login Page

The SIDARSA system includes several core modules designed to support the daily operations of BUMDes Sumbersekar managers. These modules include customer inventory, meter and billing recording, integrated report book recording, and an automatic archiving feature based on a structured database. The electronic archiving feature embedded in SIDARSA was also assessed as part of the product validation. The media expert assessment, which included the application interface, menu structure, and ease of use, scored 92%, indicating that the system was considered appropriate for the administrative activities of administrators and field technicians. Overall, the SIDARSA web application obtained an average expert validation score of 93.5%, categorized as "Very Good," and was considered feasible for implementation at BUMDes Sumbersekar.

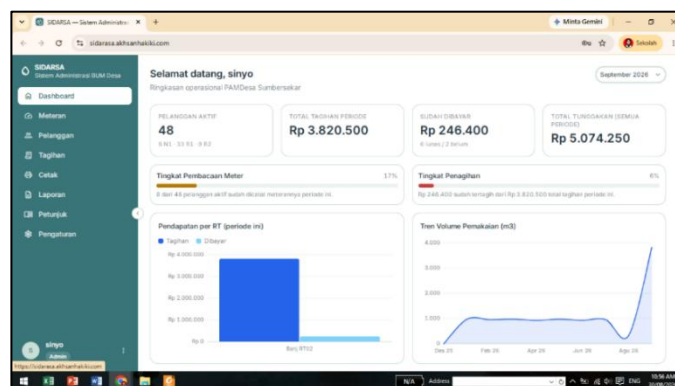


Figure 2. Admin Dashboard Menu

The SIDARSA web application interface prioritizes user-friendliness to ensure business unit managers with varying technical backgrounds can operate the system without significant operational obstacles. The menu layout is intuitive, with an informative dashboard visualization that directly monitors each business unit's financial performance.

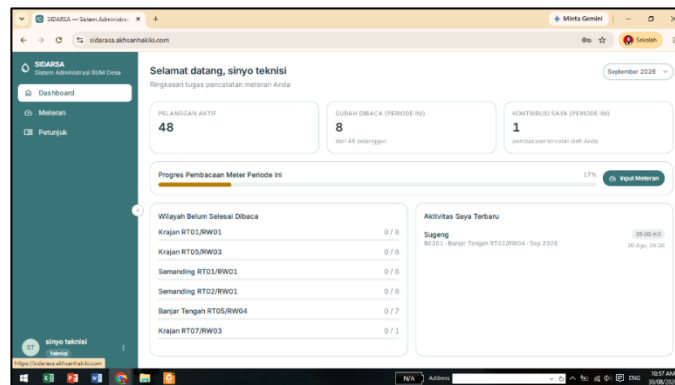


Figure 3. Technician Dashboard Menu

SIDARSA's implementation not only supports internal digitalization for administrators but also provides a strategic foothold for sustaining e-government services in the Sumbersekar Village environment. Reducing paper use (paperless) through the digital transaction receipt feature can significantly cut administrative operational costs.

Validation of the SIDARSA Product

The validation procedure for the SIDARSA web application was carried out comprehensively to test its feasibility before full implementation in BUMDes Sumbersekar's daily operations. This validation testing involved media experts and material experts. As Amirullah et al. (2023) also emphasize, a well-validated testing instrument ensures that the e-government being developed has met public administration regulatory standards and is ready to support institutional governance transparency. To determine the web application's functional feasibility, an expert validation test was conducted, as shown in Table 1 below.

Table 1. Expert Validation Results for SIDARSA

Validation	Percentage	Criteria
Material Expert	95%	Very Good
Media Expert	92%	Very Good
Average Score	93.5%	Very Good

Source: Data Processed by Researchers (2026)

Based on Table 1, the SIDARSA web application obtained an overall validation score of 93.5%, categorized as very good. The material expert assessment scored 95%, indicating that the payment transaction content and administrative procedures incorporated into the application were appropriate for the administrative system used at the BUMDes office. Meanwhile, the media expert assessment scored 92%, indicating that the application interface, menu structure, and ease of use were appropriate for administrative activities performed by administrators and field technicians. Based on these validation results, the SIDARSA web application was considered feasible for implementation at BUMDes Sumbersekar.

Product Trial

Before the product is used, a trial needs to be conducted to introduce and identify its strengths and weaknesses so that users already understand the product well when using it. The SIDARSA product trial (user acceptance test) was carried out directly, involving BUMDes administrators, namely admins and technicians. The product trial was divided into two stages: the product introduction trial and the product use trial. Table 2 below shows the results.

Table 2. Product Trial Results for SIDARSA

Trial Stage	Subject	Percentage	Criteria
Product Introduction	1 Admin and 1 Technician	88%	Strongly Agree
Product Use	2 Admins and 3 Technicians	97%	Strongly Agree
Average Score		92.5%	Strongly Agree

Source: Data Processed by Researchers (2026)

For the product trial, the team conducted a direct test involving 1 admin and 1 technician from BUMDes. The BUMDes technician simulated customer data entry, while the admin created digital payment receipts, recorded incoming and outgoing financial reports, and printed automated monthly financial reports. Feedback from the user trial was used as final evaluation material to improve the system's response speed and the neatness of the printed transaction receipt format.

In the daily operational trial scenario, the test results show that daily transaction processing time efficiency increased by 79.07% compared with manual ledger-based recording. This finding aligns with research by Saputra et al. (2024), which found that trials of village digital platforms increase financial data-processing efficiency and improve operational transparency. According to Churiyah et al. (2023), field-tested digital workflow optimization effectively minimizes repetitive administrative obstacles and improves the productivity of village operational staff. BUMDes administrators expressed high satisfaction with SIDARSA's performance, which was considered very helpful for bookkeeping accuracy and easing coordination between business units. This successful product trial supports Ariyanto et al. (2021), who concluded that adopting a web application that has been directly field tested is a crucial instrument for strengthening public trust in the accountability and professionalism of village business institutions.

Operational Efficiency Before and After SIDARSA Implementation

Before and after SIDARSA implementation, document retrieval and administrative processing time were measured through 30 transaction trials ($n = 30$). The activities included customer data retrieval, meter recording, and billing receipt processing.

Table 3. Document Completion Time Data

Measurement Indicator	Before Implementation (Manual)	After Implementation (SIDARSA)	Efficiency Difference
Average Search Time	6.45 minutes	1.35 minutes	Reduced by 5.10 minutes
Operational Time Range	4.00 to 11.00 minutes	0.80 to 2.00 minutes	More consistent and predictable
Percentage of Time Reduction	-	-	79.07% (Exceeding the target of >60%)

Source: Data Processed by Researcher (2026)

The measurement of document processing and retrieval time efficiency was carried out through a simulation test of $n = 30$ transaction trials, covering customer data search, meter recording and printing of billing proof. Testing was carried out randomly under conditions before (manual) and after the use of SIDARSA by admins and technicians. Based on the measurement results of $n = 30$ data search samples, the average time required to find a transaction file or complete manual administrative recording reached 6.45 minutes (387 seconds) per file, with a time variation (standard deviation) of 1.82 minutes. The relatively long search time range, between 4 and 11 minutes, was caused by obstacles such as misplaced physical files, the accumulation of daily recording sheets at the office, and the need for repeated verification between the field technician's recording reports and the admin's main cash book. This inefficiency in physical archiving aligns with the findings of Rachmi et al. (2022), who affirm that dependence on paper documents at the village government level has been shown to slow the flow of public services and increase the risk of recording errors.

Test results from $n = 30$ trial samples after implementation show that the average time to search for and complete administrative documents was drastically reduced to 1.35 minutes (81 seconds) per file, with very low time variation (standard deviation) of 0.38 minutes. This acceleration is supported by an automatic search feature (search bar) on the admin interface, meter-reading data input synchronized in real time from the technician's application, and automatic bill calculation by the system. Implementing the SIDARSA platform produced operational time savings of 79.07% (exceeding the efficiency target of >60%). This achievement reinforces the findings of Churiyah et al. (2023) and Saputra et al. (2024), which show that digital archiving and automated village administrative workflows can eliminate repetitive administrative obstacles, minimize human error, and sustainably optimize service efficiency in rural institutions. Thus, this 79.07% time reduction proves that archive digitalization through SIDARSA has eliminated daily administrative obstacles at BUMDes Sumbersekar.

Paper Consumption Before and After SIDARSA Implementation

Under the initial condition, all operational activities at the BUMDes, from customer data recording, daily meter data collection by field technicians, payment transaction recording, up to monthly cash bookkeeping, were carried out manually using physical HVS sheets, ledgers, and printed payment proof sheets. This conventional method required high paper consumption, averaging 1,250 sheets per month (equivalent to 2.5 reams of paper). This high paper usage not only drove wasteful operational spending on office stationery (ATK), but also led to piles of physical files at the BUMDes office, which were at risk of damage, misplacement, tearing, or loss.

Table 4. Paper Usage Comparison Data

Measurement Indicator	Before Implementation (Manual)	After Implementation (SIDARSA)	Savings / Efficiency
Paper Consumption (per Month)	1,250 sheets (2.5 reams)	200 sheets (0.4 reams)	Save 1,050 sheets/month
Paper Allocation	All transactions, meters, ledgers, and receipts	Physical financial accountability reporting	Significant restriction (paperless)
Percentage of Paper Reduction	-	-	84.00%

Source: Data Processed by Researcher (2026)

After implementing the SIDARSA web application, BUMDes Sumbersekar shifted toward a paperless work culture. By integrating digital modules such as customer inventory based on a structured database, real-time digital meter input by technicians, automatic bill calculation, and centralized digital transaction proof and reporting, daily operational paper use could be drastically reduced. After implementing SIDARSA, paper consumption decreased to only 200 sheets per month (equivalent to 0.4 reams of paper). The remaining paper use is allocated only for printing the physical monthly financial report recapitulation document as a mandatory accountability archive (hardcopy) for the Village Deliberation forum. The implementation of this digital system produced an efficiency and paper use reduction of 84.00% (successfully saving 1,050 sheets of paper each month). This transformation shows that adopting a web-based service system (e-service) at BUMDes Sumbersekar not only improves the transparency and accountability of financial governance, but also genuinely reduces operational stationery expenditure and supports the sustainability of environmentally friendly rural administrative services.

Statistical Test

The statistical hypothesis test used the paired-sample t-test at a significance level of $\alpha = 0.05$ (95% confidence level) on $N = 30$ measurement trial samples. Based on the paired-sample t-test results, a t-calculated value of 14.82 was obtained, which is far greater than the t-table value of 2.045 at the degrees of freedom ($df = n \text{ minus } 1 = 29$). In addition, the significance p-value was 0.000, far smaller than the significance threshold of 0.05 ($p < 0.05$). With t-calculated greater than t-table and $p < 0.05$, H_0 is rejected, and H_1 is accepted. This statistically and inferentially proves that the

implementation of the SIDARSA web application has a very significant effect on the efficiency of administrative and archiving processing time at BUMDes Sumbersekar. The shift from paper-based recording to a centralized digital database has proven to reduce daily operational time and improve transaction data accuracy.

Based on the results of the Paired Sample t-Test on $n = 30$ trial samples, the implementation of the BUMDESA Administration System (SIDARSA) is proven to bring real and significant change to the speed of administrative service. Before using SIDARSA, the average time needed to search for and complete paper-based transaction documents was 6.45 minutes. After implementing the digital system, this service time dropped to 1.35 minutes per file. Statistically, this efficiency is supported by a t-calculated value of 14.82, far exceeding the t-table value of 2.045, and reinforced by a significance p-value of 0.000 (far below the 0.05 threshold). This figure confirms that the reduction in document completion time of more than 79% is genuinely due to the effectiveness of the SIDARSA system, not chance. Thus, archive digitalization is scientifically proven to genuinely improve the efficiency and quality of administrative service at BUMDes Sumbersekar.

5. Discussion

Administrative Efficiency through the Implementation of SIDARSA

The results show that implementing SIDARSA significantly increases efficiency in BUMDes Sumbersekar's administrative process. The time required to complete the administrative process and retrieve documents decreased from an average of 6.45 minutes under the manual system to 1.35 minutes after using SIDARSA, a reduction of 79.07%. The statistical test results also show a significant difference between the conditions before and after implementing the system. This finding fits within the framework of process innovation in public and semi-public organizations, where digitalization not only changes the recording medium from physical documents to digital formats but also restructures work stages that previously required manual document search and management (De Vries et al., 2016).

This efficiency gain can be explained by SIDARSA's characteristics, which integrate various administrative activities into a single centralized system. Document search features, transaction recording, meter data synchronization, and automatic bill generation reduce the need for managers to repeat recording and manually search for documents. This explanation aligns with Atobishi et al. (2024) in public sector organizations, which show that digital capability improves organizational performance mainly by increasing agility in responding to daily operational needs, rather than solely through the system's technical sophistication. Thus, work time can be redirected from repetitive administrative activities to more productive activities, which is important for BUMDes given their limited human resources.

This finding aligns with previous research showing that using information systems at the village level can improve data management efficiency and reduce administrative obstacles (Immasari & Prasetyo, 2021). Churiyah et al. (2023) show that workflow digitalization can reduce repetitive administrative work and support officials' productivity, while Saputra et al. (2024) affirm that implementing web-based information systems improves data management efficiency at village-level institutions. A similar pattern is also observed in local government in other countries. A longitudinal study by Szedmák et al. (2026) of more than 3,000 municipalities in Hungary shows that implementing digital document management systems consistently shortens administrative case completion times and improves performance comparability between units. This consistency suggests that the efficiency produced by SIDARSA is not specific to the local context but aligns with the general mechanism of document digitalization in organizations with limited resources. Meanwhile, Rachmi et al. (2022) emphasize that dependence on paper-based archiving can slow service processes and increase the risk of recording errors. Thus, the results reinforce evidence that administrative digitalization can reduce inefficiencies arising from manual processes.

Administrative Digitalization and the Strengthening of Good Governance

The effectiveness of SIDARSA is evident not only in reduced administrative time, but also in changes in document and information management. Before implementing the system, administrative activities relied more on recording and storing physical documents. After implementing SIDARSA, administrative data is managed through a centralized database, making the process of recording, storing, and searching for information more systematic. This change provides a better foundation for transparency and accountability because administrative information can be managed in a more structured and more easily traceable manner.

This digitalization is also reflected in reduced paper use. Paper consumption that previously reached around 1,250 sheets per month decreased to around 200 sheets after the implementation of SIDARSA, a decrease of 84%. Nevertheless, paper use has not been fully eliminated because some documents, particularly monthly financial reports, still require a physical form. This finding shows that digital transformation in the context of BUMDes is better understood as a reduction in dependence on physical documents rather than the implementation of a fully paperless system.

From a governance perspective, this digitalization has strategic value because centralized recording can strengthen administrative regularity and support monitoring. However, this research does not specifically measure the effectiveness of that monitoring function (P. C. A. Sari & Wijayanti, 2022). This finding aligns with a case study on digital public services in Brazil, which shows that service digitalization can strengthen transparency and accountability. However, the results depend heavily on how institutional design accompanies technology implementation (Saldanha et al., 2022). Previous research by Widiastuti et al. (2019) and Titania & Utami (2021) shows that information technology in village government and institutional management can support transparency and accountability. This research extends these findings by showing that this function can be applied not only to village government administration but also to the administrative activities of BUMDes as a village economic institution.

However, the presence of a digital system does not automatically guarantee good governance. Findings from a study on rural digital Governance in China support this view, showing that user digital literacy is an internal factor that more strongly determines the sustainability of digital governance compared to the availability of subsidies or infrastructure alone (Liao et al., 2025). Matheus et al. (2021) affirm a similar principle, stating that digital transparency requires both a technological and an institutional foundation before the system is built. SIDARSA provides an instrument to support transparency, accountability, and administrative regularity. However, these benefits still depend on user discipline in entering data, a clear division of responsibility, and consistent use of the system. Therefore, technology in this research is better understood as an instrument supporting governance, not the sole factor determining governance quality.

Strengthening the Digital Capacity of BUMDes Managers

System implementation success also depends on users' ability to accept and operate the technology. The user trial results show high acceptance, with an average score of 92.5% for product recognition and use. This high level of acceptance is important, given that a study on local government in Slovenia shows that organizational readiness, covering work culture, structure, and processes, is a main determinant of the success of new technology adoption, often more determining than the technical sophistication of the system itself (Aristovnik et al., 2025). These results show that users can accept SIDARSA within the operational environment of BUMDes Sumbersekar, and this high level of acceptance is important because a technically good information system will not provide optimal benefits if users have difficulty operating it.

Digitalization requires more than merely the availability of devices and applications. Managers also need to understand digital workflows and use them consistently (Verhoef et al., 2021). This argument aligns with findings on BUMDes in Central Java and the Special Region of Yogyakarta, which show that BUMDes performance depends more on managers' managerial capacity and entrepreneurial orientation than on the availability of tools or systems alone (Wulandari & Wardani, 2024). A similar challenge also appears in other rural entrepreneurship contexts, where

adoption of information and communication technology depends more on social factors and prior experience than on formal institutional incentives (Geng & Xue, 2023). In the context of BUMDes Sumbersekar, developing SIDARSA is also a process of digital capacity building, as managers shift from a physical, document-based work pattern to information management through an integrated system.

Thus, developing an information system should be accompanied by mentoring and strengthening users' abilities. Empirical support for this approach comes from a study of a cohesive ICT training program in the e-government context, which shows that systematically designed training can significantly improve users' digital competence and self-efficacy while also reducing the digital divide in the long term (Chohan & Hu, 2022). Training is needed not only at the initial stage of implementation, but can also be provided periodically when there are changes in features, administrative procedures, or organizational needs. This approach is important so that SIDARSA use does not stop at the technology adoption stage, but develops into a sustainable change in administrative work patterns.

Research Contribution and Added Value

The main contribution of this research lies in the development and implementation of SIDARSA, which directly integrates BUMDes administrative needs with digital data and document management. Previous research has shown the benefits of information systems in supporting village administration, transparency, and efficient data management. However, this research provides additional empirical evidence by implementing the system in the operational environment of BUMDes Sumbersekar and measuring changes in administrative performance before and after its use.

The added value of this research is also seen in the use of several indicators to evaluate the implementation results, namely expert validation, user acceptance, administrative completion time, paper consumption, and statistical testing. This approach allows assessment of system development success not only by technical feasibility, but also by changes in the administrative process. The test results show that implementing SIDARSA reduces administrative time by 79.07% and paper use by 84%. In contrast, the paired-samples t-test shows a significant difference between the conditions before and after implementation.

These findings offer a practical contribution to administrative digitalization at BUMDes, particularly for institutions that still face limitations in manual document management and recording. This research shows that an information system designed around users' operational needs can provide measurable benefits to work efficiency. At the same time, the results show that successful digital transformation requires adequate user capacity and governance of system use.

Overall, SIDARSA shows that BUMDes administrative digitalization can provide benefits in three interrelated aspects, namely operational efficiency, reduced dependence on physical documents, and strengthened information management. Thus, this research contributes not only to developing a web-based application, but also to implementing a digital system that connects BUMDes operational needs with efforts to improve the quality of administrative management and institutional governance.

6. Conclusion

This community service activity successfully developed a web-based BUMDesA Administration System (SIDARSA), validated by material and media experts with an average result of 93.5% and a very good category, making it feasible to implement at BUMDes Sumbersekar. The implementation of SIDARSA provides a genuine improvement in administrative effectiveness, shown by a decrease in document processing and search time of 79.07%, from an average of 6.45 minutes to 1.35 minutes per document, as well as an improvement in archive management order and data search accuracy. Digitalization also reduces paper consumption by 84%, from 1,250 to 200 sheets per month, while supporting transparency, accountability, and internal oversight

through an integrated database. These findings show that SIDARSA not only serves as a technical instrument for resolving BUMDes administrative problems, but also strengthens public administrative governance at the rural level by implementing services that are more efficient, transparent, accountable, and sustainable.

More broadly, implementing SIDARSA shows that digital transformation at the BUMDes level can strengthen local institutional capacity to carry out village service and resource management functions. Strengthening administrative capacity through a digital system provides a better foundation for BUMDes managers to work in a structured manner, make data-based decisions, and improve service responsiveness to the community. Thus, this activity's main contribution extends beyond improving the administrative process at BUMDes Sumbersekar; it strengthens the capacity of the community and village institutions to build governance that is more independent, transparent, and sustainable. SIDARSA can serve as an initial model that other BUMDes with similar characteristics and administrative needs can adapt, while still considering human resource readiness and local institutional capacity.

Recommendations

Based on the results of the community service implementation and the SIDARSA product trial, the system's sustainability needs to be carried out gradually and with clear priorities. First, BUMDes Sumbersekar needs to establish a Standard Operating Procedure (SOP) that specifically regulates system maintenance, user access management, system updates, and periodic database backups. To reduce the risk of data loss from device or server disruption, BUMDes Sumbersekar should develop backups using an automatic, cloud-based redundancy system so copies are stored in a separate location and can be recovered if the main data is damaged or lost.

The second priority is to implement a technical literacy program and continuous digital mentoring, particularly for business unit managers and new operational staff. This program is not only provided at the initial stage of SIDARSA use, but also needs to be carried out periodically through module-use training, basic troubleshooting simulations, and mentoring during personnel turnover. This step is needed so that knowledge of SIDARSA operation does not depend only on long-time users and so that all system features can be utilized optimally, consistently, and sustainably.

The third priority is to support future research. Future research can evaluate the acceptance and sustainability of SIDARSA use more comprehensively using the Technology Acceptance Model (TAM) as the main framework, particularly by measuring perceived ease of use, perceived usefulness, attitude, and intention to use. This framework can be developed by measuring user acceptance over a longer period and linking it to administrative efficiency and BUMDes financial performance. Thus, further research can not only assess the success of system implementation at the initial stage, but also provide empirical evidence regarding the sustainability of digitalization adoption in BUMDes management.

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