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Cloud-Based Digitalization of Village Administrative Services to Support Transparent Village Governance

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Abstract

Namorambe Village continues to face several challenges in delivering administrative services, including manual record management, fragmented document archiving, and limited public access to administrative information. These issues reduce service efficiency and hinder transparent village governance. This community service program aimed to enhance the capacity of village officials to implement cloud-based administrative service digitalization in order to promote transparent, efficient, and accountable village governance. The program was conducted through a series of activities, including preliminary observation, awareness sessions, technical training, hands-on practice using cloud-based applications, implementation assistance, and monitoring and evaluation through pre-tests, post-tests, observations, and participant satisfaction questionnaires. The partner of this program was the Namorambe Village Government, involving 25 participants consisting of village officials, administrative staff, and public service operators. The results demonstrated a significant improvement in participants' knowledge of digital administrative management, practical skills in utilizing cloud storage technologies, and the quality of document management and public information services. Furthermore, participants reported high satisfaction with both the training materials and mentoring activities. Overall, this program successfully strengthened digital governance practices and contributed to improving transparency, efficiency, and accountability in village public services while supporting the realization of sustainable digital village transformation.

Keywords: Village Digitalization, Cloud Computing, Village Administration, Governance, Public Service.

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INTRODUCTION

The rapid development of digital technology has significantly transformed the way governments deliver public services at both national and local levels. Digital transformation is no longer limited to urban administrations but has become an essential strategy for improving governance quality in rural areas. Through the implementation of digital government, village administrations are expected to provide faster, more transparent, accountable, and citizen-oriented public services while strengthening institutional efficiency and data management (United Nations, 2022; OECD, 2023).

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In Indonesia, village governments play a strategic role as the closest public institutions to citizens. They are responsible for providing various administrative services, including population certificates, family registration documents, business permits, social assistance administration, and village correspondence. However, many villages still rely on conventional administrative processes that involve paper-based documentation, manual record keeping, and fragmented information management. These practices often result in slow service delivery, duplicated data, document loss, and limited transparency, ultimately reducing public trust in village governance (World Bank, 2021; Kementerian PANRB, 2022).

The Government of Indonesia has accelerated digital transformation through the implementation of the Electronic-Based Government System (SPBE) and various digital village initiatives. These national programs encourage village governments to adopt information technology to improve administrative efficiency, public service quality, and governance transparency. Nevertheless, the implementation of digital governance remains uneven because many villages face challenges related to limited digital infrastructure, inadequate human resource capacity, insufficient digital literacy, and the absence of integrated information systems capable of supporting administrative services effectively (Kementerian Kominfo RI, 2021; Kementerian Desa PDTT, 2023).

One promising solution for addressing these challenges is cloud computing technology. Cloud-based administration enables village governments to store, access, and manage administrative data securely from different locations while minimizing infrastructure costs. Compared with conventional information systems, cloud technology offers better scalability, automatic data backup, real-time collaboration, and improved service continuity. These advantages allow village officials to process administrative documents more efficiently while ensuring better information accessibility and data security (Lo et al., 2022; World Bank, 2022).

Recent studies have demonstrated that digital transformation contributes significantly to improving public administration quality. Research conducted by Sihotang and Hidayanto (2023) revealed that stakeholder collaboration is one of the critical success factors in implementing village information systems in Indonesia. Similarly, Amiril and Choiriyah (2024) emphasized that digital governance creates opportunities for increasing administrative effectiveness, although organizational readiness and digital competency remain major challenges. Furthermore, Putro and Besa (2025) reported that electronic administrative services significantly improve service responsiveness, operational efficiency, and citizen satisfaction in local government institutions.

Several community service activities have also shown positive impacts on village administrative digitalization. Mohamad et al. (2024) demonstrated that web-based village administration systems improve document management and public service quality through structured digital workflows. Likewise, Wijaya et al. (2024) found that optimizing village information systems enhances transparency and accountability in local government administration. Furthermore, Darmawan et al. (2025) highlighted that Smart Village initiatives supported by digital administrative services contribute to more effective governance and stronger public participation.

Despite these encouraging developments, many village governments still experience difficulties in fully utilizing cloud-based administrative systems because digital transformation requires not only technological infrastructure but also practical skills, continuous mentoring,

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and organizational adaptation. Village officials frequently encounter challenges in managing digital archives, maintaining data security, integrating administrative information, and utilizing digital platforms effectively in daily public service activities (Kayudin et al., 2025; Nagara & Maulana, 2025).

Namorambe Village is one of the villages that is currently facing similar challenges in administrative service management. Administrative activities are still partially conducted manually, causing inefficiencies in document processing, delayed service delivery, and difficulties in maintaining transparent administrative records. These conditions indicate the necessity of strengthening digital capacity among village officials through structured training and practical assistance in implementing cloud-based administrative services.

To address these issues, this community service program offers a comprehensive approach consisting of socialization, technical training, hands-on practice, mentoring, and evaluation of cloud-based administrative applications. The program integrates knowledge from Information Systems and Management disciplines to improve both technological capability and organizational governance. This integrated approach is expected to enhance digital competencies, optimize administrative workflows, strengthen transparency, and improve the quality of public services delivered by the village government (Normawati, 2025; Kadja & Zega, 2026).

Therefore, this community service program aims to improve the capacity of Namorambe Village officials in implementing cloud-based digital administrative services to support transparent, accountable, efficient, and sustainable village governance while strengthening public trust in village administrative services (United Nations, 2022; Sihotang & Hidayanto, 2023).

METHOD

Partner Profile

This community service program was conducted in Namorambe Village, Deli Serdang Regency, North Sumatra Province, Indonesia. The village government was selected as the community partner because its administrative services were still partially managed using manual procedures, resulting in inefficient document processing, fragmented data storage, and limited accessibility of administrative information. These conditions hinder the effectiveness of public service delivery and reduce transparency in village governance. Therefore, strengthening digital administrative capacity became an important priority to support the implementation of electronic-based public services (Kementerian PANRB, 2022; Kementerian Desa PDTT, 2023).

The participants consisted of 25 village officials, including the Village Head, Village Secretary, administrative staff, financial officers, neighborhood representatives, and members of the Village Consultative Body (BPD). Among the participants, 15 (60%) were male and 10 (40%) were female, with ages ranging from 25 to 54 years. Most participants had limited experience in utilizing cloud computing technology for managing administrative services despite having basic computer literacy. This participant profile was considered appropriate because village officials are the primary actors responsible for providing administrative services directly to the community (Sihotang & Hidayanto, 2023).

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Community Service Implementation

The community service activities were implemented over four consecutive stages to ensure that participants not only understood the theoretical concepts but were also able to apply cloud-based administrative services independently in their daily work.

Stage 1. Activity Preparation

The preparation stage began with field observations and interviews with the village head and administrative staff to identify existing problems, technological readiness, and training needs. A needs assessment was conducted to analyze administrative workflows, document management practices, internet connectivity, and participants' digital competencies. Based on these findings, the service team prepared training materials, cloud-based administrative modules, evaluation instruments, and implementation schedules tailored to the actual needs of the village government (World Bank, 2021; Amiril & Choiriyah, 2024).

Stage 2. Socialization and Technical Training

The second stage consisted of interactive lectures and discussions introducing the concepts of digital government, Smart Village, cloud computing, information security, and transparent village governance. Participants were also introduced to cloud-based office applications, digital document management, online collaboration, electronic archiving, and secure data sharing practices. The training emphasized practical examples of administrative services frequently performed by village officials to ensure direct applicability in daily operations (United Nations, 2022; OECD, 2023).

Stage 3. Hands-on Practice and Mentoring

Following the theoretical sessions, participants practiced creating, organizing, storing, and retrieving administrative documents using cloud-based platforms. They learned how to manage correspondence, archive official documents, share administrative files securely, and collaborate in real time using cloud storage technology. Each participant received direct mentoring from the service team to ensure that every administrative procedure could be completed independently and correctly. Continuous mentoring also allowed participants to discuss practical challenges encountered during implementation and receive immediate technical assistance (Mohamad et al., 2024; Wijaya et al., 2024).

Stage 4. Monitoring and Evaluation

The effectiveness of the community service program was evaluated using both quantitative and qualitative approaches. Participants completed a pre-test before the training and a post-test after all practical sessions to measure improvements in digital administrative competencies. In addition, participant satisfaction questionnaires, direct observations, interviews, and practical performance assessments were conducted to evaluate knowledge acquisition, technical skills, and participants' readiness to implement cloud-based administrative services within the village government. These multiple evaluation methods

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provided a comprehensive assessment of the effectiveness and sustainability of the training program (Normawati, 2025; Putro & Besa, 2025).

Evaluation Indicators

The evaluation focused on four primary indicators: (1) participants' understanding of digital governance concepts; (2) ability to utilize cloud-based applications for village administration; (3) improvement in administrative efficiency and document management practices; and (4) participant satisfaction with the training implementation. The achievement of these indicators was measured by comparing pre-test and post-test scores, analyzing questionnaire responses, and observing participants' performance during practical activities. This comprehensive evaluation approach is widely recommended for measuring the effectiveness of community empowerment and digital transformation programs in public institutions (World Bank, 2022; Kadja & Zega, 2026).

Overall, the implementation method emphasized participatory learning through observation, training, practical exercises, mentoring, and continuous evaluation. This integrated approach enabled village officials to develop both technical competencies and organizational readiness, thereby supporting the sustainable implementation of cloud-based administrative services and strengthening transparent village governance (Darmawan et al., 2025; Kayudin et al., 2025).

RESULT AND DISCUSSION

Initial Observation and Needs Assessment

The initial field observation showed that most administrative services in Namorambe Village were still performed manually. Official letters, resident certificates, and administrative archives were stored in separate files, making document retrieval inefficient and increasing the risk of data duplication. Interviews with village officials also indicated limited knowledge of cloud computing and digital document management. These findings confirmed the necessity of implementing practical digital transformation through cloud-based administrative services to improve efficiency and transparency in village governance (Sihotang & Hidayanto, 2023; Amiril & Choiriyah, 2024).

(a) Initial observation and interview with village officials
(b) Socialization and introduction to the program
(c) Hands-on training on cloud-based administration
(d) Practical session and direct mentoring

Figure 1. Initial Observation and Training Activities

The direct interaction between the service team and village officials allowed the training materials to be adjusted according to actual administrative problems encountered by participants. This participatory approach increased participant engagement throughout the implementation process and supported the successful adoption of digital administrative practices (Mohamad et al., 2024).

Improvement of Participants' Digital Competency

The effectiveness of the training program was evaluated through pre-test and post-test assessments involving all 25 participants.

Table 1. Comparison of Participants' Competency Before and After Training

Indicator	Pre-test	Post-test	Improvement
Digital Administration Knowledge	66.0	88.5	22.5
Cloud Storage Utilization	63.5	87.2	23.7
Digital Document Management	65.4	89.1	23.7
Information Security Awareness	64.3	85.6	21.3
Average Score	**64.8**	**87.6**	**22.8**

The average participant score increased from 64.8 before training to 87.6 after the training, representing an improvement of approximately 35.2%. This result indicates that the combination of lectures, demonstrations, and direct mentoring effectively strengthened participants' knowledge and practical skills in managing cloud-based administrative services. Similar improvements have also been reported in previous digital governance training programs implemented in Indonesian villages (Wijaya et al., 2024; Normawati, 2025).

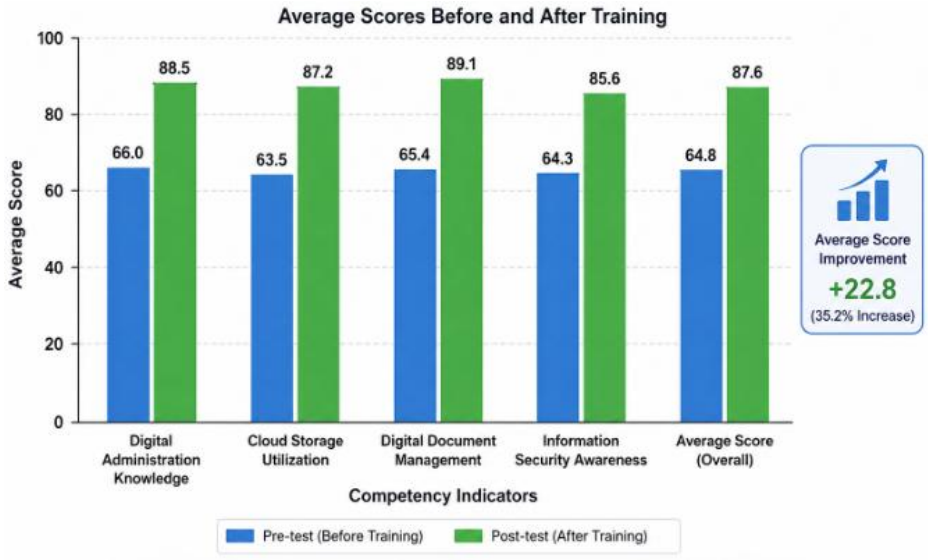

Figure 2. Comparison of Pre-test and Post-test Scores

The chart demonstrates a substantial increase in participants' competency after the training, indicating that cloud-based administrative training can significantly improve the digital readiness of village officials (Putro & Besa, 2025).

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Implementation of Cloud-Based Administrative Services

Following the practical sessions, participants successfully created digital folders, managed administrative documents online, shared official files securely, and implemented collaborative document editing using cloud-based platforms. Village officials also became capable of organizing digital archives according to administrative categories, reducing document retrieval time and minimizing the possibility of data loss.

The implementation of cloud technology simplified administrative workflows by enabling authorized officials to access documents from different devices while maintaining document integrity and data security. These improvements support more efficient public services and strengthen transparency in village administration (World Bank, 2022; OECD, 2023).

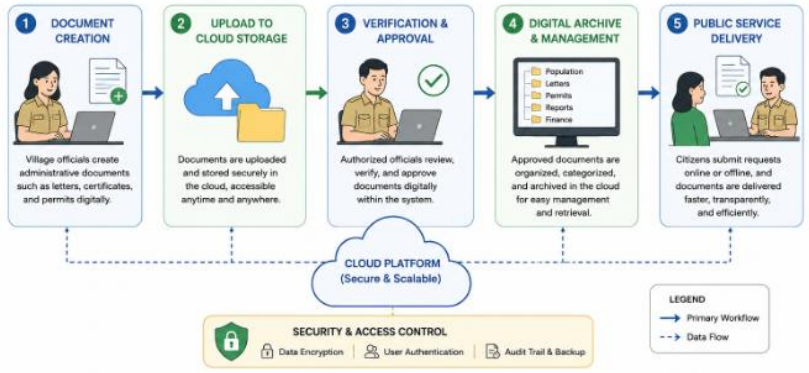

Figure 3. Cloud-Based Administrative Workflow

Figure 3 illustrates the workflow of the cloud-based administrative system implemented during the community service program. The process begins with citizens submitting administrative requests to the village office. Village officials then verify the submitted information before creating and processing the required administrative documents using a cloud-based platform. All documents are securely stored in cloud storage, allowing authorized personnel to access, update, and retrieve information in real time. After verification and approval, the completed documents are delivered to citizens, while digital archives remain securely available for future administrative purposes. This integrated workflow minimizes paper-based administration, reduces document processing time, improves data accuracy, and strengthens transparency and accountability in village public services. Furthermore, centralized cloud storage enhances data security, facilitates collaboration among village officials, and supports continuous administrative services regardless of location or device availability. These findings are consistent with previous studies reporting that cloud-based digital administration improves operational efficiency, information accessibility, and governance transparency in village governments (World Bank, 2022; OECD, 2023; Putro & Besa, 2025).

Participant Satisfaction Evaluation

Participant satisfaction was measured using a questionnaire distributed immediately after the training.

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Table 2. Participant Satisfaction Results

Evaluation Indicator	Percentage (%)
Training Materials	94
Instructor Performance	95
Practical Sessions	91
Training Facilities	89
Overall Satisfaction	**92**

The overall satisfaction level reached 92%, indicating that participants perceived the training as useful, practical, and directly applicable to their daily administrative responsibilities. Participants particularly appreciated the hands-on mentoring sessions because they enabled immediate practice using real administrative documents rather than simulated examples. Similar findings have been reported in community empowerment programs emphasizing experiential learning and continuous mentoring (Darmawan et al., 2025; Kayudin et al., 2025).

Challenges During Implementation

Several challenges were identified during the implementation process. Some participants had limited experience using cloud-based applications, while internet connectivity occasionally became unstable during practical sessions. In addition, differences in participants' digital literacy required individualized mentoring to ensure that every participant could complete each training activity successfully.

These challenges were addressed through step-by-step demonstrations, simplified learning modules, small-group mentoring, and repeated practical exercises. This adaptive learning strategy helped participants gradually develop confidence in utilizing digital administrative systems independently and increased the sustainability of the program after its completion (United Nations, 2022; Kadja & Zega, 2026).

Discussion

The results demonstrate that cloud-based administrative digitalization provides practical benefits for improving the quality of village public services. Beyond increasing technical competency, the program also encouraged organizational changes toward more transparent, accountable, and efficient governance. Digital document management reduced administrative complexity, facilitated faster information retrieval, and strengthened collaboration among village officials.

The integration of cloud computing into village administration supports Indonesia's Electronic-Based Government System (SPBE) and Smart Village initiatives by providing a scalable, secure, and cost-effective solution for local governments. The combination of technical training and continuous mentoring proved to be an effective strategy for accelerating digital transformation in rural communities, particularly for villages with limited technological experience. Consequently, this community service program not only enhanced participants' digital competencies but also established a sustainable foundation for improving public service

quality and strengthening transparent village governance (World Bank, 2021; Sihotang & Hidayanto, 2023; Putro & Besa, 2025).

CONCLUSION

This community service program successfully strengthened the digital capacity of Namorambe Village officials through the implementation of cloud-based administrative services. The combination of needs assessment, interactive training, hands-on practice, and continuous mentoring enabled participants to improve their competencies in digital document management, cloud storage utilization, and secure administrative service delivery. The improvement in participants' knowledge and skills, together with the high level of satisfaction achieved during the program, demonstrates that cloud-based administration is a practical and effective approach for supporting faster, more efficient, transparent, and accountable village public services. Furthermore, the implementation of digital administrative workflows provides a sustainable foundation for improving governance quality while supporting Indonesia's digital government and Smart Village initiatives. Therefore, strengthening the digital capabilities of village officials through continuous capacity-building programs is essential to ensure the long-term sustainability of transparent and citizen-oriented village governance (United Nations, 2022; World Bank, 2022; Sihotang & Hidayanto, 2023; Putro & Besa, 2025).

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