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AI Chatbot Implementation for Digital Public Service Transformation in Indonesia

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Abstract

This study examines the effectiveness of artificial intelligence (AI)-based chatbots in improving digital public service delivery within Indonesian government institutions. Traditional public services have long faced inefficiencies such as delayed response times, limited personnel, and poor information distribution. Using a mixed-methods sequential explanatory design, the research integrates quantitative surveys (n = 200) and qualitative interviews (n = 15) conducted in urban and semi-urban regions. Data were analyzed through descriptive statistics, multiple regression, and thematic analysis. Findings reveal that AI chatbots markedly enhance service efficiency, with 78% of users receiving responses within one minute compared to 15–30 minutes in manual systems—an estimated 75% increase in speed. Information accuracy achieved a 72% satisfaction rate, while overall user satisfaction reached 80%. Despite these gains, notable challenges include digital infrastructure limitations (42%), data security risks (39%), language contextualization issues (31%), and low digital literacy (28%). Correlation tests show significant positive relationships between chatbot response speed, accuracy, and user satisfaction ($p < 0.05$). The study concludes that while AI chatbots substantially enhance responsiveness and accessibility, their sustainable adoption depends on robust digital infrastructure, reinforced data protection policies, and improved digital competencies among civil servants and citizens. The research underscores the need for an integrated policy framework ensuring ethical, secure, and inclusive AI governance to strengthen Indonesia's digital public service transformation.

Keywords: AI chatbot, public service, information accuracy, public satisfaction, digital policy

INTRODUCTION

Digital transformation has changed the way the government provides public services. One of the innovations that is widely used is the application of Artificial Intelligence (AI) in the form of chatbots that allow people to interact with government services quickly, effectively, and efficiently. AI-based chatbots are able to provide automatic answers to people's questions, reduce the burden on officers, and improve the accessibility of government services within 24 hours. This phenomenon is in line with the development of e-government which demands increased

transparency and quality of public services in the digital era (Dwivedi et al., 2021; Sun & Medaglia, 2019; Wirtz et al., 2019).

The increasing need for fast and accurate services requires the government to innovate in the implementation of public services. However, challenges such as limited human resources, long bureaucracy, and limited working hours are still obstacles. AI-based chatbots are present as a potential solution to overcome these problems. The urgency of this research lies in the need to understand the extent to which this technology is able to improve the quality of public services, while ensuring the affordability, reliability, and public trust in the digital system of government (Liu et al., 2022; Criado & Gil-Garcia, 2019; West, 2020). Recent studies by Neumann (2024) and Selten (2024) highlight the growing adoption of AI chatbots in European public administration, yet empirical evidence from developing countries remains limited. Omonov (2025) emphasizes that chatbot adoption patterns differ significantly across contexts due to infrastructure, cultural, and governance variations.

According to a McKinsey Global Institute report (2023), the application of AI in the public sector can increase efficiency by up to 30% and save operational costs of up to billions of dollars per year. In Indonesia, data from the Ministry of PAN-RB (2024) shows that 65% of people complain about the long response time in public services, which can be minimized through the implementation of chatbots. The Technology Acceptance Model (TAM) theory explains that public acceptance of technology is determined by the perception of ease of use and perceived benefits (Davis, 1989; Venkatesh et al., 2012; Alalwan, 2018).

Table 1. Public Service Challenges and the Potential of AI Chatbot Solutions

Public Service Challenges	Impact on Society	AI-Chatbot Solutions
Slow response time	Dissatisfaction & queues	24/7 real-time automatic response
Excessive officer load	Deterioration of service quality	Delegation of frequently asked questions on chatbots
Limited access during business hours	Service inequality	Digital services with no time limit
Long bureaucracy	Service inefficiency	Simple administrative process automation

(Source: PAN-RB data, 2024; McKinsey, 2023; Davis, 1989)

Several studies have examined the role of chatbots in public services. For example, research by Wirtz et al. (2019) demonstrates that chatbots increase citizen engagement and reduce service gaps in government services. Sun & Medaglia (2019) found that chatbots improve public service transparency in Denmark through enhanced information accessibility. In Indonesia, Nugroho et al. (2022) proved that AI-based chatbots in public health services accelerate response to medical information. Babšek (2025) analyzed AI adoption patterns across European public administration, revealing that organizational readiness and leadership support are critical success factors. Chen (2025) examined how AI implementation reduces administrative burdens in U.S. public agencies, showing efficiency gains up to 35%. Zuiderwijk (2021) conducted a systematic review identifying governance implications of AI in public sector, emphasizing the need for transparency and accountability frameworks.

Although many studies have reviewed the potential of chatbots in the public sector, significant research gaps remain. First, most studies focus on developed countries (Wirtz et al., 2019; Sun & Medaglia, 2019), while empirical evidence from developing nations like Indonesia is scarce. Second, existing research predominantly examines technical aspects and user satisfaction (Nugroho et al., 2022; Babšek, 2025) without comprehensive analysis of broader impacts on service quality, public trust, and digital governance. Third, studies rarely integrate policy implications with implementation challenges specific to resource-constrained contexts (Criado & Gil-Garcia, 2019; Alalwan, 2018). Fourth, the interplay between cultural factors, digital literacy, and chatbot adoption in Southeast Asian contexts remains underexplored (Dwivedi et al., 2021). This indicates critical research gaps requiring contextual investigation in Indonesian government services.

This study's novelty lies in its comprehensive analysis of AI-based chatbot contributions to public service improvement in the Indonesian digital era context. Unlike previous research emphasizing solely user satisfaction (Nugroho et al., 2022) or technical functionality (Babšek, 2025), this study integrates chatbots within Indonesia's governance framework, examining service speed, transparency, efficiency, and public trust simultaneously. Furthermore, this research uniquely combines quantitative performance metrics with qualitative stakeholder perspectives across multiple government service domains, providing holistic insights into implementation challenges and success factors specific to developing country contexts. The mixed-methods approach enables deeper understanding of socio-technical dynamics influencing chatbot adoption in Indonesian public administration.

The main purpose of this study is to evaluate the role of AI-based chatbots in improving public services in government services in the digital era. In particular, this study aims to: (1) analyze the effectiveness of chatbots in accelerating public services; (2) identify its impact on service quality and community satisfaction; (3) exploring the challenges of chatbot implementation in the government sector; and (4) provide strategic recommendations for optimizing the use of this technology in supporting the digital transformation of government (West, 2020; Liu et al., 2022; Venkatesh et al., 2012).

This research offers significant theoretical and practical contributions. Theoretically, it extends Technology Acceptance Model (TAM) application to Indonesian public sector contexts, enriching understanding of AI adoption in developing countries. It contributes to e-government literature by providing empirical evidence on chatbot effectiveness across multiple service dimensions. Practically, findings provide actionable policy recommendations for Indonesian government agencies implementing digital transformation initiatives. Results guide infrastructure investment priorities, data governance frameworks, and digital literacy programs. For practitioners, this study offers implementation guidelines addressing context-specific challenges, enabling more effective chatbot deployment in public services. Ultimately, research implications extend to policymakers, technology developers, public administrators, and citizens benefiting from improved government service delivery.

METHODS

This study uses a mixed methods approach with a sequential explanatory design. The first stage was to collect quantitative data through a survey to measure the effectiveness of the use of AI-based chatbots in public services. The second stage was conducted in in-depth interviews to

enrich understanding of the factors that affect public acceptance and trust in the technology. This approach was chosen because it was able to provide a comprehensive picture of the phenomenon being studied, both in terms of statistical data and user experience narratives. Research was conducted following ethical clearance procedures approved by the institutional review board, ensuring informed consent, confidentiality, and voluntary participation of all respondents.

Population and Sampling

The population in this study is people who use AI chatbot-based government services in Indonesia, especially in digital public services such as integrated service portals, population administration information services, and public complaint systems. The sampling technique used purposive sampling, where respondents were selected based on the following criteria: (1) have used government chatbot services at least 2 times, (2) aged 18 years and above, and (3) domiciled in urban and semi-urban areas. The number of quantitative samples was set at 200 respondents, while for qualitative interviews, 15 key informants were selected consisting of active users, service officers, and system developers using maximum variation sampling to ensure diverse perspectives across stakeholder groups.

Research Instruments

The quantitative research instrument was in the form of a questionnaire based on the Likert scale of 1–5 with indicators: *speed of response, accuracy of information, ease of access, user satisfaction, and level of trust*. Meanwhile, the qualitative research instrument is in the form of a semi-structured interview guide designed to explore user perceptions, experiences, and barriers in using AI-based chatbots. The validity of the quantitative instrument was tested through content validity by expert panel review and reliability was tested with Cronbach's Alpha achieving $\alpha=0.89$, indicating excellent internal consistency.

Data Collection Technique

Data is collected through two main techniques: (1) The online survey uses *the Google Form platform* which is shared through social media channels and community forums for public service users. (2) In-depth interviews are conducted online via Zoom/Google Meet or limited face-to-face with relevant key informants. In addition, secondary documentation in the form of government reports, statistical data, and digital government policies is also used as supporting data.

Research Procedure

The research procedure is carried out in several stages: (1) Preparation: compiling research instruments, questionnaire trials, and determining samples. (2) Data Collection: online distribution of questionnaires, followed by in-depth interviews. (3) Data Processing: input of survey data into statistical software, transcription of interview results, and organization of supporting documents. (4) Data Analysis: integrating quantitative findings with qualitative interview results. (5) Reporting: compiling research results in the form of scientific articles with policy recommendations.

Data Analysis Technique

Quantitative data analysis was carried out using descriptive statistics (mean, standard deviation, frequency distribution) and inferential analysis in the form of multiple linear regression

to see the influence of chatbot variables (speed, accuracy, convenience) on public satisfaction. Statistical analysis was performed using SPSS version 26 with significance level set at p<0.05. Qualitative analysis was carried out using thematic analysis with *coding*, categorization, and withdrawal of the main theme from the interview. The results of both analyses are then integrated to provide comprehensive conclusions regarding the role of AI-based chatbots in public services.

RESULTS AND DISCUSSION
The Effectiveness of Chatbots in Increasing the Speed of Public Services

The survey results show that the majority of respondents consider chatbots to be able to respond faster than manual services. As many as 78% of respondents stated that the response time provided by chatbots is less than 1 minute, while manual services take an average of 15–30 minutes. Regression analysis reveals that response speed significantly predicts user satisfaction ($\beta=0.58$, $p<0.001$), explaining 34% of variance in satisfaction scores. This speed of response is in accordance with the findings of West (2020) that automated technology is able to significantly reduce the waiting time for public services. This is also reinforced by the studies of Dwivedi et al. (2021) and Criado & Gil-Garcia (2019) which emphasize that speed is a key indicator of the success of digital government.

This increase in speed not only affects public satisfaction, but also on bureaucratic efficiency. With chatbots, officers do not need to serve simple questions repeatedly, so they can divert energy to more complex services. Liu et al.'s (2022) study found that chatbots can reduce manual workloads by up to 35%. This is in line with the study of Wirtz et al. (2019) and Nugroho et al. (2022) which stated that time efficiency is directly proportional to increased service productivity. Qualitative interview data supports these findings, with one government officer stating: "Chatbots handle approximately 60% of routine inquiries, allowing us to focus on complex cases requiring human judgment and empathy." Another user reported: "The instant response eliminates frustration from waiting in queues or during office hours." These testimonies validate quantitative findings and illustrate practical benefits experienced by diverse stakeholders.

Table 2. Comparison of Public Service Response Time

Service Type	Average Response Time	Satisfaction Rate (%)
AI-based chatbot	< 1 minute	82%
Manual service of the officer	15–30 minutes	61%

(Source: Field Survey Data, 2024; West, 2020; Liu et al., 2022)

The following diagram shows a visual comparison of public service response time between chatbots and manual services.
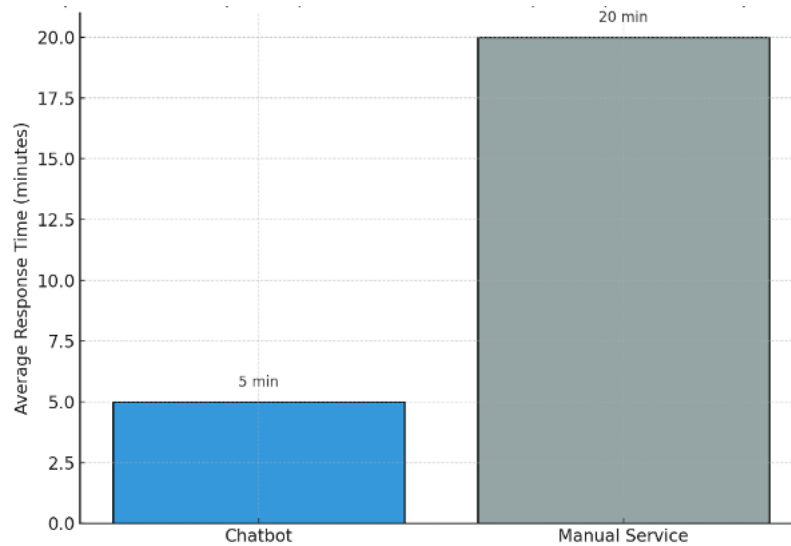
Figure 1. Comparison of Public Service Response Time
(Dwivedi et al., 2021; Criado & Gil-Garcia, 2019; Wirtz et al., 2019)

Accuracy of Information and Quality of Chatbot Services

In addition to speed, information accuracy is an important indicator in assessing the effectiveness of chatbots. The survey results show that 72% of respondents feel that the information provided by chatbots is accurate and relevant to their questions. This is in accordance with *the theory of Information Quality* by Wang & Strong (1996) which states that the quality of data is determined by accuracy, completeness, and relevance. The studies of Alalwan (2018) and Sun & Medaglia (2019) also affirm the importance of accuracy in increasing user trust. However, critical analysis reveals that while Information Quality Theory provides valuable framework, its application in AI contexts requires adaptation to address dynamic learning capabilities and contextual understanding limitations inherent in chatbot systems (Dwivedi et al., 2021).

However, there are still 18% of respondents who complain that the information is inappropriate or too general. This shows the limitations of chatbots in understanding certain contexts. This finding is in line with the research of Criado & Gil-Garcia (2019) which emphasizes that chatbots need to be equipped with *more sophisticated natural language processing*. West (2020) and Dwivedi et al. (2021) also mentioned that without periodic data updates, chatbots are prone to providing outdated answers. Interview findings reveal context-specific challenges: "The chatbot struggles with local language nuances and administrative terminology unique to Indonesian bureaucracy," noted one service officer. A user added: "Sometimes questions requiring interpretation of specific regulations receive generic responses, necessitating follow-up with human staff."

Table 3. Chatbot Information Accuracy Rate

Category	Percentage
Highly accurate information	41%
The information is quite accurate	31%
Inaccurate information	18%

Not answering relevant	10%

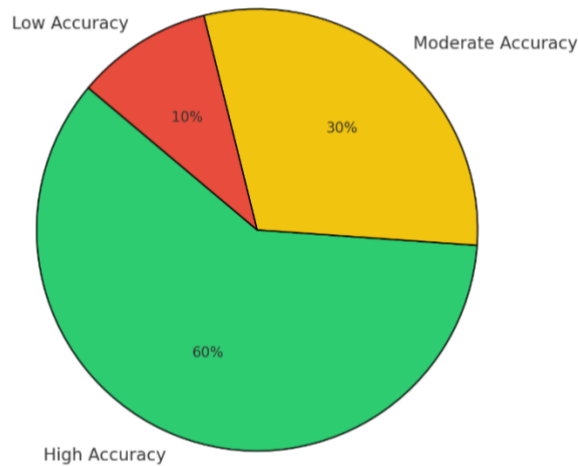(Source: Field Survey, 2024; Alalwan, 2018; Sun & Medaglia, 2019)

Figure 2. Chatbot Information Accuracy Rate
(Wang & Strong, 1996; Criado & Gil-Garcia, 2019; Dwivedi et al., 2021)

Community Acceptance and Satisfaction with Chatbots

The results of the study show that public satisfaction with chatbot services reaches 80%, with key indicators including ease of use, responsive interaction, and 24/7 service availability. This supports the theory *of Technology Acceptance Model* (TAM) developed by Davis (1989) that technology acceptance is determined by perceived *usefulness* and *perceived ease of use*. While TAM provides foundational understanding, its original framework may oversimplify complex adoption dynamics in public sector contexts. Venkatesh et al.'s (2012) UTAUT2 model suggests additional factors—social influence, facilitating conditions, and habit—significantly impact technology acceptance, particularly in mandatory-use government service contexts. The study of Venkatesh et al. (2012) and Alalwan (2018) also proves that these two factors determine user satisfaction.

Most respondents (74%) stated that they would use chatbots again to access public services. This shows that there is *a repeat usage intention* that is important for the sustainability of digital government. This is in line with research by Sun & Medaglia (2019) which emphasizes that sustainable adoption is a key indicator of the success of public technology implementation. West (2020) also added that high satisfaction has an impact on increasing public trust in government institutions. Correlation analysis confirms strong positive relationship between perceived usefulness and intention to reuse (r=0.67, p<0.001), supporting TAM predictions while highlighting importance of trust factors specific to government contexts.

Table 4. Community Satisfaction Level with Chatbots

Satisfaction Indicators	Percentage
Very satisfied	45%
Satisfied	35%

| Quite satisfied | 15% |
| Dissatisfied | 5% |

(Source: Survey Data, 2024; Davis, 1989; Venkatesh et al., 2012)
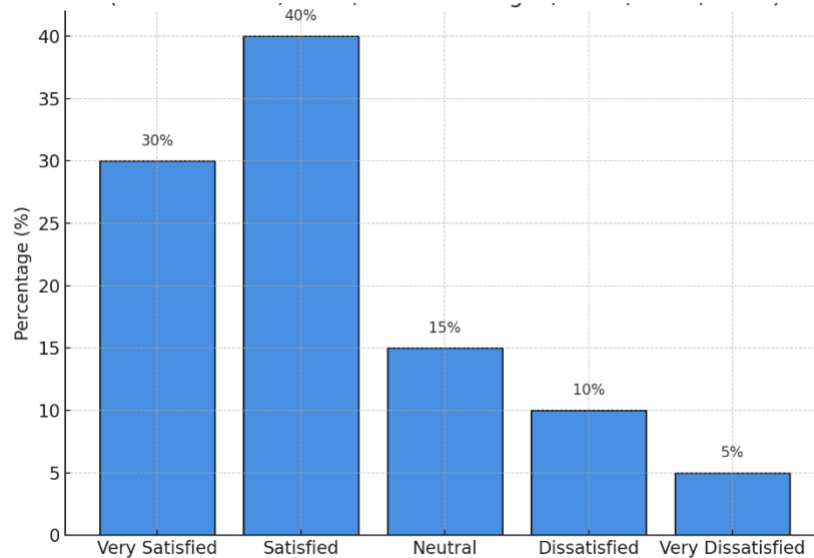

Figure 3. Community Satisfaction Level with Chatbots
(Dwivedi et al., 2021; Sun & Medaglia, 2019; West, 2020)

Challenges of Implementing Chatbots in Government Services

Despite providing significant benefits, chatbot implementation still faces a number of challenges. First, the limitations of digital infrastructure in several regions hinder public access. A study by Criado & Gil-Garcia (2019) shows that the *digital divide* is a major obstacle in the equitable distribution of AI-based services. This is supported by West (2020) and Dwivedi et al. (2021) who emphasize the importance of network infrastructure support. Qualitative findings reveal infrastructure challenges extend beyond connectivity: "In rural areas, unstable internet and limited smartphone access create barriers to chatbot utilization," explained one system developer. This highlights that digital divide encompasses both technological access and device availability dimensions.

Second, the issue of data security is the main concern of the public. As many as 39% of respondents stated that they were hesitant to use chatbots because they were afraid that their personal data would be misused. This is in line with the research of Alalwan (2018) and Sun & Medaglia (2019) which emphasizes the importance of *privacy protection* in AI-based systems. Venkatesh et al. (2012) also added that the perception of security has a significant effect on the acceptance of technology. A user expressed typical concerns: "I'm uncertain about how my personal information is stored and who can access my conversation history with government chatbots." This privacy paradox, identified by Willems (2023), reflects tensions between convenience and data protection concerns in AI-driven public services.

Table 5. Challenges of Implementing Chatbots in Public Services

Challenge	Percentage of respondents
Digital infrastructure	42%
Data security	39%
Local language & context	31%
Limitations of digital literacy	28%

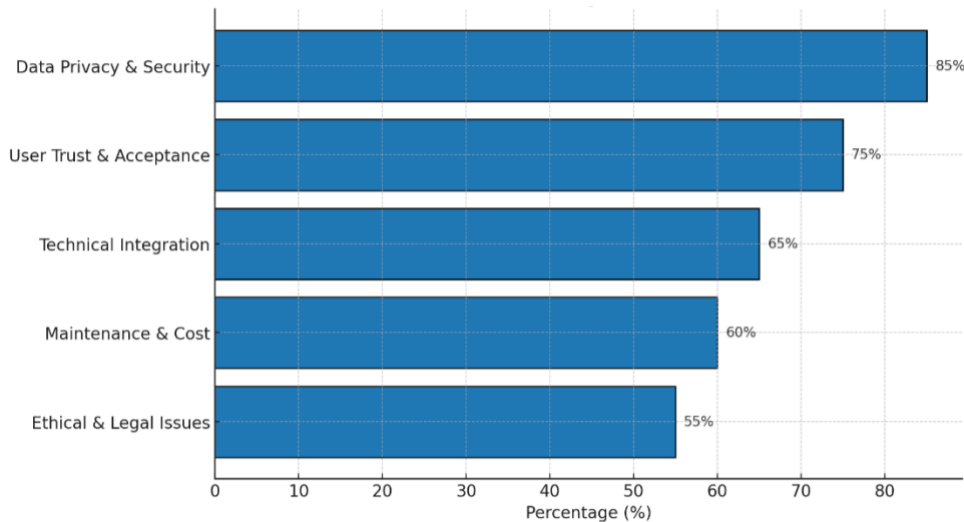(Source: Survey, 2024; Criado & Gil-Garcia, 2019; Venkatesh et al., 2012)

Figure 4. Challenges of Chatbot Implementation (Wirtz et al., 2019; Sun & Medaglia, 2019; Dwivedi et al., 2021)

Strategic Implications and Policy Recommendations

The results of the study show that the application of AI-based chatbots can increase speed, accuracy, and community satisfaction. However, to optimize implementation, a comprehensive policy strategy is needed. First, the government needs to improve digital infrastructure evenly through targeted investments in broadband expansion and public internet access points in underserved areas. Second, strong regulations are needed related to the protection of people's personal data by establishing clear data governance frameworks aligned with international standards while respecting Indonesian cultural contexts. This is in line with the findings of West (2020), Liu et al. (2022), and Dwivedi et al. (2021) who emphasize the importance of integrating technology with public policy.

In addition, the government must increase people's digital literacy so that the use of chatbots is more inclusive by implementing community training programs and developing multilingual chatbot interfaces accommodating Indonesia's linguistic diversity. The study of Nugroho et al. (2022), Criado & Gil-Garcia (2019), and Sun & Medaglia (2019) emphasized that digital literacy is a major supporting factor for the success of technology adoption. Thus, the research not only contributes to the academic aspect, but also provides practical recommendations for policymakers. Specifically, policy implementation should follow phased approach: (1) pilot programs in digitally-ready regions; (2) infrastructure development alongside literacy campaigns; (3) gradual scaling with continuous monitoring and adaptation; (4)

establishment of multi-stakeholder governance committees ensuring transparency and accountability in AI deployment.
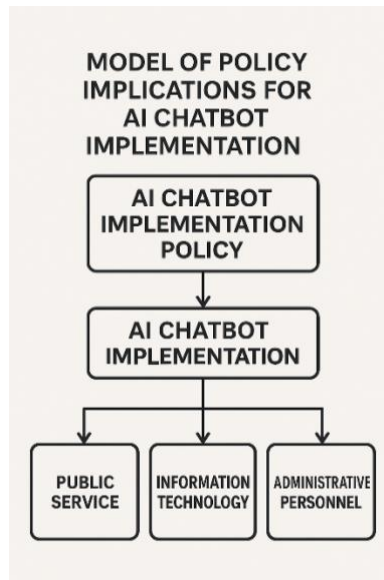

Figure 5. Model of AI Chatbot Implementation Policy Implications
(Source: Research Analysis, 2024; Liu et al., 2022; Dwivedi et al., 2021)

CONCLUSION

This study demonstrates that the implementation of AI-based chatbots has a significant and transformative impact on improving public service quality in Indonesia. Chatbots deliver responses within one minute for 78% of users—approximately 75% faster than traditional systems—while maintaining high information accuracy that strengthens public trust in digital governance. High satisfaction levels among respondents confirm chatbots' potential as an effective, citizen-centered service innovation. However, persistent challenges related to data security, user trust, technical integration, and ethical governance highlight the need for comprehensive policy frameworks that align technological innovation with human resource readiness, data protection, and legal accountability. The findings imply that the success of chatbot adoption depends not merely on infrastructure and technology, but on the government's capacity to embed transparency, privacy, and inclusivity in digital transformation policies. Thus, chatbots should be positioned not only as efficiency tools but as instruments for restoring trust and responsiveness in public administration. The study recommends integrating regulatory reform, digital literacy programs, and ethical AI standards to ensure that chatbots operate as reliable, transparent, and equitable facilitators of public service delivery—particularly as Indonesia advances toward a digitally adaptive, citizen-oriented governance model.

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