



Development of Village Administrative Data Management System Through *PAPEDA* (Village Population Administration Development Application) in Pitu Village, North Halmahera Regency

R A D Ikram^{1*}, A M Kahar², Gusrizal³

¹ BPS-Statistics North Halmahera Regency, Indonesia

² BPS-Statistics North Halmahera Regency, Indonesia

³ Ford de Kock University Bukittinggi City, Indonesia

*Corresponding author's email: riva.adli@bps.go.id

Abstract. *This study discusses the utilization of technology in managing village administrative data, improving public service systems, and providing base data for local government decision-making. Using qualitative methods for data collection and the SDLC Waterfall Model for system development, this research analyzes the benefits of PAPEDA (Aplikasi Pembangunan Administrasi Kependudukan Desa), an output of the Desa CANTIK program, on village administrative data management and public services. Based on the evaluation results using Black Box Testing and User Satisfaction Surveys, this study shows that technology utilization in villages positively impacts the community. The use of PAPEDA not only makes it easier for village officials to manage village administrative data but also accelerates the public service process in the village. Residents can access various administrative services online, anytime, and anywhere. Additionally, village monographs and stunting monitoring enable local governments to use them as a basis for development. However, uneven internet connectivity hinders technology utilization, emphasizing the need for local governments to improve internet infrastructure.*

Keyword: *Technology, PAPEDA, Data, Desa CANTIK.*

1. Introduction

In today's digital era, technology has developed rapidly and transformed various aspects of human life. Everything has become digital, from communication, transactions, to public services. According to [1], "Information technology is any integrated way or tool for collecting data, managing, sending, or presenting electronically into information in various formats that are beneficial to its users". This technological development has had a significant impact on various sectors, including government and society. Various benefits of technology can be felt in various forms, such as e-wallets, online taxis, e-commerce, and even e-government. Technology has made it easier for people to conduct transactions, access information, and obtain public services. Thus, technology has increased efficiency and effectiveness in various aspects of life.



However, there are still regencies and cities in North Maluku that have not felt the impact of this technology. This is marked by the uneven distribution of internet networks that can be accessed by the community. Based on data from the publication of the North Halmahera Regency Village Potential Statistics in 2024, it shows that out of 198 villages in North Halmahera Regency, only 49 villages have internet facilities in the village office, 12 villages have internet facilities that rarely function, 16 villages have internet facilities that do not function, and 121 villages do not have internet facilities [2]. Data management of administration managed by village officials is still traditional, namely manual recording using paper. Additionally, the procedure for public services is still complicated and requires a long time in the process of making it. It is expected that technological advancements can be felt down to the village level, where technology can help in managing village administrative data, making public services more efficient with an online system, and increasing transparency in village management.

Thus, technology can help improve the quality of life of rural communities. With this technology, policies issued by local governments can be more targeted because their implementation is based on accurate facts and data. This can help increase the effectiveness of policies and reduce errors in decision-making.

One of the technological advancements is marked by the development of information systems. According to [3], "The use of information systems to implement public services, introduce village potential, and socialize village development". Believing in the unstoppable impact of technology, we must be able to utilize and apply it in the village. So far, the village has still been treated as an object in the process of data collection and information management. This is reflected in the many data collection applications such as Prodeskel, SDGs Desa, and SIK-NG applied in the village. The Central Statistics Agency (BPS) as the institution authorized in the development of national statistics has an important role in encouraging the improvement of village capacity, especially in the management, utilization, and understanding of data, through sectoral statistical development at the village level.

Desa Cinta Statistik (Desa CANTIK) program is present as a sustainable initiative designed comprehensively to foster village statistical capabilities. This program is part of a national strategy that aims to strengthen village capacity in identifying data needs and exploring and utilizing its potential optimally, such as managing community data, providing administrative services, and providing village monograph data that can be accessed by residents. One of the outputs of the implementation of *Desa CANTIK* in Pitu Village, North Halmahera Regency, is the provision of a village data management information system in the form of *PAPEDA (Aplikasi Pembangunan Administrasi Kependudukan Desa-Village Population Administration Development Application)*.

In this study, research was conducted on the utilization of technology in managing village administrative data, improving public service systems, and providing basic data for local government decision-making using qualitative methods. Thus, I hope to understand how technology can help village officials, local governments, and communities in improving the quality of life and efficiency in village management. This study analyzes the benefits of using *PAPEDA* on village administrative data management and public services.

2. Related Research

There are several studies related to this research, including the study conducted by [4] who developed a website and village information system using OpenSID in Tulungagung Regency. The information system is the result of a community service program to help village officials in publishing their potential and managing village administrative data digitally.

Another study by [5] on the implementation of a village information system using OpenSID in Tanjung Dayang Selatan Village. The study is the result of a community service program that provides training on the use of village information systems. The success of the training is reflected in the evaluation filled out by 10 training participants. The evaluation results show that participants can



understand the training material well, even though none of the participants had previously interacted with the application. Additionally, the training can increase participants' knowledge and optimize village information services. Another study by [6] on the development of a village information system for good village governance based on ICT using the life cycle method with stages of analysis, design, coding, testing, and implementation. Based on the study, the village information system can help manage population data, display statistical data on village community conditions, manage village profile data, and manage incoming and outgoing letters.

The next study by [7] is about a village information system application as an appropriate technology for population data collection and village potential in Central Lombok. Based on the study, village officials are greatly assisted in managing village data because village development and data such as population data, village financial data, and village administrative data can be recorded well. Additionally, there is a village tourism profile menu that can help tourists know the locations in Central Lombok.

The following research by [8] is about citizen participation in the Terong Village information system in Bantul Regency. Based on the study, it explains that this information system emerged due to the desire of the community and village officials to archive population data and provide public services. The socialization of this information system by young people to the community greatly helps in community participation in its use and utilization. Because the sustainability of an information system is heavily influenced by community participation and its benefits to the community.

The following research by [9] is about problems of implementing the Village Information System (SID) in Indonesia. Based on this research, it is explained that with the existence of an information system, villages can provide data that can be used as consideration in making development policy decisions, provide better public services, and provide transparent and accountable information to the community. However, in its implementation, there are challenges such as incomplete village administrative data, lack of human resources in the village that can develop the village information system, and sometimes the information system created is not tailored to the needs of the village.

The subsequent research conducted by [10] is about analysis of implementing an integrated village information system in Serang Regency. According to this research, with the existence of a village information system, the community can experience better public services that are accessible from anywhere. Additionally, village data and information are presented transparently and accountably. The success of the information system implementation is influenced by several supporting factors, including adequate budget support, clear division of roles among stakeholders, and completeness of content provided in the Village Information System.

The subsequent research conducted by [11] is about designing a village information system for Tomuan Holbung village using the waterfall method. According to this research, the implementation of a village information system developed in the form of a website makes it easier for village officials to process and manage data. Through this system, the delivery of information related to village governance can be more organized, faster, and able to improve the effectiveness and efficiency of services to the community.

This research is based on studies [4], [5], [6], [7], [8], [9], [10], [11], which serve as a foundation for developing the *PAPEDA* application in Pitu Village. This application is highly beneficial for managing village administrative data, improving public service systems, and providing basic data for local government decision-making. The differences between this research and the aforementioned studies are: Firstly, it offers public services such as administrative certificate issuance (e.g., family card, identity card, birth/death certificate, domicile certificate, relocation certificate, and others) that can be completed online within 2-5 minutes. Secondly, it features stunting monitoring that displays locations of households with stunting cases. Thirdly, it includes village monograph data that can be used as a basis for village development policy-making.



3. Research Method

3.1. Data Collection Methode

According to [12], the qualitative approach encompasses a series of methods that are interpretive in nature and aim to uncover the meaning behind a social event that occurs naturally. The primary focus of this approach is not on how often a phenomenon occurs, but rather on gaining a deep understanding of the meaning behind the event. According to [13], the qualitative approach provides researchers with the opportunity to explore individual experiences in detail through various focused techniques, such as in-depth interviews, group discussions, direct observation, content analysis, visual-based methods, and life story or biography tracing. In this study, data collection was conducted in four ways, namely : Literature review, Observation, Interview and Discussion.

3.2. System Development Method

The system development method used in this research is the System Development Life Cycle (SDLC) with a Waterfall model [14]. This waterfall model consists of 5 stages: planning, analysis, design, implementation, and evaluation, which are explained as follows:

1. Planning

In the planning stage, the researcher collects data and information by conducting interviews and discussions with subject matter experts, including Pitu Village Officials, Public Works and Spatial Planning Office, Department of Education, Department of Population and Civil Registration, Regional Planning and Development Agency, Research and Development Agency, Department of Communication and Information, and Subdistrict Head of Central Tobelo. The interviews and discussions aim to discuss existing problems in public service processes and village administrative data management. The researcher then conducts a literature review to find relevant references. Observasi (observation) is also conducted on the existing public service processes and village administrative data management in Pitu Village.

2. Analysis

After conducting interviews, discussions, literature reviews and observations on the problems in the current system, a need analysis is carried out using a cause-and-effect diagram analysis approach. This analytical tool was first introduced by Dr. Kaoru Ishikawa in 1943 and serves to illustrate the relationship between a problem and its various causal factors. According to [15] this diagram, also known as a fishbone diagram, consists of a main line and supporting symbols that visually illustrate the relationship between cause and effect. The end of the diagram shows the problem being faced, while the branches, resembling the structure of a fish skeleton, represent various causes that are grouped into several main categories, such as human factors, materials, machines, methods, and environment. Liliana explains that the process of using a fishbone diagram involves four stages: (1) formulating the problem, (2) identifying the main elements that influence it, (3) exploring possible causes, and (4) evaluating the results of the diagram analysis [16].

3. Design

In the design stage, based on the analysis results, the researcher designs a business process system proposal to overcome the problems. Then, database design, public service flow design, and user interface design are conducted.

4. Implementation

The implementation stage involves developing the system based on the previously designed plan. The researcher develops the application using the CodeIgniter 3 framework and Admin LTE 3 as the interface template. Visual Studio Code is used for application development, while MySQL is



used as the Database Management System (DBMS). The application is then hosted on a web hosting service to enable online access.

5. Evaluation

In the evaluation stage, testing and evaluation of the proposed system are conducted with village officials using Black Box Testing [17] and a user satisfaction survey for the *PAPEDA* application.

4. Result and Discussion

The *Desa CANTIK* program implemented by BPS North Halmahera Regency in Pitu Village has several stages, as follows:

1. BPS held discussions with various agencies (Public Works and Spatial Planning Office, Department of Education, Department of Population and Civil Registration, Regional Planning and Development Agency, Research and Development Agency, Department of Communication and Information, Subdistrict Head of Central Tobelo, Pitu Village Officials) to determine the data to be collected and displayed on *PAPEDA*.
2. Identification of needs related to public services and menus required by village officials and the community for *PAPEDA* application development.
3. Development of *PAPEDA* according to the results of the identification of village needs.
4. Training on basic statistics and business processes in data collection, processing, and dissemination to village officials.
5. Testing of *PAPEDA* to determine whether the menus and public services created meet the needs of village officials and the community.
6. Launching of the *PAPEDA* application, attended by the Head of BPS North Maluku Province, Deputy Regent of North Halmahera, OPD North Halmahera Regency, and Heads of BPS Regency/City throughout North Maluku.
7. Socialization of *PAPEDA* usage to the Pitu Village community.

4.1. Needs Analysis

Based on the results of observations and interviews conducted by researchers, the old village administrative data management system can be overcome by utilizing technology in the form of *PAPEDA* implementation. This can be identified using a fishbone diagram as follows.

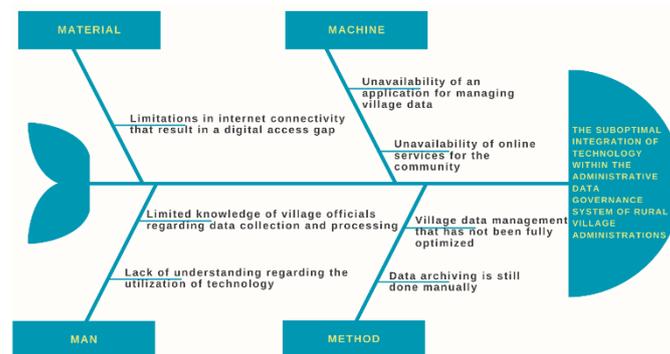


Figure 1. Fishbone Diagram

1. Man



The limited knowledge of village officials regarding technology is a significant factor affecting the village data management system. Additionally, there is a lack of knowledge among village officials regarding data collection, processing, and dissemination. The *Desa CANTIK* program implemented by BPS can help village officials to follow proper procedures for data collection, processing, and dissemination according to the General Statistical Business Process Model (GSBPM) applied by BPS. GSBPM is a business process used by data producers to obtain high-quality data. BPS North Halmahera Regency also introduced the use of technology to village officials through the development of *PAPEDA*. The results and discussion sections may be written as separate subsection or combined into one.

2. Material

The uneven distribution of internet networks is a major obstacle in rural areas, resulting in a digital divide. As a result, rural communities are often isolated from important digital information and services, including online education, remote healthcare, and digital economic opportunities. To overcome this issue, a joint effort is needed from the government, internet service providers, and the community to build adequate infrastructure, reduce access costs, and increase digital literacy in rural areas.

3. Machine

The lack of applications that manage village administrative data and public services that can be accessed online is a challenge for village officials. With *PAPEDA*, village officials can manage village administrative data effectively, and the community can access administrative services online from anywhere and at any time. Additionally, local governments can make informed policies for village development based on existing data, such as village monograph data and stunting data.

4. Method

The management of archives at the village government level is often disorganized and manual. This can hinder administrative effectiveness and public services. Moreover, there is a risk of losing and damaging important documents. With *PAPEDA*, village data can be well-archived, and data can be updated in real-time.

4.2. Recommended Business Process System

Based on the needs analysis, the researcher designs a public service business process system, as shown in Figure 3, to overcome the problems of the previous public service business process, as shown in Figure 2. This proposed system business process makes it easier for villagers to access public services, as they can be accessed from anywhere and at any time without requiring a lot of time.

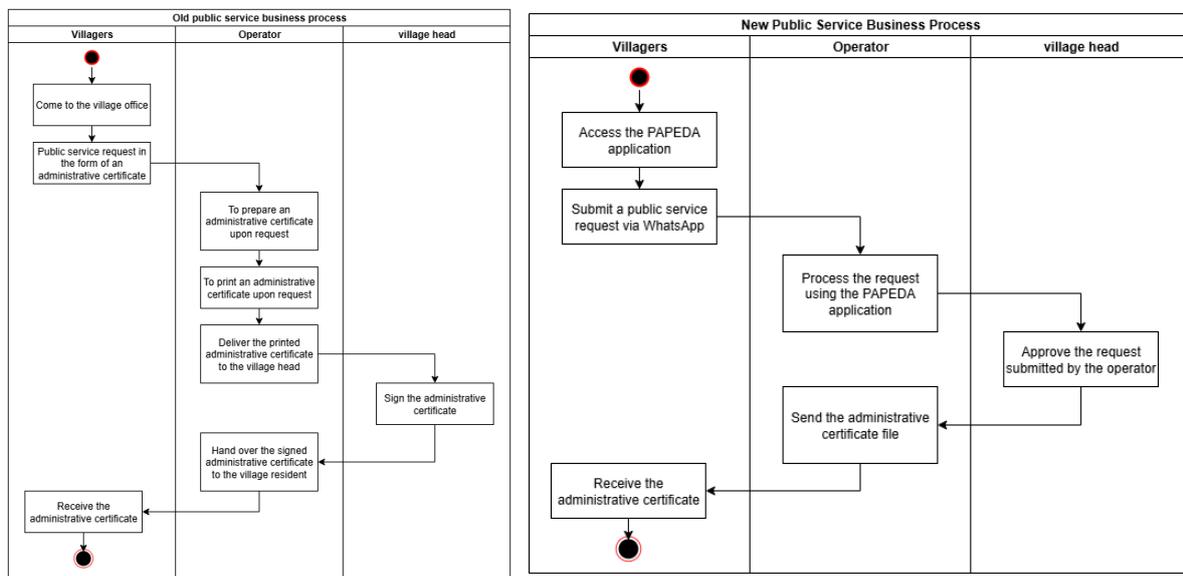




Figure 2. Old Public Business Process

Figure 3. New Public Business Process

4.3. Use Case Diagram

In the proposed system, there are several roles that can access the *PAPEDA* application, including villagers, operators, and the village head. Each role has different access levels, as illustrated in the use case diagram in the figure.

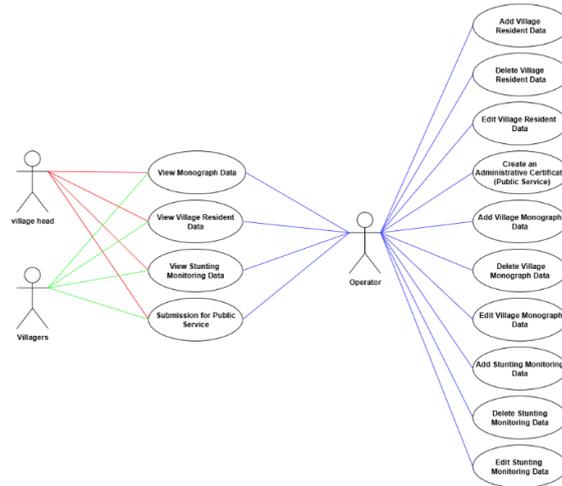


Figure 4. Use Case Diagram

4.4. User Interface Implementation

Based on the results of the needs analysis, the proposed system business process, and use case diagrams, researchers developed a user interface consisting of several displays: first, a landing page, a village monograph page, and a stunting monitoring page, accessible to everyone. Second, a login page accessible only to operators and village heads. Third, an admin page accessible only to operators.

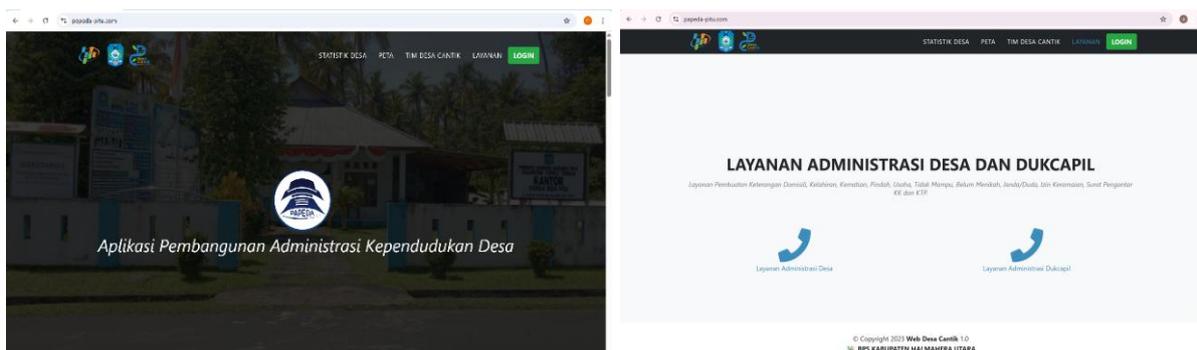


Figure 5. *PAPEDA* Landing Page Display

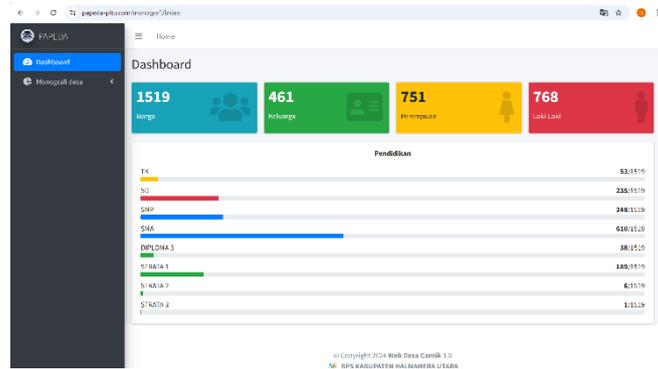


Figure 6. Monograph Dashboard

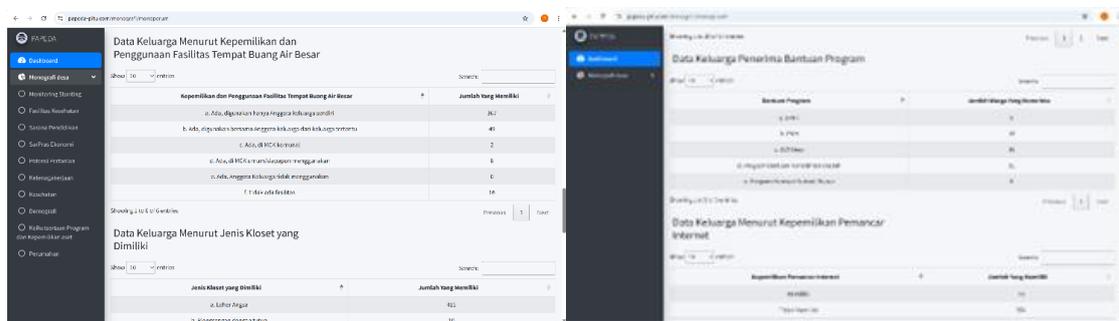


Figure 7. Village Monograph

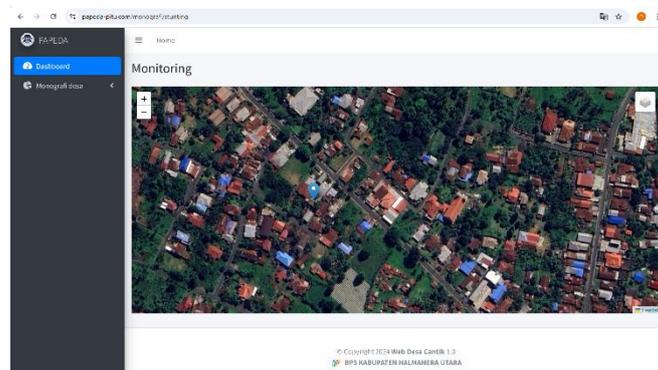


Figure 8. Stunting Data Monitoring

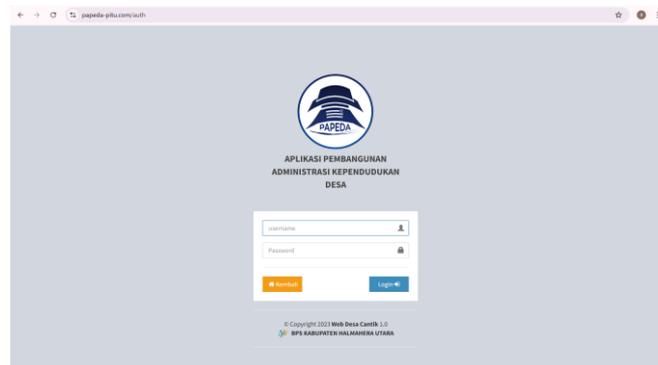




Figure 9. Operator Login Screen

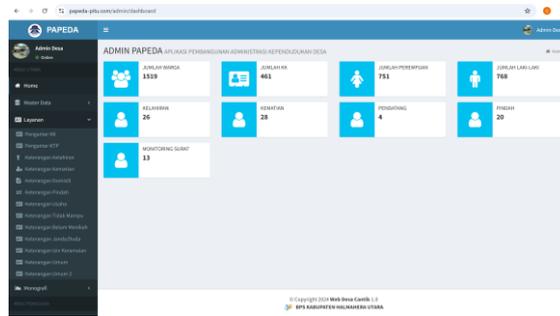


Figure 10. Demographic Dynamics Dashboard

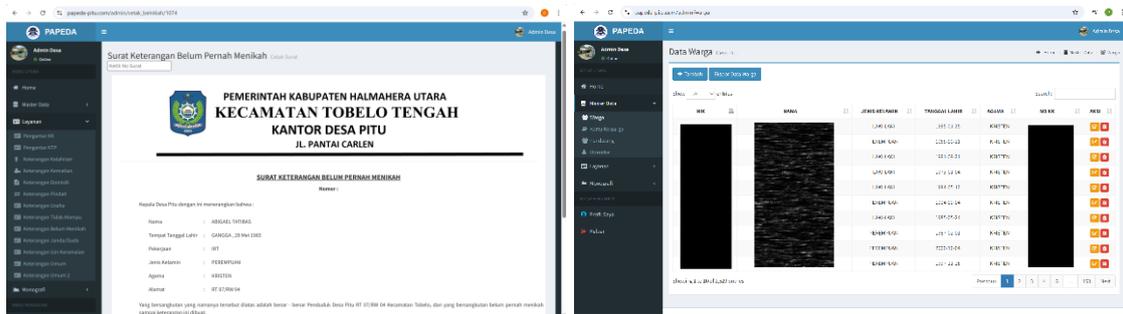


Figure 11. Public Service and Village Resident Data Management Page

4.5. PAPERDA Application Evaluation

In this study, the researcher conducted testing of the PAPERDA application using the black box testing method. The researcher created several test scenarios, including logging into PAPERDA, adding resident data, deleting resident data, editing resident data, creating administrative certificate letters for public services, and submitting public service requests. Based on the testing scenarios, the results showed that all features in PAPERDA functioned as expected and were successfully executed with satisfactory results.

Table 1. Customer Satisfaction Survey Questions

No.	Question	Score				
		1	2	3	4	5
1	How easy is it for you to access PAPERDA services?	Very Difficult	Difficult	Neutral	Easy	Very Easy
2	Is the service procedure easy to understand and follow?	Very Difficult To Understand	Difficult To Understand	Neutral	Easy To Understand	Very Easy To Understand
3	Are you satisfied with the overall service?	Very Dissatisfied	Dissatisfied	Neutral	Satisfied	Very Satisfying



- 4 How would you rate the speed of the service provided? Very Slow Slow Neutral Fast Very Fast

Table 2. Results of the user satisfaction survey

No	Question	Average Score
1	How easy is it for you to access <i>PAPEDA</i> services?	4,96
2	Is the service procedure easy to understand and follow?	4,90
3	Are you satisfied with the overall service?	4.93
4	How would you rate the speed of the service provided?	4.96

Based on the results of the user satisfaction survey evaluation of *PAPEDA* with questions listed in table 1, which was filled out by 30 respondents, it shows that in general, respondents have a high level of satisfaction with the existence and function of this application in supporting more effective and efficient public administration services.* Most users assess that *PAPEDA* is able to simplify the service process, which was previously manual, into a faster, more transparent, and easily accessible process.

Based on table 2, it can be seen that the results of the public satisfaction survey can be described in two aspects, namely the aspect of user-friendliness and service speed. From the **aspect of user-friendliness**, based on questions 1, 2, and 3, the majority of respondents stated that the application interface is quite intuitive and easy to understand, even for users without a technical background. The value of question 1 is 4,96, which means that users can easily access *PAPEDA* services. The value of question 2 is 4,90, which means that the service procedure is easy to understand. The value of question 3 is 4.93, which means that respondents are very satisfied with the *PAPEDA* service overall.

In terms of **service speed**, based on question 4, the *PAPEDA* application is considered successful in significantly reducing the time required for administrative processing. Users feel more comfortable because they can submit service requests from anywhere without having to come directly to the service office. This is in line with the increased satisfaction in the indicators of time efficiency and reduced queues, as reflected in the value of question 4, which is 4.96.

Here is the utilization of technology applied in Pitu Village, North Halmahera Regency, in the form of *PAPEDA*:



Figure 12. Testimonials from The Community & Village Official



Laporan Penggunaan Aplikasi PAVEDA Desa Pitu
Tahun 2024

Layanan	Bulan											
	Januari	Februari	Maret	April	Mei	Juni	Juli	Agustus	Sep	Okto	Nov	Des
1 Pembuatan Pengantar KK	0	1	0	0	1	2			1	1		
2 Pembuatan Pengantar KTP	1	0	0	0	1					1		
3 Pembuatan Keterangan Kelahiran	0	1	0	1	8	7	1		3	2	1	
4 Pembuatan Keterangan Kematian	1	0	0	1		1	2	1	1	1	2	1
5 Pembuatan Keterangan Domisili	4	2	4	4	2	6	2	3	3		2	2
6 Pembuatan Keterangan Pindah	3	0	2	0	1					1		
7 Pembuatan Keterangan Usaha	4	5	9	7	3	6	3	3			8	2
8 Pembuatan Keterangan Tidak Mampu	0	2	0	1		1	1	2		1	1	
9 Pembuatan Keterangan Belum Pernah Menikah	0	1	0	1	1		2			2		
10 Pembuatan Keterangan Janda/Duda	1	1	0	0		2						
11 Pembuatan Izin Keramaian	1	0	0	1	1		1	1			1	
12 Pembuatan Keterangan Umum	2	2	1	6	4	2	4	2	2	2	3	5
Jumlah	17	15	16	22	22	27	16	12	9	19	12	8



Figure 13. PAVEDA Usage Report For The Year 2024

PAVEDA can be a solution in utilizing technology in the village population administration data management system, as village population administration data can be updated in real-time and well-archived. With the village monograph and stunting monitoring, the government can use it as basic data in policy-making for village development. Families identified as having stunted babies can be followed up quickly and precisely. In addition, with public services that can be accessed online by the community, it can help with administrative needs. The community does not need to come to the village office, as these services can be accessed anywhere and anytime.

5. Conclusion

The results of this study show that the utilization of technology in the village has a positive impact on the village community. The use of *PAVEDA* not only makes it easier for village officials to manage village administrative data, but also accelerates the public service process in the village. The community can manage various administrative needs from anywhere and anytime with online services. Additionally, with the village monograph and stunting monitoring available on *PAVEDA*, local governments can use it as basic data for development. The success of this service is indeed supported by adequate internet services throughout the village. The lack of uneven internet networks is a constraint in maximizing the use of this technology, therefore, efforts are needed from local governments to build better internet networks so that *PAVEDA* can be replicated to all villages in North Halmahera Regency.

Government support for equal distribution of internet networks is a key point in technological advancement in villages, as the application will run well with the presence of internet. The steps that can be taken by the government are to collaborate with internet providers to install internet networks in villages. With the '*Desa CANTIK*' program implemented by BPS, which aims to foster the process of collecting, processing, and disseminating data, it can help village officials to display valid and up-to-date data. Another target of this program is to help and educate village officials and the community on the use of technology that can make work easier. It is expected that local governments and village governments can support and actively participate in the implementation in the '*Desa CANTIK*' program.

References



- [1] D. Rahmawati, "Analysis of factors influencing the utilization of information technology," *Journal of Economics and Education*, vol. 5, no. 1, pp. 107–118, 2012.
- [2] Badan Pusat Statistik Kabupaten Halmahera Utara, "Village Potential Statistics of Halmahera Utara Regency 2024", Catalog No. 1105014.8205, Publication No. 82050.24038, released December 30, 2024.
- [3] R. Jahja *et al.*, "Village information system: Information and data system for village renewal," *Journal of Communication Research*, vol. 17, no. 2, pp. 129–140, 2012, COMBINE Resource Institution (CRI).
- [4] F. Rozi and T. Listiawan, "Development of website and village information system in Tulungagung Regency," *JUPI (Scientific Journal of Informatics Research and Learning)*, vol. 2, no. 2, pp. 107–112, Dec. 2017.
- [5] Abdiansah, A. S. Utami, N. Yusliani, K. J. Miraswan, and A. F. Oklilas, "Implementation of village information system using OpenSID in Tanjung Dayang Selatan Village, Ogan Ilir Regency, South Sumatra," *DINAMISIA: Journal of Community Service*, vol. 5, no. 6, pp. 1472–1479, Dec. 2021.
- [6] R. Fitri, A. N. Asyikin, and A. S. B. Nugroho, "Development of village information system towards good governance based on ICT," *Jurnal Positif*, vol. 3, no. 2, pp. 99–105, 2017.
- [7] Syaharuddin, "Application of village information system as an appropriate technology for population and village potential data collection," *Jurnal Masyarakat Mandiri*, vol. 1, no. 1, pp. 60–67, Dec. 2017.
- [8] F. Sulistyowati and M. C. C. R. Dibyorin, "Citizen participation in village information systems," *Jurnal Komunikasi ASPIKOM*, vol. 2, no. 1, pp. 579–587, Jul. 2013.
- [9] A. Karimullah, R. R. Maulany, and M. A. Ma'mal, "Problems in the Implementation of the Village Information System (SID) in Indonesia," *Jurnal Laboratorium Syariah dan Hukum*, vol. 3, no. 4, Aug. 2022.
- [10] A. R. Putra and S. Silfiana, "Analysis of the Implementation of the Integrated Village Information System in Serang Regency," *Regional Development Policy Journal: Research and Development Journal of Regional Development Policy*, vol. 6, no. 1, pp. 67–78, Jun. 2022.
- [11] Supiyandi, M. Zen, C. Rizal, and M. Eka, "Design of Tomuan Holbung Village Information System Using the Waterfall Method," *JURIKOM (Journal of Computer Research)*, vol. 9, no. 2, Apr. 2022.
- [12] D. R. Cooper and P. S. Schindler, *Business Research Methods*. Jakarta, Indonesia: PT Media Global Edukasi, 2006.
- [13] M. Hennink, I. Hutter, and A. Bailey, *Qualitative Research Methods*. London, U.K.: SAGE Publications Ltd., 2011.
- [14] Y. Bassil, "A simulation model for the waterfall software development life cycle," *The International Journal of Engineering & Technology*, vol. 2, no. 5, 2012.
- [15] L. Liliana, "A new model of Ishikawa diagram for quality assessment," *Materials Science and Engineering*, vol. 161, no. 1, p. 012099, 2016.
- [16] D. H. Besterfield, *Quality Control*, 7th ed. Upper Saddle River, NJ, USA: Pearson Prentice Hall, 2004.
- [17] S. Nidhra, "Black box and white box testing techniques — A literature review," *International Journal of Embedded Systems and Applications*, vol. 2, no. 2, pp. 29–50, Jun. 2012, doi:10.5121/ijesa.2012.2204.