Implementation of Chatbot-Based Digital Services to Optimize Community Service Processes in Inbate Village, Indonesia – Timor Leste Border Area

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Abstract.
Inbate Village is located in the border area between Indonesia and Timor Leste and still experiences limitations in public service accessibility. Administrative services are mostly conducted manually, causing delays, increased workload for village staff, and difficulties for citizens in obtaining information. This community service activity aimed to implement chatbot-based digital services to improve the efficiency, accessibility, and transparency of public services in Inbate Village. The implementation method included needs analysis, chatbot development, training and socialization, implementation, and evaluation stages. The chatbot was integrated into the village website and WhatsApp platform to provide administrative information, document requirements, service schedules, and complaint services. The activity was conducted over eight months, starting from September 2025 until April 2026. The implementation schedule consisted of preparation and needs analysis in September 2025, chatbot development during October–November 2025, training and socialization in December 2025, implementation and monitoring from January to February 2026, and evaluation and refinement during March–April 2026. The results showed that the chatbot successfully improved service effectiveness, reduced queues at the village office, and enhanced digital literacy among village officials and residents. This activity also provides a model for AI-based public service implementation in border areas.

Keywords: *chatbot, public services, digital village, border area and artificial intelligence.*

I. INTRODUCTION

Inbate Village is located in Bikomi Nilulat District, North Central Timor Regency (TTU), East Nusa Tenggara Province, Indonesia, directly bordering the Oecusse region of the Democratic Republic of Timor-Leste [1]. The village covers an area of approximately 16 km² and had a population of 1,187 people in 2023, with a relatively low population density of around 74 people per km² [2]. In general, the majority of the population in TTU Regency falls within the productive age group (15–64 years), accounting for approximately 64% of the projected population of 275,439 people in mid-2024 [3]. This demographic pattern is also reflected in Inbate Village, where most residents are of productive age, providing significant potential for the adoption and utilization of digital public services.

In terms of infrastructure, Inbate Village is currently covered by telecommunication networks, although the quality of connectivity still varies across several areas. Internet access has increasingly become an essential need, particularly for younger generations who actively use social media and digital services in their daily activities. In addition, the village government already operates an official website; however, its use remains limited to basic information publication and has not yet been optimized as an interactive platform capable of supporting comprehensive digital public services. With a predominantly productive-age population and the availability of basic network infrastructure, Inbate Village possesses strong potential to develop a more participatory, transparent, and responsive digital governance system that meets the needs of the community [4].

Due to its location in a border region, far from urban centers and with limited road access, the people of Inbate Village often face various challenges in accessing public services, ranging from administrative procedures to obtaining information from the village office. At present, most services are still conducted manually and through face-to-face interactions. The use of conventional record-keeping systems requires more time and carries a higher risk of errors and data loss. These conditions present significant challenges for village officials in maintaining service accuracy and efficiency. Furthermore, the level of understanding

and utilization of information technology among both village officials and community members remains relatively low. This limited digital literacy slows the modernization of public services, even though technology has substantial potential to accelerate processes, simplify workflows, and improve service quality.

Fig. 1 Interview and Data Collection

The workload of village officials is also considerably high because only two staff members—the village secretary and the head of general affairs—are responsible for handling all correspondence and administrative matters. This limited workforce is not proportional to the volume of services required by the community. The situation becomes even more complex due to the need for special administrative documents, such as cross-border permits, which require fast and accurate processing. On the other hand, community members often encounter difficulties in obtaining timely, accurate, and up-to-date information regarding procedures, requirements, and service schedules. The lack of effective information channels forces some residents to visit the village office directly simply to ask for specific information. Nevertheless, the high proportion of productive-age residents who are capable of accessing digital services indicates substantial potential for the development of faster, more transparent, and more accessible public services.

Along with the advancement of technology, Artificial Intelligence (AI)-based chatbots have emerged as an innovative solution to assist village governments in delivering more effective and efficient services. Chatbots accessible through smartphones—which are already owned by most community members—enable services to be provided anytime without requiring residents to visit the village office directly [5]. Through the implementation of AI-based chatbots, citizens can access service information, submit administrative requests, and monitor application status in real time. This approach is expected to reduce the workload of village officials, accelerate service delivery, and increase public satisfaction. In addition, the growing use of digital devices such as smartphones among the productive-age population presents a strategic opportunity to implement chatbot-based digital services integrated with popular communication platforms such as WhatsApp, Telegram, Facebook Messenger, and websites as accessible automated public service channels [6].

In the field of public services, chatbots are increasingly being utilized to support village governments and other institutions in providing information, handling administrative processes, and responding to public inquiries 24 hours a day [7]. Beyond public administration, chatbot applications have also expanded into various other sectors. In education, chatbots function as virtual learning assistants by providing additional learning materials, answering students' questions, and reminding them of academic schedules [8]. In business, chatbots play a significant role in customer service by providing product information, facilitating transactions, and handling consumer complaints automatically [9]. In healthcare, chatbots are utilized for initial consultations, health service scheduling, and providing healthy lifestyle information [10]. With their high flexibility and accessibility, chatbots have become a digital innovation capable of enhancing service effectiveness across multiple sectors of society.

The proposed chatbot system will be integrated into the village's official website and WhatsApp platform. The system will facilitate document submissions, provide service information such as cross-border permits, population administration, and service schedules, enable application status tracking, and handle public complaints. By optimizing digital access through chatbot technology, Inbate Village can accelerate service processes, reduce administrative burdens, maintain transparency, and improve the quality of public services, while simultaneously strengthening its position as a responsive border-region village government.

II. METHODS

The implementation of this program is carried out through several stages as follows:

1. Preparation Stage

This stage begins with observing public service needs. The team conducts field observations, interviews with village officials, and identifies the types of administrative services commonly used by the community. Furthermore, a chatbot workflow design is developed in accordance with village service procedures.

2. Development and System Testing

At this stage, the development of the chatbot system is carried out using an easy-to-operate platform integrated with the village website and WhatsApp application. The chatbot system is designed to:

a. Provide public service information
b. Answer frequently asked questions automatically
c. Provide administrative requirement information
d. Deliver village service schedules
e. Offer a public complaint service

After the development process is completed, limited testing is conducted together with village officials and community representatives.

3. Training and Socialization

Training is provided to village officials as chatbot system administrators. In addition, socialization activities are conducted for the community regarding how to use the chatbot through smartphones and the village website. In this stage, a user guide booklet is also distributed.

4. System Implementation

The chatbot system is directly implemented in public services for three months. The development team provides assistance and monitoring to ensure that the chatbot operates effectively and can be properly utilized by the community.

5. Evaluation

The evaluation stage is conducted through user satisfaction questionnaires and interviews with community members and village officials. This evaluation aims to determine the level of user satisfaction, service effectiveness, and obstacles encountered in using the chatbot. The evaluation results are then used for further system feature development.

III. RESULT AND DISCUSSION

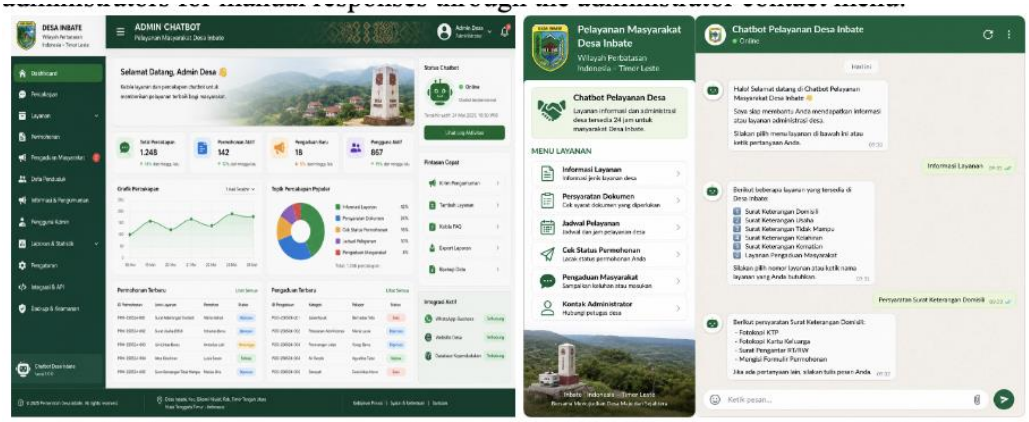
Implementation of the Village Service Chatbot

The results of the community service program indicate that the chatbot system was successfully implemented through the village website and WhatsApp application. The system is capable of providing automated administrative information services to the community for 24 hours a day.

The main features of the chatbot include:

1. Administrative procedure information
2. Document requirement information
3. Village service schedules
4. Application status tracking
5. Public complaint services

The system operates automatically based on the village service database. If certain information is unavailable, community inquiries are forwarded to village administrators for manual responses through the administrator contact menu.



Chatbot admin menu on website Chatbot user menu on WhatsApp

Fig 2. Chatbot Menu

Improved Service Effectiveness

The implementation of the chatbot successfully reduced service queues at the village office. Community members no longer need to visit the office directly simply to obtain administrative information. This system is especially beneficial for residents living far from the village office.

In addition, the chatbot helps village officials manage public services in a more structured and efficient manner, reducing the administrative workload that was previously handled by only two village staff members.

Improvement of Digital Literacy

The training and assistance provided through this program improved the digital capabilities of both village officials and community members in utilizing digital technology. Residents became more familiar with accessing information and digital administrative services.

This activity also demonstrated that productive-age communities in border areas have significant potential to adopt AI-based digital services.

Program Impact

The community service program generated several positive impacts, including:

1. Improving the quality of village public services.
2. Reducing community time and service costs.
3. Increasing service transparency.
4. Strengthening responsive public service delivery.
5. Serving as a model for AI-based digital village implementation in border areas.

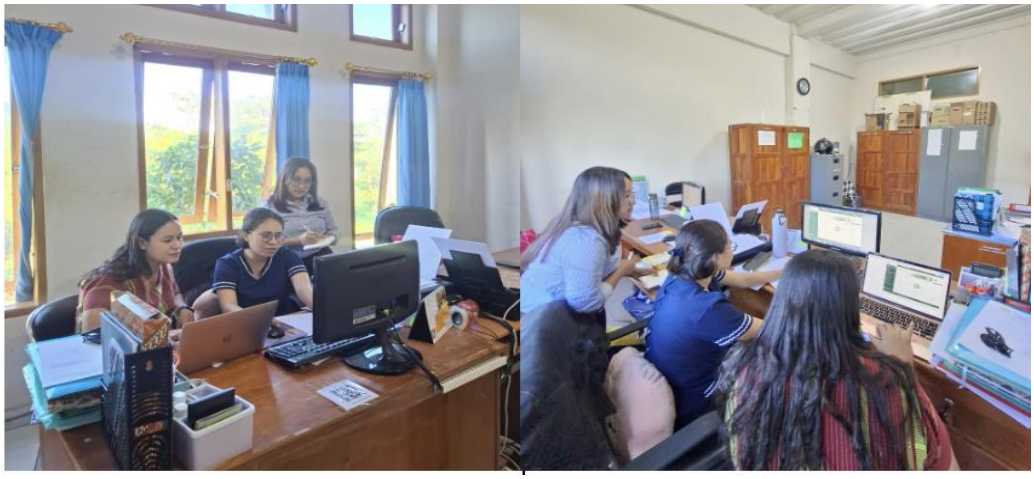


Fig 3. Training to Staff

Evaluation

The evaluation of the community service program was conducted using questionnaires and interviews involving 30 community members and village officials who used the chatbot service system.

Table 1. Questionnaire Evaluation Results

Evaluation Aspect	Percentage (%)	Category
Ease of Use	92%	Very Good
Information Clarity	88%	Good
Service Response Speed	90%	Very Good
User Satisfaction	91%	Very Good
Reduction of Direct Visits	85%	Good
Service Effectiveness	89%	Good

Table 2. Interview Results Summary

Indicator	Result
Administrative workload reduction	Reduced by approximately 40%
Faster information access	Increased significantly
Community response	Positive and supportive
Main obstacle	Internet network stability
Development suggestion	Addition of local language features

Fig 4. Graph of User Satisfaction Results

Based on the evaluation results, the chatbot system was able to improve the effectiveness, accessibility, and efficiency of public services in Inbate Village. Most users expressed satisfaction with the digital service system, while village officials reported a reduction in administrative workload and faster service delivery processes.

IV. CONCLUSION

The implementation of chatbot-based digital services in Inbate Village has successfully contributed to optimizing public services in the Indonesia–Timor Leste border region. The chatbot system has improved the accessibility of administrative services, accelerated service processes, and assisted village officials in managing information more effectively.

This program has also enhanced the digital literacy of both the community and village officials, while opening opportunities for the development of AI-based public service innovations in other border areas. In the future, the system can be further developed by adding more comprehensive administrative service features and integrating it with other village government systems.

V. ACKNOWLEDGMENTS

The authors would like to express their sincere gratitude to the Institute for Research and Community Service (LPPM) for the financial support and institutional assistance provided throughout the implementation of this community service program.

The authors also extend their appreciation to the Government and community of Inbate Village, Bikomi Nilulat District, North Central Timor Regency, for their cooperation, active participation, and valuable support during the development and implementation of the AI-based chatbot public service system.

Special thanks are also addressed to all village officials, community representatives, and participants who contributed their time, ideas, and feedback to ensure the success of this program. Their collaboration and enthusiasm greatly supported the achievement of the program objectives and the advancement of digital public services in border areas.

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