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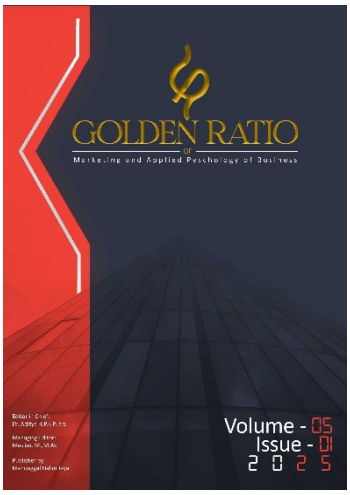

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MARKETING | RESEARCH ARTICLE

Effect of Using Artificial Intelligence on Service Frequency and Public Satisfaction

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Abstract: This study aims to assess how Indonesia's Government Office of Kediri District responds to integrating Artificial Intelligence (AI) in improving service frequency and public satisfaction. An explanatory quantitative approach was adopted to investigate the causal relationship between AI adoption and the two dependent variables—service frequency and public satisfaction—through multiple linear regression analysis, utilizing data from a sample of 15 districts between 2018 and 2023. The study reveals that AI adoption significantly enhances public satisfaction and service frequency. Implementing AI, facilitated through the Digital Service Living Lab (DSLL) platform, increases efficiency, responsiveness, and service quality. The study underscores that AI integration can boost public service effectiveness and efficiency, encouraging local governments to broaden AI usage and invest in staff training and capacity development. This research offers strategic recommendations for governments to expand AI adoption further, strengthen inter-district collaboration, and optimize the use of Electronic Government (E-Government) initiatives to support the goals of smart city and provincial development.

Keywords: Artificial Intelligence, Service Frequency, Public Satisfaction, Electronic Government Systems, E-Government, District Government.

JEL Classification Code: H83, O33, L86, R58, C12, C51

1. INTRODUCTION

Adopting Artificial Intelligence (AI) in Government institutions in Indonesia is a strategic step to speed up the implementation of Electronic Government Systems (EGS) (Sha, Taeihagh, & Jong, 2023), (Zhang, Zuo, He, Li, & Yu, 2021). The government plans to implement EGS through the Digital Service Living Lab (DSLL) platform. DSLL is an experimental platform designed to test, develop, and implement digital technologies in real-world scenarios. Its primary objective is to enhance public services by promoting collaboration, fostering innovation, and utilizing adaptive technologies that respond effectively to community needs. In the context of government, DSLL facilitates the acceleration of EGS, contributing to improvements in administrative efficiency, transparency, and overall public service quality (Humas, 2023).

In 2023, Eight districts/cities in West Java agreed to use the DSLL platform developed by Sumedang District. This initiative aims to serve as a tool to measure and enhance the Electronic Government System (EGS) index in their respective regions (Humas, 2023). The DSLL platform fosters regional collaboration and synergy, optimizes the implementation of EGS, and supports the realization of smart cities and imaginative province concepts to enhance public services. The platform enables government agencies to adopt and adapt successful programs from other regions. For instance, Sumedang District achieved an EGS index of 3.89, the highest in West Java, which can serve as a benchmark for other areas to improve their performance.

Adopting AI and the DSLL platform will enhance service delivery and increase public satisfaction with public services (Zhang, Zuo, He, Li, & Yu, 2021). One practical application of AI is through chatbots and virtual assistants, which can automate tasks, answer frequently asked questions (Kuberkar & Singhai, 2020), and guide users through government services (Chen, Hernandez, & Marc, 2023). This approach reduces the workload of human employees and provides 24/7 support (Seliger, Carpinetti, Gerolamo, & Balerezo, 2008). Furthermore, DSLL AI can use predictive

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analytics to analyze historical data and forecast future trends and community needs, enabling the government to plan and allocate resources more effectively (Hu, 2021). Natural Language Processing allows text data analysis in government documents, emails, and online forms, enhancing understanding and automating document handling processes (Zhang, Zuo, He, Li, & Yu, 2021), (Ku, Iriberri, & Leroy, 2008).

Lastly, computer vision technology is utilized to process and analyze images and videos, significantly contributing to public security by detecting potential threats in real-time and ensuring efficient infrastructure monitoring. This technology enables the automated detection of anomalies, such as road damage or unauthorized access to restricted areas, thus allowing for faster and more accurate responses. Furthermore, machine learning is critical in extracting patterns from vast data, providing government agencies with insights that facilitate better decision-making and policy formulation. By continuously learning from historical and real-time data, machine learning can generate predictive models to anticipate future challenges, recommend solutions, and streamline public services. These applications enhance the government's ability to manage resources, improve service delivery, and optimize operational processes across various sectors, from transportation and healthcare to law enforcement and urban planning (Apoorva, Impana, Siri, Varshitha, & Ramesh, 2019).

Adopting AI in DSLL motivates researchers to examine the impact of implementing these policies further. Previous studies have mentioned several effects of AI implementation on the government. The research (Mushayt, 2019) shows that AI-based frameworks and deep learning models can significantly improve e-government services by reducing processing time and costs and increasing citizen satisfaction. AI can enhance decision-making processes, reduce costs, and improve disaster prevention and response, directly impacting the efficiency and effectiveness of public services.

Androutsopoulou, Karacapilidis, Loukis, and Charalabidis (2018) conducted another study emphasizing using AI-based chatbots to enhance citizen-government communication. These chatbots allow for more prosperous and expressive interactions in everyday language, making information search and transactions easier. Meanwhile, a study (Harrison, 2022) emphasizes the importance of a conservative approach to AI in government to build public trust and uphold democratic values, which are crucial in enhancing public satisfaction.

Previous research focused on AI implementation in government in general. There is a research gap since no studies have explicitly examined the impact of AI adoption on Indonesian governance, particularly at the district/city level. Previous studies, including those by (Mushayt, 2019), (Cruz, 2019), (Goralski & Tan, 2020), (Uzun, 2020), (Almazan, Faura, & Vargas, 2023) and (Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2018), are less tailored to the Indonesian context and more centered on global examples. This study intends to investigate the effect of AI adoption on expanding the number of services and public satisfaction based on the previously mentioned research gap. The research defines the study's research questions as (1) Does AI adoption affect the increase in Service Frequency? and (2) Does AI adoption affect the increase in the number of services and public satisfaction?

This study aids the Indonesian government's adoption of artificial intelligence, mainly through the Digital Service Living Lab (DSLL) platform. The findings will offer strategic recommendations for the government to expand AI technologies across all district and city governments, such as chatbots, predictive analytics, and computer vision. By implementing these AI solutions, the government can enhance both the quantity and quality of public services, ultimately improving overall citizen satisfaction.

2. LITERATURE REVIEW

2.1. Acceptance Model of Technology (TAM)

The Technology Acceptance Model (TAM) provides a framework for understanding how individuals adopt and use new technologies (Davis, 1989). According to this theory, users' attitudes towards technology are shaped by its perceived usefulness and ease of use, which subsequently influence their intention to utilize it. In the context of this research, the TAM framework can be

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applied to assess how government employees and the general public accept and use AI technologies, such as chatbots, in public services. The successful adoption and integration of AI into public services will largely depend on how employees and the public perceive the technology in terms of its practicality and user-friendliness.

2.2. Customer Satisfaction Theory

Customer Satisfaction Theory relates to the comparison between customers' expectations and their actual experiences. When experiences meet or exceed expectations, customers feel satisfied. A commonly used model in this context is the Satisfaction Gap Model, also known as Disconfirmation Theory. This theory is particularly relevant for evaluating the impact of AI adoption on public satisfaction with public services. This research can assess how AI influences public satisfaction by measuring citizens' expectations and experiences related to AI-powered services. In the context of public services, public satisfaction refers to citizens' overall evaluation of the services they receive from government or public organizations. This satisfaction is typically influenced by several factors, including service quality, speed, convenience, and perceived fairness in the provision of services. According to Oliver (1980), customer satisfaction is determined by comparing pre-service expectations with post-service perceptions. In public service settings, public satisfaction often serves as a primary indicator to evaluate the effectiveness and efficiency of government programs.

2.3. Artificial Intelligence Concepts

Artificial intelligence (AI) is a subfield of computer science focused on developing machines capable of performing tasks that typically require human intelligence. These tasks include problem-solving, speech recognition, image recognition, natural language understanding, and decision-making. AI leverages mathematical models and algorithms to process data, make predictions, and make decisions based on that data. AI is the study of intelligent agents that can observe their environment and take actions to improve their chances of successfully achieving specific goals (Iftikhar, Kujipers, Khayyat, Iftikhar, & Sa, 2020). AI can be applied in various government services to enhance efficiency, accuracy, and public satisfaction. Here are some AI applications that can be implemented in government services:

a. Chatbots: Used to answer citizens' questions and provide service information quickly and automatically.
b. Virtual Assistants: Help citizens navigate government websites or public service applications, direct them to the correct information, and assist in filling out forms.
c. Data Analysis: AI can examine vast volumes of government data to identify trends and patterns that aid decision-making.
d. Prediction: AI algorithms can forecast future public service needs, like healthcare or education service demands, helping the government plan budgets and resources.
e. Face Recognition: Used in public safety to identify individuals in public places, assist law enforcement in finding missing persons or criminal suspects, and control access to government buildings.
f. Biometrics: Used for identity verification in services that require high security, like voter registration, passport issuance, or access to healthcare services.
g. Natural Language Processing (NLP): Automating document management processes, including information extraction, classification, and retrieval. This can reduce the time needed to manage documents and improve operational efficiency.
h. Decision Support Systems: Help government officials make decisions based on data analysis and recommendations generated by AI.
i. Robotic Process Automation (RPA): Automating repetitive and administrative tasks like data management, payment processing, and claim processing is known as robotic process automation or RPA. This can increase productivity and lower human error rates.

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j. AI in GIS (Geographic Information Systems): AI in GIS (Geographic Information Systems): Used for mapping and spatial analysis, which helps in city planning, disaster management, and environmental monitoring.
k. Drone and Satellite Image Monitoring: AI can analyze data from drones and satellite images for area monitoring, environmental change detection, and natural resource management.
l. AI in Diagnostics: Used to diagnose diseases and treat patients by analyzing medical data.
m. Social Program Management: AI can identify eligible citizens for social assistance programs, ensure accurate aid allocation, and reduce fraud.

2.4. Service Frequency Concepts

Service frequency refers to how often a service is provided to clients or the public within a specific period. This concept is vital in public services because higher service frequency is associated with better accessibility and faster response to community needs. Service frequency is considered part of the reliability dimension, one of the key factors influencing perceptions of service quality (Parasuraman, Parsu, Zeithaml, & Berry, 1985).

2.5. Research Framework

Adopting artificial intelligence (AI) in government services is the independent variable in this research framework. AI adoption refers to how AI technology is implemented and utilized across different aspects of government services. The study focuses on two dependent variables: service frequency and public satisfaction. Service frequency reflects the number of individuals served by government services in a single working day following the adoption of AI technology. Meanwhile, public satisfaction refers to the community's perception and satisfaction level concerning the quality, accessibility, and sustainability of government services after the implementation of AI.

2.6. Hypotheses Framework

a. The Impact of AI Adoption on Service Frequency

The Technology Acceptance Model (TAM) explains how individuals adopt and use new technologies, emphasizing two key determinants: perceived usefulness (PU) and perceived ease of use (PEOU) (Davis, 1989). In the context of AI adoption in government services, PU refers to how AI enhances the effectiveness and responsiveness of public service delivery. AI can significantly reduce processing times and operational costs. (Mushayt, 2019). This highlights that PEOU, in this case, reflects the ease provided by AI applications such as chatbots, which streamline communication between the government and citizens, thereby improving both the frequency and quality of interactions (Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2018). Therefore, governments and their employees are more likely to adopt AI technology if they perceive it as valuable and easy to use, which, in turn, can lead to an increase in service frequency. Based on this theoretical foundation and previous studies, the first hypothesis of this research is formulated as follows:

H1: AI adoption positively influences Service Frequency

b. The Impact of AI Adoption on Public Satisfaction

According to the Technology Acceptance Model (TAM), perceived utility (PU) and perceived ease of use (PEOU) are the two primary determinants of technology acceptance. AI's perceived usefulness in government services is reflected in its capacity to automate and expedite various administrative processes, thus reducing processing time and associated costs. (Mushayt, 2019) shows that implementing deep learning models in e-government can significantly reduce processing time and costs, ultimately increasing citizen satisfaction. This improved efficiency allows the government to respond to community needs faster and more accurately. This reflects how AI can be considered helpful in enhancing government service performance and increasing public satisfaction. From the theoretical explanation above, it is found that the application of ERP in the procurement process becomes very visible and has a substantial positive impact, one of which is the automation carried out

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in issuing purchase orders and receiving reports. Moreover, the AI PEOU holds significant importance. Artificial intelligence (AI) technology can enhance citizen-government communication by enabling more prosperous, expressive natural language exchanges. One example of this is chatbots that AI guides. (Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2018) mention that these chatbots facilitate information search and transactions in a more efficient and personalized manner. When citizens feel that their interactions with the government are easier and straightforward, they tend to feel more satisfied with the services provided. Additionally, the application of AI to disaster relief and decision-making processes has been shown to improve the caliber of public services. (Almazan, Faura, & Vargas, 2023) Reveal that AI can improve decision-making processes, reduce costs, and enhance disaster response, all of which contribute to increasing public satisfaction with public services. Perceived usefulness in this context is seen from AI's ability to provide faster and more targeted solutions in critical situations. Therefore, the second hypothesis in this study is:

H2: AI adoption positively influences the level of public satisfaction.

3. RESEARCH METHOD AND MATERIALS

This study employs an explanatory quantitative approach, which uses statistical data analysis to explore and explain the causal relationship between the variables under investigation. This method is well-suited for this study, as it allows researchers to test hypotheses and assess how much the independent variable, AI adoption, affects the dependent variable, public satisfaction.

Table 1. Characterization and Quantification of Variables

No	Variable	Characterization	Quantification	Source
1.	Adopting AI	AI in Government Services	Number of AIs implemented in government services on a scale of 1-13	(Mushayt, 2019) dan (Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2018)
2.	Service Frequency	People served in one day	Number of people served	(Almazan, Faura, & Vargas, 2023)
3.	Public Satisfaction	Overall evaluation by citizens on the quality of services they receive from the government.	Public Satisfaction Index (IKM = Indeks Kepuasan Masyarakat)	(Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2018)

3.1. Population and Sample

The study's population includes all districts in Indonesia. A sample of 15 districts was selected, with data collected from 2018 to 2023. This sample was chosen because, as of 2023, only 35 districts or cities have implemented AI in public services, making these 15 districts representative of the early adopters within this context.

3.2. Methods of Analysis

This study uses multiple linear regression analysis to test the hypothesis. This analysis aims to determine how the dependent variables, service frequency and public satisfaction, and the independent variable, AI adoption, relate to one another. The model stages in this study are:

$$\boldsymbol{SF = \beta_0 + \beta_1\, AIA + \epsilon \quad (Model\ 1)}$$

$$\boldsymbol{PS = \beta_0 + \beta_1\, AIA + \epsilon \quad (Model\ 2)}$$

SF = Service Frequency
AIA = AI Adoption
PS = Public Satisfaction

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This research also performed classical assumption tests to ensure model fit, starting with normality testing. The next step involved conducting partial significance tests (t-tests) for each independent variable. The alternative hypothesis (Ha) opposes the null hypothesis (H0), which posits that the regression coefficients have no significant effect on the dependent variable.

Subsequently, a simultaneous significance test (F-test) was conducted to assess the overall regression model. The alternative hypothesis (Ha) asserts that at least one regression coefficient is significant, while the null hypothesis (H0) suggests that all regression coefficients are simultaneously equal to zero. Finally, the effectiveness of the regression model in explaining the variability in the dependent variable is evaluated using the coefficient of determination (R^2). These procedures ensure the accuracy and validity of the multiple linear regression analysis results. The framework for this research is presented in Figure 1.

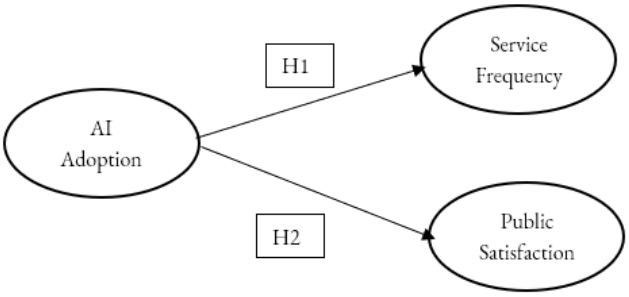

Figure 1. Research Model

4. RESULTS AND DISCUSSION

This research aims to test whether AI Adoption (AAI) affects the increase in Service Frequency (SF) and Public Satisfaction (PS). The following are the study's descriptive statistical findings:

Table 2. Descriptive Statistics

		FP	AIA	PS
N	Valid	210	210	210
	Missing	0	0	0
Mean		22,5674	2,2575	24,4965
Std. Error of Mean		0,27541	0,01388	0,06465
Median		14,0000	2,1700	24,8600
Mode		14,00	0,17	24,86
Std. Deviation		4,91893	0,24795	1,15460
Variance		24,196	0,061	1,333
Range		46,00	13,00	59,73
Minimum		2,00	0,00	1,08
Maximum		48,00	13,00	60,81
Sum		4739,15	474,07	5144,26

Table 2 presents a total of 210 valid observations. The average service frequency (SF) is 22.57, while the average AI adoption (AIA) is 2.26, and public satisfaction (PS) is 24.50. The standard error of the mean indicates the accuracy of the average estimates for the population. For SF, AIA, and PS, the standard deviation—a measure of the data's dispersion from the mean—is approximately 4.92, 0.25, and 1.15, respectively. Variance, the square of the standard deviation, and represents data variation, is approximately 24.20 for SF, 0.06 for AIA, and 1.33 for PS. The range, representing the difference between the maximum and minimum values, is 46 for SF, 13 for AIA, and 59.73 for PS. The minimum values recorded are 2 for SF, 0 for AIA, and 1.08 for PS, while the maximum values are 48 for SF, 13 for AIA, and 60.81 for PS. The total sum of all values across the variables is 4739.15 for SF, 474.07 for AIA, and 5144.26 for PS. This summary allows us to understand the data distribution and characteristics before proceeding with further analyses, such as regression.

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This study conducted a linear regression test to examine the influence among variables. Table 3 displays the regression test's findings.

Table 3. Outcomes of Regression Testing

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10,853	1,062		10,222	0,000
	FP	15,816	4,397	0,212	3,597	0,000
2	(Constant)	40,052	6,311		6,346	0,000
	PS	9,321	3,968	0,125	2,349	0,019
a. Dependent Variable: AIA						

Table 3 displays the regression results for two compared models. The first model shows the relationship between the variables Service Frequency (SF) and AI Adoption (AAI), while the second model links the variable Public Satisfaction (PS) with AAI. The table shows the standard errors (Std. Error), t-values, non-standardized coefficients (B), standardized coefficients (Beta), and the significance (Sig.) of the coefficients for each model.

Model 1:

a. It has a coefficient of 10.853 with a standard error of 1.062. The SF coefficient is 15.816 with a standard error of 4.397 and significance p <0.001. This suggests that a rise in AI adoption correlates with increased service frequency.
b. It is confirmed that there is little chance of the relationship between SF and A occurring by chance, as the SF coefficient has a significant relationship with AIA (β = 0.212, p <0.001).

Model 2:

a. Constant: It has a coefficient of 40.052 with a standard error of 6.311. The PS coefficient is 9.321 with a standard error of 3.968 and significance p = 0.019. This shows that the relationship is statistically strong enough.
b. There is a noteworthy correlation between AIA and the PS coefficient (β = 0.125, p = 0.019). This implies that while the impact of rising public satisfaction on adopting AI may not be as significant as rising service frequency, it still plays a role.

Table 3 concludes that AI Adoption (AIA) positively influences Service Frequency (SF) and Public Satisfaction (PS). These results indicate that H1 and H2 in this study are accepted.

4.1. Discussion

a. The Influence of AI Adoption on Service Frequency

The findings of this study indicate that adopting AI significantly enhances service frequency. The regression analysis reveals that the service frequency (SF) variable has a positive and statistically significant coefficient (B = 15.816, t = 3.597, p < 0.001). This result suggests that the frequency of services provided increases with AI adoption. Additionally, public satisfaction (PS) demonstrates a significant positive relationship with AI adoption (B = 9.321, t = 2.349, p = 0.019), indicating that AI increases the frequency of services and positively affects the public's overall satisfaction with those services.

Several key factors may explain why AI adoption positively impacts service frequency. First, integrating AI into service delivery systems can enhance operational efficiency and productivity. Tasks that are typically time-intensive, such as data processing, information analysis, and routine administrative procedures, can be automated by AI systems. This automation allows service personnel to redirect their efforts toward more complex tasks that require human judgment and expertise. Consequently, AI implementation leads to a higher throughput or an increased number of services that can be completed within a given timeframe.

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Furthermore, AI can significantly enhance service responsiveness. By leveraging intelligent algorithms and real-time data processing, AI systems can respond to user requests and needs promptly and accurately. In customer service, for instance, AI-powered chatbots can immediately respond to user inquiries or direct users to the appropriate information sources. This instant, automated assistance reduces wait times and improves the overall user experience, ensuring that services are more frequent, responsive, and efficient. Customers are more likely to use the service frequently and have a better opinion of the quality of the service when prompt and effective responses are provided. These research results are consistent with the study conducted by Androutsopoulou et al. (2019), which demonstrates how AI-based chatbots can improve citizen-government communication by facilitating faster and richer interactions.

AI can automate routine and repetitive tasks that usually take time if done manually. For example, document processing, data management, and handling citizen inquiries can be completed faster and with lower error rates. This allows district governments to handle more requests in a shorter time, increasing the frequency of services they can provide. These research findings align with the study by Al-Mushayt (2019), which shows that AI-based frameworks can significantly reduce processing time and costs and improve citizen satisfaction. The research findings also indicate that the Digital Service Living Lab (DSLL) and Electronic Government System (EGS) support the testing and integration of technology A. This ensures that innovations are tested in a controlled environment and optimized before widespread implementation, ultimately enhancing the frequency and quality of public services.

b. The Impact of AI Adoption on Public Satisfaction Levels

The study's findings show that the adoption of AI has a substantial impact on the rise in public satisfaction because AI can enhance public services' accessibility, accuracy, and efficiency, all of which have an impact on how well people perceive and use government services. The research findings are consistent with the study by (Mushayt, 2019) This shows that implementing AI in government services can reduce processing time and service costs, allowing people to receive services faster and cheaper. Artificial intelligence (AI) technologies, such as chatbots and virtual assistants, offer round-the-clock services that facilitate people's access to information and support at any time. (Androutsopoulou, Karacapilidis, Loukis, & Charalabidis, 2018). Furthermore, AI also enhances transparency and public participation in the governance process. These findings align with the study by (Savaget, Chiarini, & Evans, 2018) Which states that AI adoption will empower broader political participation and more active citizen involvement. Thus, AI adoption significantly impacts increasing public satisfaction levels through improved operational efficiency, service responsiveness, transparency, and public engagement.

4. CONCLUSION

This study demonstrates that the implementation of Artificial Intelligence (AI) by district governments in Indonesia leads to a significant increase in both service frequency and public satisfaction. Integrating AI into the Electronic Government System (EGS) through the Digital Service Living Lab (DSLL) platform can enhance service responsiveness, operational efficiency, and the overall quality of public services. AI technologies such as chatbots, virtual assistants, predictive analytics, natural language processing, and computer vision have proven effective in automating routine tasks, improving service responsiveness, and optimizing resource allocation. The findings of this research underscore the dual benefits of AI adoption—namely, the increase in service frequency and the enhancement of public satisfaction. These outcomes align with the government's broader objectives of building smart cities and bright provinces. By streamlining public service delivery and improving citizen engagement, AI adoption contributes directly to these development goals.

This study provides important recommendations for local governments to expand AI use further across various public service areas. Key suggestions include investing in team member training and capacity building, promoting cross-regional collaboration through the DSLL platform, and conducting regular testing and evaluation to ensure that AI solutions are aligned with community needs. Additionally, enhancing transparency and encouraging public participation in the AI implementation will strengthen accountability and improve service responsiveness. The research

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highlights AI's vital role in transforming public service delivery, contributing to operational efficiency, citizen satisfaction, and government accountability. Further research can expand the scope of the study by including more districts and cities across Indonesia to get a more comprehensive picture of the impact of AI adoption in governance. Research can also examine various types of AI technology used and how each improves public services and citizen satisfaction.

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