

Research Article

Development of a Web-Based Service System for the Empowerment of Mandalamekar Village

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Abstract

Efficient and effective public services are key indicators of successful village governance. Mandalamekar Village, Bandung Regency, faces significant challenges in its manual population administration services. These issues reduce service efficiency, data accuracy, and transparency in village administration management. This community service activity developed an integrated web-based village service system and increased the capacity of village officials through technology training. We used a Research and Development (R&D) approach with a Software Development Life Cycle (SDLC), including needs analysis, design, development, implementation, field trials, training, mentoring, and system evaluation and improvement. The implementation results showed increased service efficiency (a 60% reduction in processing time), improved data recording accuracy, and higher community satisfaction (85% of respondents were satisfied). This activity had a positive impact on the quality of administrative services, the digital skills of village officials, and public trust in village governance.

Keywords: Public Services; Web-Based Systems; Village Digitalization; Community Empowerment; Population Administration

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1. Introduction

Successful governance, including at the village level, relies heavily on efficient and effective public services. Villages, as the closest government units, play a crucial role in providing population administration services, managing data, and facilitating citizens' administrative needs (Dwiyanto, 2018). However, many villages in Indonesia face challenges in improving the quality of public services (Setiawan, 2015). Mandalamekar Village in Bandung Regency, West Java, is one example where administration still operates conventionally, using paper forms, manual recording, and physical archiving. These work methods are prone to input errors and data loss and require lengthy service times (Susanto & Wibowo, 2020).

This situation creates several real problems. First, low service efficiency leads residents to wait a long time for administrative documents. Second, the accuracy of population data cannot be guaranteed due to potential duplication or recording errors. Third, low archive accessibility makes it difficult to find documents for rapid reporting. This impacts low public satisfaction with village services and hinders transparency and accountability in village government (Prabowo & Hermawan, 2020).

With advances in information technology, digitizing public services at the village level has become an urgent need. Various studies have shown that implementing information and communication technology (ICT) can improve the efficiency, transparency, and accountability of public services (Heeks, 2018; Wihartini et al., 2021). The

implementation of e-government in villages through web-based information systems has been shown to accelerate administrative processes, simplify reporting, and improve service quality (Prabowo & Hermawan, 2020; Sari & Putra, 2020). Recent research also confirms that villages that digitize their administration improve bureaucratic capacity, data accuracy, and public services (Dana et al., 2025; Rahmawati et al., 2021). The web-based service model allows residents to access information and services independently, reducing the workload of village officials and accelerating service delivery (Sari & Putra, 2020).

However, most ICT implementations in Indonesian villages still face limitations in human resources, network infrastructure, and training for village officials (Susanto & Wibowo, 2020). Furthermore, studies on developing integrated web-based service systems tailored to the local needs of specific villages remain limited. This situation opens up opportunities for further research to develop applicable, participatory, and sustainable models.

Population administration services in Mandalamekar Village, Cimenyan District, Bandung Regency, still face various challenges related to effectiveness, efficiency, and accessibility. The manual process can lead to delays, inaccurate data, and limited access to information and services for residents. This situation highlights the need for innovation through information technology, particularly in developing web-based village service applications that are more accessible to the public.

The development of a web-based service system is expected to address challenges in the population administration process by providing faster, more accurate, and more integrated services. Furthermore, the success of the system implementation depends not only on the technology developed but also on the readiness of human resources to operate it. Therefore, training in using the application is necessary for village officials and the community to improve digital skills and encourage the adoption of sustainable systems.

Furthermore, technological intervention through the implementation of this village service application is expected to address the limitations of the manual services currently in place. With a digital system, administrative processes can be conducted more efficiently and transparently, with better documentation, thereby improving the overall quality of public services in Mandalamekar Village.

The novelty of this article lies in the development of a web-based service system tailored to the needs of Mandalamekar Village. We emphasize the integration of population administration, ease of access for residents, and capacity building of village officials through training. This approach differs from previous research, which generally discusses the digitalization of services in general without considering the specific context and needs of the village (OECD, 2019). The solution we offer is not only technological but also prioritizes aspects of community empowerment and system sustainability. This article aims to: (1) develop a web-based service system tailored to the needs of Mandalamekar Village to accelerate population administration services, (2) provide training and mentoring for village officials and outreach to the community so they can use the system, and (3) increase the efficiency, transparency, and accountability of village services through the application of information technology.

2. Methods

2.1. Research Design

This community service activity uses a Research and Development (R&D) approach with a Software Development Life Cycle (SDLC)-based system development. We chose this approach because it addresses the village's specific needs through the stages of needs analysis, design, development, implementation, training, mentoring, and system evaluation (Pressman & Maxim, 2020; Sommerville, 2016).

2.2. Location and Subject of Activities

This activity was held in Mandalamekar Village, Cimenyan District, Bandung Regency, West Java. The location was chosen based on the still-manual nature of population administration services, the lack of a web-based information system, and the high public demand for fast, effective, and accurate services. These conditions make Mandalamekar Village a suitable location for implementing information technology-based service innovations.

The participants in this activity comprised several parties, both directly and indirectly, involved in the system implementation process. The primary participants were village officials tasked with providing population administration services to the community. Furthermore, the Mandalamekar Village community also served as service users who directly benefited from the system. The implementation team from YARSI University also served as technical assistance throughout the system's design, development, and implementation.

2.3. Activity Stages

The implementation methodology for this activity was carried out through several systematic stages, starting with needs analysis and continuing through system evaluation. The first stage was a needs analysis conducted through

initial observations of the administrative service process at the Mandalamekar Village office. Furthermore, interviews were conducted with village officials and community leaders to identify key service needs (Kusumadewi et al., 2019). Document studies were also conducted to understand population data and administrative archives used in the village service process. The next stage is system design, the process of developing a web-based application architecture that considers user-friendliness and data security (Pramono & Santoso, 2017). The system developed includes several main modules: population registration; administrative services such as KTP Receipt, Certificate of Poverty, Certificate of Poor Family, SKCK Cover Letter, Birth Certificate, Business Certificate (SKU), and Domicile Certificate (SKD); and digital archive management. The next stage is system development, which involves coding the application using a web-based programming language. The system is then implemented on a hosting server and domain for online access. Afterward, the development team conducts internal testing to ensure the system operates as expected.

The implementation and field trials phase involved directly deploying the system at the village office and using it among village officials. Testing was conducted through several administrative service scenarios, including various types of letters provided within the system. Performance indicators such as service time, data recording accuracy, and user satisfaction were also measured during this phase (Purwanto et al., 2022). The next stage is training and mentoring, which involves providing technical training to village officials on using the system (Wahyuni et al., 2020). Furthermore, community outreach was conducted to explain how to access web-based services, and intensive mentoring was provided during the transition from manual to digital systems to ensure optimal implementation. The final stage is system evaluation and improvement, which is carried out by gathering feedback from village officials and user communities. The evaluation results are used as a basis for refining the system to suit field needs better.

2.4. Data Collection Instruments

The data collection instruments used in this activity consisted of several techniques to obtain comprehensive data. A questionnaire was used to measure community satisfaction with the services provided through the system. Semi-structured interviews were conducted with village officials to gather in-depth information regarding the service process and any challenges encountered. Participatory observation was also conducted to directly observe the administrative service process before and after system implementation. Furthermore, documentation was used to collect data, including administrative archives, activity reports, and system trial results.

2.5. Data Analysis Techniques

Data analysis in this activity used a mixed approach, namely, simple qualitative and quantitative methods. Qualitative descriptive analysis was used to interpret data from interviews, observations, and documentation to deepen understanding of service conditions. Meanwhile, a simple quantitative analysis was conducted by calculating percentages and comparing service times before and after the system's implementation to measure service efficiency.

Additionally, a comparative analysis was conducted to examine differences between manual and web-based systems, particularly regarding service time, data accuracy, and user satisfaction (Sugiyono, 2018). This approach was used to assess the extent to which the developed system improved the quality of village administration services.

2.6. Success Indicators

The success of this activity is measured based on several indicators, including technical aspects, adoption, usability, and user satisfaction. From a technical perspective, a system is considered successful if the application runs reliably, is accessible online, and meets the needs of village administration. From an adoption perspective, success is characterized by the ability of village officials to operate the system independently without relying entirely on the development team.

In terms of benefits, the system is considered successful if it increases service speed by at least 30% compared to the previous manual system. Meanwhile, in terms of public satisfaction, the initiative is considered successful if the user satisfaction rate reaches at least 80%, as indicated by the results of the distributed questionnaire.

3. Results and Discussion

3.1. System Implementation Results

The results of this community service activity demonstrate that a web-based village administration service system has been successfully developed and implemented in Mandalamekar Village, Cimenyan District, Bandung Regency. This system is designed to support the transformation of administrative services from manual to a more effective, efficient digital system.

The developed system consists of several main modules. The first module is a population administration module that facilitates the creation of various documents, such as certificates of domicile, birth, death, and change of residence, as well as other administrative services. The second module is a digital archive that stores documents electronically so they can be accessed and searched more quickly through the system's search feature. Furthermore, the user dashboard module provides up-to-date information on the number of services, resident data, and the status of applications currently being processed.

This system has been hosted on a dedicated village domain, allowing the public to access it online via computers and smartphones. This means that administrative services are no longer limited to village office hours but can be accessed more flexibly by the public.



Figure 1. Mandalamekar Village Office, Bandung Regency



Figure 2. Socialization of the Service Website in Mandalamekar Village, Bandung Regency

3.2. Implementation Evaluation

Evaluation of system implementation is carried out by comparing conditions before and after the use of the web-based system, using several main indicators: service efficiency, data accuracy, community satisfaction, and village apparatus readiness.

In terms of service efficiency, administrative processing times have improved significantly. For example, obtaining a domicile certificate, which previously took around 20–30 minutes, can now be completed in 5–10 minutes after the system's implementation. This represents a reduction in service time of approximately 60%, demonstrating that the system can improve the effectiveness of village administrative services.

In terms of data accuracy, the system has a positive impact through its input validation mechanism, which reduces recording errors and minimizes data duplication. Furthermore, the archive search process is faster and more efficient than the previous manual system.

Regarding public satisfaction, the questionnaire results showed that 85% of respondents were satisfied with the implemented system. This satisfaction was based on ease of access, speed of service, and transparency in the

administrative submission process. Meanwhile, regarding the readiness of village apparatus, the evaluation results indicate that village officials can operate the system independently after training. However, technical assistance is still needed in the initial implementation phase to ensure smooth adaptation. Overall, the implementation of this web-based service system has had a positive impact on improving the quality of administrative services in Mandalamekar Village.

3.3. Benefits and Impacts of Activities

The implementation of a web-based village administration service system in Mandalamekar Village has provided various benefits and positive impacts on the public service process, both for village officials and the community as service users. This application of information technology serves not only as an administrative tool but also as an effort to improve the quality of village service governance by digitizing work processes.

For Mandalamekar Village officials, implementing a web-based service system simplifies population administration, particularly in recording, processing, and storing documents. The digital archiving system reduces reliance on physical documents, making data retrieval faster and more structured. Furthermore, system utilization training activities also improve village officials' ability to utilize information technology to support administrative work. This increased digital competency is crucial to the system's continued use, as the success of digital transformation depends not only on the availability of technology but also on the readiness of human resources to operate it. System implementation can also reduce repetitive manual workloads, such as data recording and service document management. Automating administrative processes allows village officials to focus more on improving the quality of public services.

From the public's perspective, the web-based service system makes it easier to obtain administrative services without waiting in long lines at the village office. Residents can submit service requests online using available devices, minimizing the time and costs involved in the administrative process. In addition to easy access, this system also provides reliable information regarding the status of requested services. The application history feature allows the public to track the progress of their requests transparently. This can increase public trust in village government services by making the service process more transparent, measurable, and easily monitored.

The implementation of digital services improves the quality of village governance. Administrative digitization supports the creation of more effective, transparent, and data-driven public services (OECD, 2019). Digitally stored population data also has a higher level of validity, allowing it to serve as a basis for developing village development programs and plans (Wulandari & Wibowo, 2023). Furthermore, the successful implementation of a web-based service system in Mandalamekar Village can serve as an example of digital technology adoption for other villages in Bandung Regency. This system demonstrates that using information technology can overcome the limitations of manual administrative services and accelerate digital transformation at the village government level.

3.4. Narrative Summary of Survey Results on Mandalamekar Village Website Use

The evaluation of the Mandalamekar Village service website was conducted through a survey of 9 respondents, comparing pre- and post-test results. This evaluation aimed to assess user experience with accessing and using service features, as well as satisfaction with the developed system.

3.5. Devices and Website Access

The survey results showed that in the pre-test phase, the majority of respondents accessed the website on Android phones (87.5%), and 12.5% used laptops/PCs. No respondents used iPhones. After the system implementation in the post-test phase, device usage patterns changed: Android phone usage decreased to 55.6%, while laptop/PC usage increased to 44.4%. These changes demonstrate that the system can be accessed through a variety of devices, both mobile and desktop. Despite the increase in laptop/PC usage, Android devices remain the primary means of accessing village digital services. In terms of browser, all respondents in the pre- and post-test phases used Google Chrome, ensuring that system testing was conducted in a uniform browser environment.

Access test results showed that all respondents (100%) successfully opened the website's main page, registered an account, and logged in without any issues. This indicates that the system's basic accessibility aspects were functioning well.

3.6. Usage and Status of Administrative Services

Based on the service usage survey results, the most frequently used administrative service during the pre-test phase was the KTP Receipt service, with 75% of respondents using it. Furthermore, the Certificate of Inability, the Certificate of Poor Family, and the Certificate of Domicile were each used by 37.5% of respondents. Meanwhile, the Police Clearance Certificate (SKCK) Cover Letter, Birth Certificate, and Business Certificate (SKU) were used by 25% of respondents.

During the post-test phase, service usage patterns changed. The KTP Receipt service remained the most frequently used service at 66.7%, followed by the Certificate of Inability at 55.6% and the Certificate of Poor Family at 44.4%. Other services, such as the Police Clearance Certificate (SKCK), Birth Certificate, Business Certificate (SKU), and Domicile Certificate, were each used by 22.2% of respondents. These changes in usage patterns indicate that the system has been able to provide various administrative services that the public can use according to their individual needs. In terms of service status, the entire application process undertaken by respondents was completed successfully, with no technical issues. This is indicated by a service issues score of 0%, indicating the system's ability to support administrative processes stably.

3.7. System Functionality and User Satisfaction

The evaluation of the system's functionality showed that all key features functioned effectively. 100% of respondents reported no issues when completing service forms, uploading required documents, or submitting administrative requests. Documents uploaded by users, such as Family Cards (KK), Resident Identity Cards (KTP), and other supporting documents, were correctly read by the system. Furthermore, all respondents received a success notification reading "Success! Form submitted successfully" and could view their application details in the service history feature. These results indicate that the system has met the ease-of-use criteria and the core functions of digital-based administrative services.

3.8. Level of User Satisfaction with the Mandalamekar Village Website

User satisfaction was measured on a scale of 1 to 5, with 1 indicating very dissatisfied and 5 indicating very satisfied. Pre-test results indicated excellent satisfaction, with 87.5% of respondents scoring 5 and 12.5% scoring 4. No respondents rated themselves dissatisfied. In the post-test stage, 77.8% of respondents scored 5, and 22.2% scored 4. Although there was a change in the distribution of scores, overall, all respondents (100%) still gave a positive assessment with scores of 4 and 5.

These results demonstrate that the Mandalamekar Village service website provides a positive user experience for the community. The system is considered capable of improving ease of access, expediting service processes, and providing transparency in the village administration application process. The results of this implementation align with various previous studies emphasizing that village digitalization improves the efficiency and transparency of public services (Wihartini et al., 2021; Rahmawati et al., 2021). However, the findings in Mandalamekar Village provide evidence that the success of digital transformation is determined not only by technological systems but also by intensive mentoring and training for village officials to enable them to operate the systems independently (Wahyuni et al., 2020). Furthermore, success is measured not only by technical aspects (application stability) but also by social aspects, namely, community acceptance of the system. The fact that more than 80% of the community is satisfied demonstrates that a local needs-based approach can increase the acceptance of technological innovation (Purwanto et al., 2022). These results also reinforce the view that decentralizing digital services at the village level accelerates the achievement of transparent and accountable governance (Heeks, 2018; OECD, 2019). Therefore, this intervention has novel value by combining the technical aspects of system development with community empowerment through training and outreach.

Overall, this web-based service system demonstrated a very high level of reliability and functionality. This was evidenced by 100% success in opening the main page, registering, logging in, submitting forms, and document readability across both testing periods. Despite significant changes in the type of device used (increased laptop/PC usage in the post-test), user satisfaction levels remained at Very Satisfied and Satisfied levels (scores of 4 and 5). These results indicate that the system development successfully empowered Mandalamekar Village with an effective and user-friendly service platform (Suryana et al., 2023).

4. Conclusion

The development of a web-based village administration service system in Mandalamekar Village has successfully improved the quality of public services by digitizing population administration processes. The system's implementation has reduced service times by approximately 60%, improved data recording accuracy, streamlined archive management, and achieved an 85% community satisfaction rating. Furthermore, the training provided to village officials has improved their ability to operate the system independently, thus supporting the sustainability of digital transformation. Overall, the developed system has proven effective in increasing the efficiency, transparency, and accountability of village service governance and has the potential to become a model for digital implementation for other villages.

Recommendation

Based on the results of implementing these activities, the development of the web-based service system in

Mandalamekar Village requires ongoing maintenance, feature updates aligned with community needs, and enhanced user data security. Furthermore, further training is needed for village officials to optimize their system management skills and adapt to technological developments. Regular community outreach is also necessary to increase the utilization of digital services, ensuring optimal system implementation and a broader impact on improving the quality of village public services.

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