



Perceived AI Utilization and Digital Literacy as Predictors of Government Social Media Communication Effectiveness in Aceh Province

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ABSTRACT

Purpose – This study examines the associations and predictive contributions of perceived AI-supported government communication and digital literacy to perceived public communication effectiveness through official government social media in Aceh Province.

Methods – A quantitative cross-sectional survey was conducted among 180 Aceh residents who had accessed or interacted with at least one official government social media account. Data were collected using a five-point Likert-scale questionnaire and analyzed using descriptive statistics, preliminary instrument assessment, regression-assumption testing, and multiple linear regression.

Findings – Perceived AI-supported government communication was positively associated with perceived public communication effectiveness ($B = 0.389$, $\beta = 0.347$, $p < 0.001$). Digital literacy was also positively associated with perceived public communication effectiveness ($B = 0.472$, $\beta = 0.441$, $p < 0.001$) and showed a relatively larger standardized coefficient, although the difference between coefficients was not formally tested. Together, both predictors explained 52.4% of the variance in perceived public communication effectiveness ($R^2 = 0.524$).

Research implications – The findings suggest that government institutions in Aceh should combine responsible AI-supported communication practices with staff capability development, human oversight, accessible public information, and initiatives that strengthen citizens' digital literacy. Because the study used cross-sectional, purposive, and citizen-reported data, these implications should be verified through more representative, longitudinal, and multi-source research.

Originality – This study integrates citizens' perceptions of AI-supported government communication and digital literacy within a single analytical model, providing empirical evidence on their joint relationship with perceived public communication effectiveness in a local-government social media context.

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INTRODUCTION

Digital transformation has fundamentally reshaped how governments disseminate information and communicate with citizens. Public communication, which previously relied predominantly on conventional media, has increasingly shifted toward social media platforms that enable information to be delivered more rapidly, openly, and extensively. Beyond functioning as channels for information dissemination, social media platforms provide interactive spaces in which citizens can raise questions, express criticism, communicate aspirations, and respond to public issues. In local governance, social media has consequently become an important instrument for improving public access to information and strengthening relationships between government institutions and citizens.

The strategic value of government social media lies in its capacity to communicate policies, programs, public services, emergency warnings, and other relevant information directly to citizens. Nevertheless, effective public communication cannot be determined solely by the existence of official government accounts. It also depends on message clarity and accuracy, information timeliness, institutional responsiveness, transparency, and opportunities for meaningful public interaction. Government social media communication may serve multiple functions, including public information delivery, institutional representation, self-presentation, and the pursuit of broader democratic objectives [1]. Accordingly, effective communication requires more than frequent content publication; it requires systematic, responsive, transparent, and citizen-oriented management.

Aceh Province provides a relevant setting for examining digital public communication because of its distinctive social, cultural, geographical, and administrative characteristics. As a province with special authority in several areas of governance, Aceh requires communication practices that are clear, culturally sensitive, and capable of reaching communities across geographically diverse areas. Official government social media accounts may facilitate this process by disseminating information concerning regional development, public services, disaster mitigation, education, health, and local policies. Examining communication effectiveness from the perspective of citizens is therefore particularly important because citizens constitute the primary recipients and evaluators of public information delivered through these platforms.

One technological development increasingly associated with digital public communication is Artificial Intelligence (AI). AI-supported tools can assist government institutions in preparing content, monitoring emerging public issues, identifying patterns in citizen responses, analyzing public sentiment, organizing communication activities, and accelerating information services. However, the introduction of AI into public-sector activities also involves challenges related to organizational readiness, governance, ethical responsibility, data protection, transparency, and user acceptance [2]. Within public communication, AI-supported systems may therefore provide technological assistance for producing more timely, consistent, responsive, and data-informed communication.

AI in public communication should not be understood simply as a replacement for human communication personnel. Rather, it may function as a supporting mechanism that assists social media managers in preparing messages, identifying information needs, processing large volumes of information, and responding to emerging public issues. AI in public relations extends beyond robots or automated responses because it can also influence how organizations process information and manage relationships with stakeholders [3]. Nevertheless, citizens observing government social media may not always be able to distinguish whether communication outcomes are produced through AI, conventional automation, analytical software, or human personnel. Consequently, citizens' perceptions of AI-supported government communication constitute an important dimension for examining how technological support is associated with their evaluation of communication effectiveness.

The effectiveness of digital public communication is not determined exclusively by institutional technological capacity. Citizens' digital literacy also influences how government information is accessed, understood, evaluated, and used. Digital literacy enables citizens to recognize official information sources, assess information credibility, distinguish reliable information from misleading

content, avoid disseminating unverified claims, and participate responsibly in digital environments. Previous evidence indicates that digital literacy is associated with citizens' behavior in using electronic government services [4]. Technological improvements within government institutions may therefore have limited public value if citizens lack sufficient capabilities to interpret and use the information provided through digital platforms.

This relationship between institutional technology and citizen capability is important because effective public communication involves both the production and reception of information. Government institutions are responsible for providing clear, accurate, relevant, timely, and accessible messages, whereas citizens require sufficient digital competencies to interpret those messages and evaluate their credibility. Institutional technological support and citizens' digital literacy can therefore be viewed as complementary dimensions of digital public communication. Improvements in communication technologies may not necessarily translate into more effective communication when citizens experience difficulties accessing, understanding, or evaluating digital information.

Public communication effectiveness through government social media is also closely related to the quality of government-citizen interaction. Effective communication involves understandable messages, timely and accurate information, responsive institutional behavior, transparency, and opportunities for meaningful engagement. Citizens' use of government social media has been associated with perceived transparency and trust in government [5], suggesting that government social media serves not only as a mechanism for information distribution but also as a potential means of strengthening public confidence and citizen engagement. Social media can similarly enhance citizen engagement with local government when institutions use its interactive capabilities effectively [6].

However, previous evidence indicates that the presence of digital platforms does not automatically result in effective or participatory government communication. Mergel et al. [7] emphasized that public-sector digital transformation requires not only technological adoption but also changes in organizational processes, institutional structures, and relationships with service users. In Indonesia, Budi et al. [8] evaluated websites and social media accounts across 116 government institutions and reported uneven Government 2.0 implementation, with an average effectiveness score of approximately 42 percent. Their study provided important evidence regarding institutional digital-government implementation but did not examine citizens' digital literacy or perceived AI-supported communication as factors associated with communication effectiveness.

Evidence from regional government contexts further demonstrates this limitation. Roengtam et al. [9] examined local governments in Bandung, Iligan, and Phuket and found that social media was used predominantly for information dissemination rather than for involving citizens in governmental decision-making. Their findings demonstrate that social media availability alone does not necessarily produce participatory communication. In another Indonesian study, Kusumastuti et al. [10] investigated information-seeking and information-sharing behavior among 1,161 respondents across eight smart cities. Although their findings highlighted important social and behavioral determinants of residents' use of government digital platforms, the study focused on information behavior rather than examining perceived AI-supported government communication and digital literacy together as predictors of perceived public communication effectiveness.

Taken together, these studies provide substantial insight into public-sector digital transformation, Government 2.0 implementation, government social media use, information behavior, and citizen participation. However, they have largely examined institutional technology adoption, social media practices, digital-service use, information-seeking behavior, and electronic participation as separate areas of inquiry. Limited empirical evidence has examined how citizens' perceptions of AI-supported government communication and their own digital literacy are jointly associated with their evaluations of communication effectiveness through local-government social media. This distinction is important because citizen participation in government-led electronic initiatives is influenced by both technological conditions and user perceptions [11]. Examining institutional technological

support and citizen digital capability within a single analytical model may therefore provide a more integrated understanding of digital public communication.

The gap is particularly relevant in Aceh Province, where distinctive administrative, sociocultural, and geographical conditions may influence how government information is produced, communicated, interpreted, and evaluated. Rather than assuming that the presence of AI-related technologies or government social media automatically improves communication outcomes, empirical evidence is needed regarding how citizens perceive technological support in government communication and how their digital capabilities relate to their assessment of communication effectiveness. Accordingly, this study examines the associations and predictive contributions of perceived AI-supported government communication and digital literacy to perceived public communication effectiveness through official government social media in Aceh Province.

METHOD

Research Method

This study employed a quantitative explanatory approach using a cross-sectional survey design to examine the relationships among perceived AI-supported government communication, digital literacy, and perceived public communication effectiveness through official government social media in Aceh Province. All variables were measured at a single point in time using a structured questionnaire. Given the cross-sectional and nonexperimental design, the findings were interpreted in terms of associations and predictive contributions rather than causal effects.

The unit of analysis was individual citizens residing in Aceh Province, while official government social media accounts constituted the communication context evaluated by the respondents. The platforms covered in the study included Instagram, Facebook, X, TikTok, YouTube, and other digital platforms used by government institutions to disseminate public information. Respondents evaluated government communication based on their experiences of accessing, reading, following, or interacting with at least one official government social media account in Aceh.

The target population comprised residents of Aceh Province who actively used social media and had accessed information from official government social media accounts. Purposive sampling was employed to ensure that respondents had relevant experience with the communication context being evaluated. The inclusion criteria required respondents to: (1) be at least 17 years old, (2) reside in Aceh Province, (3) actively use social media, and (4) have accessed government information through official social media accounts. The initial data-collection target ranged from 150 to 200 respondents. Following eligibility and response-completeness screening, 180 valid responses were retained for analysis.

Respondents were recruited through online invitations containing a link to the questionnaire. These invitations were distributed through social media platforms, community groups, and relevant networks in Aceh. Prospective respondents accessed the questionnaire voluntarily, and responses that did not meet the eligibility criteria or were incomplete were excluded from the final dataset. Because recruitment relied on purposive non-probability sampling and voluntary online participation, the procedure was susceptible to self-selection bias. Citizens who were more digitally active, more familiar with government social media, or more interested in public information may have been more likely to participate. Consequently, the sample should not be interpreted as probabilistically representative of the entire population of Aceh Province.

Data were collected using an online questionnaire administered through Google Forms. The instrument consisted of questions concerning respondent characteristics and statements measuring perceived AI-supported government communication, digital literacy, and perceived public communication effectiveness. Each statement was measured using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

The AI-related construct was operationalized as perceived AI-supported government communication rather than objectively verified institutional AI utilization. The study did not conduct a technical audit of government AI systems or independently verify whether specific communication

outputs were generated using AI. Therefore, this construct reflected citizens' perceptions of technological or automated support in areas such as content preparation, response management, issue monitoring, information personalization, and communication evaluation. The construct should consequently be interpreted as perceived AI-related communication support rather than direct evidence of actual institutional AI deployment

Table 1. Operational Definition of Research Variables

Variable	Operational Definition	Indicators	Scale
Artificial Intelligence Utilization (X1)	The use of AI by government institutions to support content management, responses, issue monitoring, and social media communication evaluation.	Response speed; content preparation support; issue monitoring; information personalization; digital communication evaluation.	Likert 1-5
Digital Literacy (X2)	The public's ability to access, understand, evaluate, use, and respond to government digital information.	Information access; message understanding; credibility evaluation; social media ethics; digital participation.	
Public Communication Effectiveness (Y)	The success of government social media communication in delivering information that is clear, fast, responsive, transparent, and trusted by the public.	Message clarity; information speed; information accuracy; responsiveness; interactivity; transparency; public trust.	

Data analysis consisted of descriptive statistics, preliminary instrument-quality assessment, regression-assumption testing, and multiple linear regression analysis. Frequencies and percentages were used to summarize respondent characteristics, while mean scores were used to describe respondents' assessments of each study variable. Item validity was assessed using the Pearson product-moment item-total correlation, in which the score of each questionnaire item was correlated with the total score of its respective construct. With 180 respondents, an item was considered to demonstrate an acceptable item-total relationship when its correlation coefficient exceeded the critical value of $r = 0.146$ at the 5% significance level. Internal consistency reliability was assessed using Cronbach's Alpha, with coefficients of 0.70 or higher considered acceptable. These procedures provided preliminary evidence regarding item consistency and internal reliability. However, Pearson item-total correlations and Cronbach's Alpha alone do not establish factorial, convergent, or discriminant validity; therefore, they were not interpreted as comprehensive evidence of construct validity.

Before estimating the regression model, several assumptions were evaluated. Residual normality was examined using the Kolmogorov-Smirnov test, with a significance value greater than 0.05 indicating no statistically significant deviation from normality. Multicollinearity was assessed using tolerance and Variance Inflation Factor (VIF) values. The model was considered free from problematic multicollinearity when tolerance values exceeded 0.10 and VIF values were below 10. Heteroscedasticity was evaluated using the Glejser test, with significance values greater than 0.05 indicating no statistically detectable evidence of heteroscedasticity.

Multiple linear regression was subsequently employed to estimate the associations and predictive contributions of perceived AI-supported government communication and digital literacy to perceived public communication effectiveness. The regression model was specified as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

Note.

Y = perceived public communication effectiveness

X₁ = perceived AI-supported government communication

X₂ = digital literacy

α = regression constant

β₁ and β₂ = regression coefficients

ε = error term

The t-test was used to assess whether each predictor was significantly associated with perceived public communication effectiveness while statistically controlling for the other predictor. The F-test was used to evaluate the overall statistical significance of the regression model. The R² and adjusted R² values were used to indicate the proportion of variance in perceived public communication effectiveness explained by the predictors included in the model. All statistical tests were evaluated at a significance level of α = 0.05, and statistical outputs displayed as 0.000 were reported as p < 0.001.

Standardized regression coefficients (β) were also examined to descriptively compare the relative predictive contributions of the two predictors within the estimated model. However, a larger standardized coefficient was not interpreted as evidence that one predictor was statistically significantly stronger than another unless the difference between coefficients was formally tested.

Based on the proposed analytical model, the hypotheses were formulated as follows:

1. H1: Perceived AI-supported government communication is positively associated with perceived public communication effectiveness through official government social media in Aceh Province.
2. H2: Digital literacy is positively associated with perceived public communication effectiveness through official government social media in Aceh Province.
3. H3: Perceived AI-supported government communication and digital literacy jointly provide a significant predictive contribution to perceived public communication effectiveness through official government social media in Aceh Province.

RESULTS AND DISCUSSION

Results

This section presents the findings concerning the relationships among perceived AI-supported government communication, digital literacy, and perceived public communication effectiveness through official government social media in Aceh Province. The analysis was based on 180 respondents who met the eligibility criteria, including residence in Aceh Province, active social media use, and previous access to or interaction with at least one official government social media account. The results cover respondent characteristics, descriptive statistics and preliminary instrument assessment, regression-assumption diagnostics, and multiple linear regression analysis. The demographic and social media characteristics of the respondents are summarized in Table 2.

Table 2. Respondent Characteristics

Characteristic	Category	Frequency	Percentage
Gender	Male	82	45.6%
	Female	98	54.4%
Age	17–25 years	68	37.8%
	26–35 years	59	32.8%
	>35 years	53	29.4%
Last education	Senior High School or equivalent	54	30.0%
	Diploma/Bachelor's Degree	103	57.2%

Characteristic	Category	Frequency	Percentage
Access intensity	Postgraduate	23	12.8%
	1–2 times per week	46	25.6%
	3–5 times per week	79	43.9%
	>5 times per week	55	30.5%

Female respondents represented 54.4% of the sample, while male respondents accounted for 45.6%. The largest age group was 17–25 years, representing 37.8% of respondents, followed by those aged 26–35 years at 32.8%. Most respondents had completed a diploma or bachelor's degree (57.2%). Regarding exposure to government social media, 74.4% of respondents reported accessing official government social media at least three times per week. This frequency indicates that most participants had relatively regular exposure to the communication environment evaluated in this study.

Descriptive Statistics and Preliminary Instrument Assessment

Descriptive statistics, item-total correlation ranges, and internal consistency coefficients are presented in Table 3.

Table 3. Descriptive Statistics and Preliminary Instrument Assessment

Variable	Indicators	Mean	Category	Range of r-value	Cronbach's Alpha
Perceived AI-Supported Government Communication (X1)	5	4.03	High	0.683–0.812	0.873
Digital Literacy (X2)	5	4.15	High	0.701–0.836	0.889
Perceived Public Communication Effectiveness (Y)	6	4.10	High	0.694–0.851	0.901

Digital literacy produced the highest mean score ($M = 4.15$), indicating that respondents generally perceived themselves as capable of accessing, understanding, evaluating, and appropriately using digital government information. Perceived public communication effectiveness had a mean score of 4.10, suggesting generally favorable evaluations of the clarity, timeliness, accuracy, responsiveness, and transparency of government communication through social media. Perceived AI-supported government communication obtained a mean of 4.03, indicating relatively high perceptions of technological or automated support in government social media communication.

All item-total correlation coefficients exceeded the critical value of $r = 0.146$ at the 5% significance level. Cronbach's Alpha coefficients ranged from 0.873 to 0.901 and therefore exceeded the minimum criterion of 0.70. These results provide preliminary evidence of satisfactory item consistency and internal reliability for the three constructs. However, item-total correlations and Cronbach's Alpha do not independently establish factorial, convergent, or discriminant validity. Accordingly, these findings should not be interpreted as comprehensive evidence of construct validity.

Regression-Assumption Diagnostics

Regression assumptions were evaluated before estimating the multiple linear regression model. The diagnostic results are summarized in Table 4.

Table 4. Summary of Regression-Assumption Diagnostics

Test	Indicator	Result	Criterion	Interpretation
Residual normality	Kolmogorov–Smirnov	$p = 0.200$	$p > 0.05$	No statistically significant deviation from normality
Multicollinearity	Tolerance X1; X2	0.642; 0.642	>0.10	No problematic multicollinearity
	VIF X1; X2	1.558; 1.558	<10	No problematic multicollinearity
Heteroscedasticity	Glejser X1; X2	0.216; 0.347	$p > 0.05$	No statistically detectable heteroscedasticity

The Kolmogorov–Smirnov test yielded a significance value of 0.200, indicating that the regression residuals did not significantly deviate from a normal distribution. Tolerance values for both predictors were 0.642 and their VIF values were 1.558, indicating no problematic multicollinearity. The Glejser significance values were 0.216 for perceived AI-supported government communication and 0.347 for digital literacy, providing no statistically detectable evidence of heteroscedasticity. Taken together, the available diagnostic results supported the use of multiple linear regression for the subsequent analysis.

Multiple Linear Regression and Hypothesis Testing

Multiple linear regression was conducted to estimate the associations and predictive contributions of perceived AI-supported government communication and digital literacy to perceived public communication effectiveness. The results are reported in Table 5.

Table 5. Results of Multiple Linear Regression

Variable	B	Std. Error	β	t	p
Constant	8.214	1.536	–	5.348	<0.001
Perceived AI-Supported Government Communication (X1)	0.389	0.072	0.347	5.403	<0.001
Digital Literacy (X2)	0.472	0.069	0.441	6.841	<0.001

Model summary: $R = 0.724$; $R^2 = 0.524$; Adjusted $R^2 = 0.519$; $F(2, 177) = 97.512$, $p < 0.001$. Based on the unstandardized coefficients, the estimated regression equation was:

$$Y = 8.214 + 0.389X_1 + 0.472X_2 + \varepsilon$$

Perceived AI-supported government communication was positively associated with perceived public communication effectiveness after digital literacy was statistically controlled ($B = 0.389$, $SE = 0.072$, $\beta = 0.347$, $t = 5.403$, $p < 0.001$, 95% CI [0.247, 0.531]). The confidence interval did not include zero, providing evidence of a statistically significant positive association. Therefore, H1 was supported. Digital literacy was also positively associated with perceived public communication effectiveness after perceived AI-supported government communication was statistically controlled ($B = 0.472$, $SE = 0.069$, $\beta = 0.441$, $t = 6.841$, $p < 0.001$, 95% CI [0.336, 0.608]). Therefore, H2 was supported.

The standardized coefficient for digital literacy ($\beta = 0.441$) was descriptively larger than that for perceived AI-supported government communication ($\beta = 0.347$). Within the estimated model, this pattern indicates a relatively larger predictive contribution from digital literacy. However, because the difference between the two coefficients was not formally tested, the findings should not be interpreted as statistical evidence that digital literacy was significantly stronger or more important than perceived AI-supported government communication. The overall regression model was statistically significant, $F(2, 177) = 97.512$, $p < 0.001$. The two predictors jointly explained 52.4% of the observed variance in perceived public communication effectiveness, with an adjusted R^2 of 0.519. Therefore, H3 was supported.

From a practical perspective, the R^2 value indicates that perceived AI-supported communication and digital literacy together captured an important proportion of variation in respondents' evaluations of government communication. At the same time, 47.6% of the variance remained unexplained by the model, indicating that communication effectiveness is also associated with factors not represented by these two predictors. The unexplained variance should not be attributed to particular variables without additional empirical investigation.

Table 6. Summary of Hypothesis Testing

Hypothesis	Statement	Result	Decision
H1	Perceived AI-supported government communication is positively associated with perceived public communication effectiveness.	$B = 0.389; \beta = 0.347; p < 0.001$	Supported
H2	Digital literacy is positively associated with perceived public communication effectiveness.	$B = 0.472; \beta = 0.441; p < 0.001$	Supported
H3	Perceived AI-supported government communication and digital literacy jointly provide a significant predictive contribution to perceived public communication effectiveness.	$F(2,177) = 97.512; R^2 = 0.524; p < 0.001$	Supported

Discussion

The findings demonstrate that perceived AI-supported government communication and digital literacy were both positively associated with perceived public communication effectiveness through official government social media in Aceh Province. Taken together, the results indicate that digital public communication should be understood through two complementary dimensions: the technological and organizational support available on the institutional side and the capability of citizens to access, understand, evaluate, and use government information on the user side. This interpretation is consistent with the broader understanding of public-sector digital transformation as a process involving not only technology adoption but also organizational capacity and relationships with service users [7].

Perceived AI-supported government communication remained positively associated with communication effectiveness after digital literacy was statistically controlled. Respondents who perceived greater technological support in content preparation, issue monitoring, response management, personalization, and communication evaluation also tended to evaluate government social media communication more positively. This pattern is consistent with previous literature indicating that AI can assist public institutions in processing information, organizing service activities, and responding to emerging public needs [2], [12].

However, the finding requires careful interpretation because this study measured perceived AI-supported communication rather than objectively verified AI deployment. Respondents may observe rapid responses, structured content, personalization, or other indicators of technological support without knowing whether these outcomes were generated through AI, conventional automation, analytical software, or human communication personnel. Consequently, the significant association identified in this study cannot be interpreted as direct evidence that actual institutional AI implementation caused improvements in public communication. This distinction differentiates the present study from experimental research in which participants evaluate explicitly identified AI-supported public services [13]–[15].

The finding nevertheless reinforces the importance of maintaining human involvement in AI-supported public communication. AI-assisted systems may help institutions process large volumes of information and identify emerging public concerns, but communication personnel remain responsible for ensuring accuracy, accountability, contextual appropriateness, and sensitivity to citizens' needs [3]. Previous research indicates that public acceptance of government AI is influenced by factors such as human involvement, transparency, accuracy, institutional experience, privacy concerns, and opportunities for review [13]–[15], [21]. These considerations are particularly relevant in Aceh, where communication may need to account for local language, cultural norms, social expectations, and the distinctive administrative environment. AI-supported communication should therefore be accompanied by human supervision, verification procedures, transparency, and appropriate data-governance mechanisms.

Digital literacy also showed a positive association with perceived public communication effectiveness. Respondents with stronger digital literacy are more capable of locating official sources, understanding government messages, evaluating credibility, distinguishing reliable information from misinformation, and using public information appropriately. This finding is consistent with previous evidence linking digital literacy to e-government use and digital inclusion [4], [16]. It also

corresponds with studies showing that citizens' information literacy influences trust in government websites and their capacity to use public information effectively [24], [25].

An important finding is that digital literacy produced a relatively larger standardized coefficient ($\beta = 0.441$) than perceived AI-supported government communication ($\beta = 0.347$). One plausible explanation is that digital literacy operates directly at the point where citizens receive and evaluate information. Citizens may have limited knowledge of whether AI is actually involved in producing government social media content, whereas their ability to locate, understand, interpret, and verify information directly shapes their communication experience. Digital literacy may therefore be more immediately visible to respondents when they evaluate whether government communication is effective.

This interpretation is also consistent with previous studies connecting government social media use with transparency, trust, satisfaction, and citizen engagement [5], [6], [17], [23]. Nevertheless, the difference between the standardized coefficients was not formally tested. The present study therefore does not establish that digital literacy is statistically more influential than perceived AI-supported communication. The finding should be understood only as a descriptive comparison of their relative predictive contributions within this particular regression model.

The combined model explained 52.4% of the variance in perceived public communication effectiveness. This level of explained variance indicates that the two predictors capture a meaningful portion of differences in respondents' assessments of government communication, while simultaneously demonstrating that communication effectiveness cannot be reduced to AI-related technological support and digital literacy alone. The result extends earlier studies that examined Government 2.0 implementation, government social media practices, information-seeking behavior, and electronic participation separately [8]–[11] by integrating an institution-side perception of technological support with a citizen-side digital capability within one analytical model.

The practical implications are particularly relevant to digital governance in Aceh. Government institutions should avoid viewing AI adoption as an isolated technological investment. The findings suggest that technological development should be accompanied by staff capability, human oversight, content verification, transparent communication processes, and mechanisms through which citizens can obtain human assistance when automated communication is insufficient [20], [21]. At the same time, efforts to improve digital literacy should support citizens in identifying official information, evaluating credibility, understanding government services, detecting misinformation, and participating responsibly in digital environments.

This combined strategy is important because the availability of official social media accounts does not automatically produce responsive or participatory public communication. Previous studies have shown that government social media may remain dominated by one-way information dissemination when institutional mechanisms for interaction and participation are weak [8], [9]. Government communication performance should therefore be evaluated through dimensions such as message accuracy, response quality, public understanding, transparency, interaction continuity, issue resolution, and trust rather than publication frequency or follower counts alone. Evidence from other government contexts similarly indicates that social media can improve responsiveness when citizen requests are systematically received and followed by institutional action [22].

Several alternative explanations should nevertheless be considered. Respondents' evaluations of communication effectiveness may also have been influenced by trust in government, educational background, age, frequency of social media access, previous experiences with public services, platform characteristics, or broader attitudes toward government institutions. These factors were not controlled in the present regression model. Accordingly, the remaining 47.6% of unexplained variance cannot be assigned to particular determinants without additional empirical evidence.

The findings should also be interpreted in light of the study's methodological limitations. First, the cross-sectional design does not establish temporal ordering and therefore cannot provide evidence of causal relationships. Second, purposive online recruitment and voluntary participation create the possibility of self-selection bias, because citizens who are more digitally active, more familiar with

government social media, or more interested in public information may have been more likely to participate. The findings should consequently not be generalized probabilistically to the entire population of Aceh Province.

Third, perceived AI-supported government communication was measured using citizens' perceptions rather than objective documentation or technical verification of institutional AI use. Fourth, some conceptual proximity may exist between indicators of technological support and communication effectiveness, particularly those involving response management and responsiveness. Finally, all constructs were collected from the same respondents through the same questionnaire and response scale, creating the possibility of common-method variance. Although item-total correlations and Cronbach's Alpha demonstrated satisfactory preliminary consistency, they do not establish factorial or discriminant validity among the constructs.

Future studies should therefore employ stronger measurement-validation procedures, including exploratory or confirmatory factor analysis and discriminant-validity assessment. Multi-source evidence would also strengthen the interpretation of AI-related communication, for example by combining citizen surveys with interviews involving government communication personnel, institutional documentation, technical system audits, and digital-content analysis. Longitudinal designs could provide stronger evidence concerning temporal relationships, while comparative research across institutions, platforms, districts, or provinces could determine whether the patterns identified in Aceh are context-specific or reflect broader characteristics of digital governance in Indonesia.

CONCLUSION

This study found that perceived AI-supported government communication and digital literacy were positively and significantly associated with perceived public communication effectiveness through official government social media in Aceh Province. Digital literacy showed a relatively larger standardized coefficient than perceived AI-supported government communication, although the difference between the two coefficients was not formally tested. Together, the two predictors explained 52.4% of the variance in perceived public communication effectiveness, indicating that both institutional technological support and citizens' digital capabilities are important components of effective digital public communication. These findings suggest that government institutions should not rely solely on technological development but should combine responsible AI-supported communication practices with staff capability, human oversight, accessible information, and initiatives that strengthen citizens' digital literacy. Nevertheless, the findings should be interpreted within the boundaries of the cross-sectional design, purposive online sampling, and citizen-reported measures, and therefore do not establish causal effects of actual institutional AI implementation or probabilistic representation of the entire Aceh population. Future research should validate these relationships using more representative samples, longitudinal or multi-source designs, stronger construct-validation procedures, and objective evidence of AI use within government communication systems

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AUTHOR CONTRIBUTION STATEMENT

MS contributed to the formulation of the research idea, development of the background, preparation of the research instrument, data collection, data analysis, interpretation of findings, manuscript drafting, article revision, and final approval of the version to be published.

AI DISCLOSURE STATEMENT

The author used ChatGPT during the preparation of this work to assist with language editing, sentence structure refinement, translation, and improvement of manuscript readability. After using the tool, the author thoroughly reviewed, checked, and edited the content as needed. The author takes full responsibility for the accuracy, originality, academic substance, and final content of this publication.

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