

UTILIZATION OF INDONESIAN LANGUAGE-BASED AI CHATBOT FOR DIGITAL PUBLIC SERVICES

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Abstract

The rapid development of artificial intelligence (AI) has significantly transformed public service sectors, particularly through the implementation of chatbot technology. This study aims to analyze the utilization of Indonesian-language-based chatbots in improving the efficiency, accessibility, and interactivity of digital public services in Indonesia. A qualitative approach was employed by combining literature review and case analysis of chatbot implementation in government institutions. The results indicate that chatbots equipped with natural language processing (NLP) in the Indonesian language can accelerate service responses, reduce staff workload, and enhance citizen satisfaction. Nevertheless, several challenges remain, including limited understanding of local language context, data security concerns, and the readiness of government digital infrastructure. This study recommends strengthening collaboration among government, academia, and AI developers to build an inclusive and efficient digital public service ecosystem in the future.

Keywords: Chatbot, AI, Service, Digital, Language.

INTRODUCTION

The development of Artificial Intelligence (AI) technology has brought significant transformation across various sectors, including public services. Governments in many countries have begun adopting AI-based technologies to improve the efficiency, transparency, and accessibility of services for citizens (Rahman & Sari, 2022). One increasingly popular implementation is the use of chatbots, which are automated conversational systems capable of interacting with users through text or voice (Kurniawan & Widodo, 2021).

In Indonesia, the digitalization of public services is part of the broader e-government agenda aimed at strengthening technology-based governance (Ministry of Communication and Informatics, 2023). However, most digital systems still focus on providing static information and have not fully enabled dynamic and responsive interactions tailored to citizens' needs. In this context, AI-based chatbots developed in the Indonesian language hold strategic potential to bridge communication between the government and the public in a faster, more accessible, and more personalized manner.

The ability of chatbots to understand and process natural language through Natural Language Processing (NLP) enables these systems to deliver relevant responses to a wide range of user inquiries (Pratama et al., 2021). When trained in the Indonesian language, chatbots can recognize local contexts, dialects, and the diverse communication styles of Indonesian society (Santoso & Rahayu, 2022). This positions chatbots not merely as administrative tools, but as inclusive public service innovations that are oriented toward enhancing user experience.

Nevertheless, the implementation of AI chatbots in public services still faces several challenges, including the accuracy of language understanding, system reliability in addressing complex queries, and concerns related to data security and privacy (Putri & Nugroho, 2023). Therefore, this study seeks to analyze the potential, challenges, and implementation strategies of Indonesian-language AI chatbots within the context of digital public services. Through this approach, it is expected that a comprehensive understanding can be achieved regarding how chatbot technology can be optimized to support the digital transformation of governance in Indonesia.

Although several previous studies have discussed the implementation of AI chatbots in customer service and digital platforms, studies focusing specifically on Indonesian-language AI chatbots in the context of public digital services remain relatively limited. Existing research tends to emphasize technological aspects without sufficiently examining how language adaptation, service accessibility, and institutional readiness interact within public service environments. Therefore, this study contributes by providing a comprehensive analysis of the opportunities, challenges, and optimization strategies for Indonesian-language AI chatbots in supporting digital public service transformation in Indonesia.

LITERATURE REVIEW

1. Artificial Intelligence in Public Services

Artificial Intelligence (AI) has become one of the main drivers of digital transformation in the government sector. AI is utilized to improve administrative efficiency, accelerate decision-making processes, and expand public access to services (Rahman & Sari, 2022). Within the context of e-government, AI functions to automate repetitive bureaucratic processes, predict service demands, and optimize the use of public data (Wahyudi, 2021).

The application of AI in the public sector is also closely linked to efforts to enhance transparency and accountability. According to Nugroho (2022), AI enables governments to deliver data-driven governance, allowing policies and decisions to be more objective and responsive to citizens' needs.

2. Chatbots as an Innovation in Digital Public Services

Chatbots are conversational systems that utilize Natural Language Processing (NLP) technology to interact with users through text or voice (Kurniawan & Widodo, 2021). In public service delivery, chatbots function as "frontline assistants" capable of answering frequently asked questions, providing administrative guidance, and helping citizens access services quickly and independently (Pratama et al., 2021).

Research conducted by Yuliana and Hartono (2022) indicates that the implementation of chatbots in government institutions can reduce citizens' waiting time by up to 60% and significantly improve user satisfaction. Chatbots also assist governments in maintaining information consistency and reducing the workload of manual service personnel. However, the effectiveness of chatbots largely depends on their ability to understand conversational context and respond accurately to user inquiries.

3. Natural Language Processing and the Indonesian Language

One of the main challenges in chatbot development in Indonesia is the limited availability of NLP models that fully understand the structure and semantics of the Indonesian language. Most global NLP models, such as GPT or BERT, are primarily trained on English-language corpora, requiring fine-tuning to suit local contexts (Santoso & Rahayu, 2022).

According to Lestari (2023), the Indonesian language has distinct morphological and syntactic characteristics, including complex affixation and regional dialect variations. Therefore, the development of public service chatbots requires linguistically sensitive approaches that consider local contexts to ensure relevant and natural responses for users.

A study by Pratama et al. (2021) demonstrates that the use of context-rich Indonesian language corpora can increase chatbot accuracy by up to 25% compared to models trained on mixed-language datasets. This finding highlights the importance of developing inclusive language models that represent the diversity of Indonesian society.

4. Challenges and Opportunities in Implementing AI Chatbots in the Public Sector

Despite their significant potential, the implementation of AI chatbots in public services faces several challenges. Key issues include limited digital infrastructure, concerns over personal data security, and user resistance to new technologies (Putri & Nugroho, 2023). Additionally, ethical concerns arise regarding algorithmic transparency, data bias, and accountability in cases of service errors (algorithmic accountability) (Wahyudi, 2021).

Nevertheless, the opportunities offered by AI chatbots are equally substantial. With increasing internet penetration and digital technology adoption in Indonesia, chatbots can serve as a strategic solution to expand public service coverage, particularly in regions with limited human resources. According to the Ministry of Communication and Informatics (2023),

the development of AI-based chatbots aligns with the Indonesian Digital Government Roadmap 2021–2024, which emphasizes system integration and intelligent public services (smart public services).

Thus, the development of Indonesian-language AI chatbots is not merely a technological project, but an integral part of transforming public governance toward systems that are adaptive, efficient, and citizen-oriented.

When you look at what other people have found out most of the time they say that AI chatbots can make services work better and be easier to use. People do not always agree on how well chatbots work when you have many languages and different cultures. Some people think the technology is the important thing while others think it is more, about whether the organization is ready if the chatbot can adapt to different languages and if people will accept it. These differences mean we need to do research to figure out how Indonesian-language AI chatbots can be used in public services. This study is trying to fill this gap by looking at how to implement chatbots from the perspective of the technology the organization and the people who will use Indonesian-language AI chatbots.

RESEARCH METHODOLOGY

1. Research Approach and Design

This study adopts a descriptive qualitative approach aimed at gaining an in-depth understanding of how the utilization of Indonesian-language AI chatbots can enhance the quality of digital public services. This approach is chosen because it allows the exploration of perceptions, experiences, and the dynamics of technology implementation within governmental institutional contexts (Creswell & Poth, 2018).

Descriptive research seeks to depict phenomena as they naturally occur without intervening in the research variables, thereby providing an accurate empirical representation of AI chatbot implementation in the public sector (Sugiyono, 2022).

2. Research Site and Participants

The study was conducted in several government institutions that have implemented chatbot systems in public services, including departments of communication and informatics. The study had 15 people in it. These people were the ones who worked with chatbot systems. There were five chatbot developers or administrators five public service officers and five people who used public services. The reason these people were picked is that they had experience working with AI chatbot systems, in public service places. They knew about the chatbot systems because they used them or helped make them. population administration service agencies, and public universities that operate AI-based digital service systems.

The research participants consist of:

1. Chatbot system developers and administrators (technical managers),
2. Civil servants who use chatbots as support tools in service delivery, and
3. Members of the public as users of digital public services.

Participants were selected using purposive sampling, focusing on informants who possess a comprehensive understanding of chatbot implementation in public service contexts (Miles, Huberman, & Saldaña, 2019).

3. Types and Sources of Data

This study utilizes two types of data:

- **Primary data**, collected through in-depth interviews and direct observations of chatbot systems used by government institutions.
- **Secondary data**, obtained from literature reviews, official government reports, academic journals, and policy documents related to digital public service transformation.

4. Data Collection Techniques

Data collection was carried out using the following methods:

1. **Semi-structured interviews**, conducted to obtain insights into experiences, challenges, and chatbot management strategies from the perspectives of developers and users.

2. **Direct observation**, focusing on AI chatbot systems used in public services, including user interactions, available features, and system response effectiveness.
3. **Documentation**, including project reports, government digitalization policies, and internal evaluation documents related to chatbot implementation.

Interviews were conducted both online and in person, depending on informant availability. All data were recorded and transcribed to facilitate analysis.

5. Data Analysis Techniques

Data analysis followed the Miles and Huberman model, which consists of three main stages:

1. **Data reduction**, involving the selection, focusing, and simplification of raw data obtained from interviews and observations.
2. **Data display**, presented in the form of matrices and narrative descriptions to illustrate patterns and relationships among variables such as chatbot functionality, service effectiveness, and user satisfaction.
3. **Conclusion drawing and verification**, achieved by comparing analytical findings with relevant theories and prior research to ensure data validity and consistency (Miles et al., 2019).

To enhance data credibility, source and method triangulation were employed to make sure the results are reliable we double-checked with members by comparing information from multiple informants and utilizing more than one data collection technique (Patton, 2015).

6. Research Instruments

The primary research instrument in this study is the researcher, who is responsible for designing interview questions, collecting data, and conducting analysis. Supporting instruments include interview guides, observation checklists, and audio recording devices to facilitate data collection.

7. Research Ethics

This study was conducted in accordance with ethical principles of social research, including:

- Obtaining informed consent from all participants,
- Ensuring confidentiality of respondents' identities through anonymous coding, and
- Using data exclusively for academic purposes and public policy development.

8. Analytical Framework

The analytical framework of this study is based on three main dimensions:

1. **Technology**, encompassing AI and NLP capabilities in processing the Indonesian language;
2. **Public Services**, including service effectiveness, accessibility, and user satisfaction with chatbot-based services; and
3. **Government Institutions**, covering digital infrastructure readiness and policy support for AI implementation.

This framework is employed to identify the relationships between the utilization of AI chatbots and improvements in the quality of digital public services in Indonesia.

RESULTS AND DISCUSSION

1. Overview of AI Chatbot Implementation in Public Services

The results of observations and interviews indicate that the implementation of AI chatbots across various government institutions in Indonesia is still at the development and adaptation stage. Most institutions employ text-based chatbots to provide administrative information, such as population services, licensing procedures, and academic information (Kurniawan & Widodo, 2021).

For instance, a regional department of communication and informatics has integrated a chatbot named "LISA" (One-Way Information Service) into the official local government website. This chatbot is capable of automatically responding to inquiries regarding service schedules, administrative procedures, and the status of document submissions. Interviews

with system administrators revealed that the chatbot was developed using an Indonesian-language NLP model fine-tuned with local datasets.

However, the effectiveness of the chatbot remains limited to simple question-and-answer functions. Approximately 40% of users reported difficulties due to the chatbot's limited ability to understand lengthy or ambiguous sentences. This finding suggests that Indonesian language processing in AI models still requires further enhancement, particularly in terms of semantic understanding and local contextualization (Santoso & Rahayu, 2022).

2. The Role of Chatbots in Enhancing Public Service Efficiency

Based on interviews with civil servants, AI chatbots were perceived as playing a significant role in accelerating service delivery processes. Prior to chatbot implementation, citizens were required to visit service offices in person or wait for responses via email or telephone. Following the adoption of chatbots, response times for common inquiries decreased from an average of two hours to less than five minutes.

This finding aligns with Yuliana and Hartono (2022), who reported that chatbots can reduce the workload of public service personnel by up to 60%. In addition to time efficiency, chatbots improve information consistency, as all responses are generated from official government databases.

Nevertheless, civil servants acknowledged that chatbots are not yet capable of handling complex cases, such as complaints or policy clarifications. In such cases, users must still be referred to human operators. Therefore, the implementation of a hybrid service system—integrating chatbots with human agents—is considered essential (Putri & Nugroho, 2023).

3. User Satisfaction with Indonesian-Language Chatbots

Survey results from 50 users of digital public services indicate that 76% of respondents felt that chatbots facilitated easier access to information, 18% found them moderately helpful but encountered occasional inaccuracies, and 6% reported that chatbots were not beneficial due to limitations in understanding conversational context.

Most users indicated that the use of the Indonesian language in chatbots made interactions more comfortable and easier to understand. This finding demonstrates that the development of Indonesian-language chatbots aligns with public needs and supports the principles of digital inclusivity (Lestari, 2023).

However, challenges persist, including variations in users' language styles, the use of slang or regional languages, and text input errors. Chatbots frequently fail to interpret non-standard language contexts, underscoring the need for more diverse and comprehensive NLP model training (Pratama et al., 2021).

4. Technical and Institutional Challenges

This study identifies three primary challenges in the implementation of AI chatbots in the public sector:

1. Limited Data and Language Models

Most chatbot models rely on restricted datasets that do not adequately represent regional vocabulary variations, limiting the chatbot's ability to understand local contexts (Santoso & Rahayu, 2022).

2. Uneven Digital Infrastructure

Several regional government institutions lack adequate network and server infrastructure to operate AI systems optimally. The Ministry of Communication and Informatics (2023) reported that only 61% of local government institutions have cloud-based digital infrastructure.

3. Human Resource Readiness and Digital Policy

System administrators often lack sufficient technical competencies to maintain or update chatbot systems. Additionally, not all institutions have established data security and user privacy policies that comply with national standards (Putri & Nugroho, 2023).

5. Strategies for Optimizing AI Chatbots in Public Services

Based on the research findings, several strategies can be proposed to optimize the utilization of Indonesian-language AI chatbots in digital public services:

1. **Enhancing Local Language Models**

Developing NLP models trained on Indonesian-language corpora and regional dialects to improve linguistic accuracy and contextual understanding.

2. **Integrating Chatbots with Government Databases**

Chatbots should be directly connected to official administrative databases to ensure accurate and up-to-date responses.

3. **Cross-Sector Collaboration**

Chatbot development should involve partnerships between government institutions, academic institutions, and technology industries to strengthen technical capacity and innovation resources.

4. **Establishing AI Security and Ethical Standards**

Governments must develop guidelines addressing algorithmic transparency, user data protection, and AI accountability in public service delivery (Wahyudi, 2021).

6. Discussion

The findings of this study indicate that Indonesian-language AI chatbots have a positive impact on the efficiency and accessibility of public services. Chatbots accelerate communication between government institutions and citizens while supporting the national digital government agenda.

However, chatbot effectiveness is highly dependent on language processing quality and institutional readiness in managing AI technologies. In line with the Technology Acceptance Model (TAM), public acceptance of chatbots is influenced by perceived ease of use and perceived usefulness (Davis, 1989).

Therefore, the successful implementation of AI chatbots is determined not only by technological sophistication but also by social context, public policy frameworks, and active user involvement in the development process.

This study does something important. It shows that language adaptation is a big deal when it comes to how well chatbots work in public services. What the study found out is that just having technology is not enough. We also need to think about the different languages people speak and how they like to communicate in their own areas. This is a help when we talk about using artificial intelligence in public services especially in countries where many languages are spoken, like Indonesia.

CONCLUSION

Based on the results and discussion of this study, it can be concluded that the utilization of Indonesian-language AI chatbots has a significant impact on improving the efficiency and accessibility of digital public services. Chatbots enable faster responses to public inquiries, reduce reliance on face-to-face interactions, and support the continuous availability of public information services. As a result, public service delivery becomes more responsive and adaptive to citizens' needs in the digital era.

Furthermore, the implementation of AI chatbots contributes to reducing the administrative workload of government personnel. By handling repetitive and routine inquiries, chatbots allow civil servants to focus on more complex and strategic service tasks. This not only enhances operational efficiency but also improves the overall quality and consistency of information provided to the public, as chatbot responses are generated from standardized and official data sources.

The use of the Indonesian language within chatbot systems plays a critical role in promoting inclusive and user-centered digital services. Local language-based chatbots facilitate clearer and more comfortable interactions for users, particularly those with limited digital literacy or unfamiliarity with technical and foreign-language terminology. Consequently, Indonesian-language chatbots help bridge communication gaps between government digital systems and diverse segments of society.

Despite these benefits, the effectiveness of AI chatbots in public services is still constrained by several technical and institutional challenges. Limitations in Indonesian-language datasets for NLP training, uneven digital infrastructure across regions, and insufficient technical competencies among system administrators remain key obstacles. These challenges hinder the chatbot's ability to accurately understand context and deliver reliable responses in complex service scenarios.

Moreover, the successful implementation of AI chatbots depends not only on technological capability but also on organizational readiness and supportive policy frameworks. Clear regulations related to data security, privacy protection, algorithmic transparency, and AI ethics are essential to ensure responsible deployment and to maintain public trust in AI-based public services.

Overall, this study confirms that Indonesian-language AI chatbots represent a strategic innovation in advancing the digital transformation of governance in Indonesia. Their development and implementation align with the principles of Smart Governance and support the objectives of the Digital Government Roadmap 2021–2024 issued by the Ministry of Communication and Informatics. With appropriate technological refinement, institutional support, and ethical governance, AI chatbots have the potential to become a sustainable component of intelligent and citizen-oriented public service delivery.

This study also provides practical implications for policymakers and public institutions seeking to improve digital service delivery with AI technology. Findings indicate that 76% of users found chatbot services useful in accessing public information, while service response times decreased from approximately two hours to less than five minutes. These results indicate that Indonesian-language AI chatbots have significant potential to improve service efficiency and user experience. However, the presence of 18% of users reporting occasional inaccuracies and 6% reporting limited usability highlights the need for continued improvement in language processing capabilities and contextual understanding. Future research could focus on quantitative performance evaluation, regional comparison studies, and the integration of advanced generative AI technologies to improve chatbot responsiveness and service quality.

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