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Digital Transformation in Rural Governance: TAM Analysis of E-Government Adoption in Indonesia

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Abstract

The implementation of e-government in rural regions of developing nations encounters unique challenges, especially in environments where conventional governance frameworks continue to dominate. This research investigates the determinants affecting the adoption of e-government in Nagari Batipuah Ateh, a rural community in West Sumatra, Indonesia, emphasizing the execution of the Electronic-Based Government System (SPBE). This study utilizes an extended Technology Acceptance Model (TAM) to determine the primary factors influencing e-government acceptance and utilization in the Nagari Batipuah Ateh community. A quantitative, cross-sectional design was employed to gather data from 62 residents of Nagari Batipuah Ateh, utilizing a questionnaire that assessed seven constructs of the Technology Acceptance Model (TAM). The multiple regression analysis results demonstrated that perceived usefulness ($\beta = 0.41$, $p < 0.001$) and perceived compatibility ($\beta = 0.29$, $p < 0.001$) significantly influenced attitudes toward usage, whereas social influence ($\beta = 0.18$, $p < 0.05$) impacted behavioral intention to use. Behavioral Intention to Use significantly predicted Actual System Use ($\beta = 0.74$, $p < 0.001$). The research indicated favorable perceptions of the SPBE, reflected in high mean scores for Behavioral Intention to Use (4.31 out of 5) and Attitude Toward Using (4.23 out of 5). The Perceived Ease of Use score was the lowest at 3.21 out of 5, suggesting potential usability challenges. The findings underscore the necessity of illustrating concrete advantages, ensuring cultural alignment, and utilizing social influence to facilitate e-government adoption in rural areas.

Keywords: Digital Transformation, E-Government, Technology Acceptance Model, Rural Areas.

Introduction

The rapid proliferation of digital technologies has ushered in a new era of governance, with e-government initiatives emerging as a cornerstone of public sector modernization efforts worldwide (1). These initiatives promise enhanced efficiency, transparency, and citizen engagement in government operations and service delivery (2). However, developing countries and rural areas, which may have limited technological infrastructure and digital literacy, continue to face significant challenges in the effective implementation and uptake of e-government systems (3). Recent research investigated the growth of e-government among the member nations of the African Union. This research explores the influence that e-government has had on the reform of public administration and governance, with a particular focus on Ghana as a case study (4). A mixed-methods approach was applied in order to conduct an analysis of secondary data on important e-government variables. The TOPSIS method was utilized for this particular investigation. Through the identification of areas that could be improved and the allocation of resources for the development of e-government policy, this study contributes to the promotion of public service delivery. Nguyen and Lee, 2023 investigated the implementation of e-government in rural Vietnam within the Southeast Asian context (5). The findings indicated that social influence and perceived compatibility were significant factors affecting the observed adoption rates. The research involving 312 rural residents demonstrated that traditional community structures significantly influenced technology acceptance. Husin *et al.*, 2017 examined the implementation of e-government in Philippine barangays, highlighting the impact of cultural factors and social networks on adoption patterns (6). The implementation of e-government

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initiatives presents a distinctive set of challenges and opportunities. The Indonesian government has initiated a series of ambitious digital transformation initiatives, including the implementation of the Electronic-Based Government System (SPBE) across various administrative levels (7). Nevertheless, the efficacy of these initiatives is contingent upon their acceptance and utilization by citizens, particularly in rural areas where traditional governance structures, such as the Nagari system in West Sumatra, continue to exert considerable influence (8). Research on e-government adoption in urban and developed contexts has been extensive, but studies examining the factors influencing adoption in rural, developing settings are scarce (9, 10). The distinctive socio-cultural dynamics, technological limitations, and governance structures in these regions demand a bespoke methodology for investigating e-government adoption (11). This study seeks to fill existing research gaps by investigating the adoption of the SPBE in Nagari Batipuah Ateh, a rural community located in West Sumatra, Indonesia. Utilizing an expanded Technology Acceptance Model (TAM) framework (12–14). This research aims to address the question: What are the primary factors influencing the adoption and utilization of e-government services in rural Indonesian contexts, specifically within the Nagari system? A quantitative, cross-sectional research design was utilized to investigate this question, as detailed in references (15, 16). While the Technology Acceptance Model (TAM) has been widely applied in various technology adoption studies, its application in rural governance contexts requires careful consideration of contextual factors. Our extended TAM framework incorporates additional constructs specifically relevant to rural Indonesian settings. Perceived Compatibility (PC) was added to address the alignment between e-government systems and traditional governance values, while Social Influence (SI) was included to capture the communal decision-making processes characteristic of rural communities. Our extended model addresses this concern by incorporating elements that reflect the socio-cultural dynamics of the Nagari system. However, we acknowledge that additional factors beyond our extended TAM may influence e-government adoption in rural settings, such as infrastructure limitations, power dynamics within traditional governance structures, and varying levels of digital literacy. Data was collected from 62 people of Nagari Batipuah Ateh through the use of a questionnaire that utilized an expanded TAM framework (17). The questionnaire included components such as perceived utility, perceived ease of use, perceived compatibility, and social influence. In this study, multiple regression analysis was employed to investigate the hypothesized connections between the aforementioned components and the behaviors associated with the adoption of e-government (18). This study contributes to the existing body of work on the adoption of e-government in developing countries and broadens the application of the Technology Acceptance Model to settings that are culturally distinct and rural (18–21). It addresses a significant geographical and contextual gap in the extant literature by focusing on rural e-government adoption in a developing nation. While e-government studies have increased in recent years, they have largely focused on urban or developed contexts. In contrast, our investigation of Nagari Batipuah Ateh offers empirical insights into the distinctive dynamics of rural adoption. In this context, infrastructure limitations, traditional governance structures, and communal decision-making processes give rise to adoption patterns that differ substantially from those observed in urban settings.

Methodology

This research utilized a quantitative, cross-sectional design to examine the adoption of the Electronic-Based Government System (SPBE) in Nagari Batipuah Ateh, Indonesia. The study employed an extended Technology Acceptance Model (TAM) framework to analyze the factors affecting e-government adoption in a rural context (22–24). An illustration of the methodical approach that was applied in this investigation of the implementation of e-government in Nagari Batipuah Ateh may be seen in the flowchart of the research process (Figure 1). A logical journey from ideation to conclusion is described by the process that is outlined here. This progression is comprised of five key stages within the process. The study design, the selection of participants, the collection of data, the analysis of data, and the phase of discussing the results are the key steps of

the research process. Initially, the research design phase is where the quantitative and cross-sectional nature of the study is established. This phase marks the beginning of the procedure.

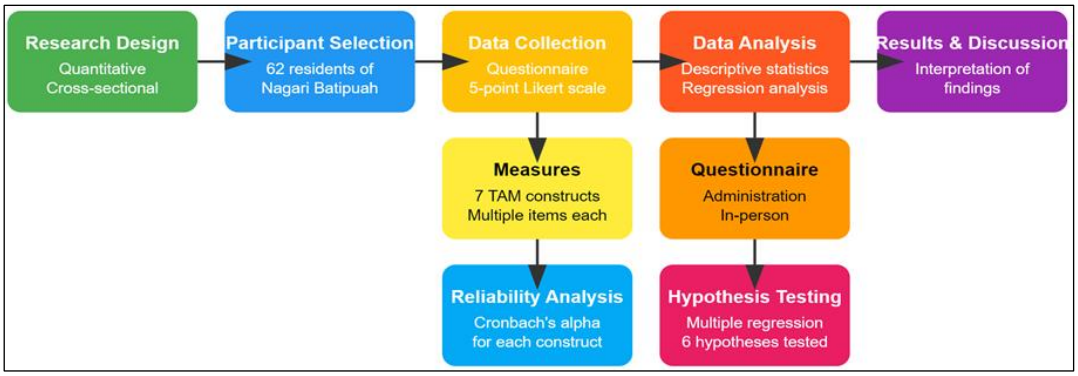

Figure 1: Research Process Flowchart

This foundational step provides the basis for all subsequent methodological decisions and ensures alignment with the research objectives. Subsequently, the Participant Selection stage entails the recruitment of 62 residents from Nagari Batipuah Ateh, thereby ensuring the representativeness of the sample for the investigation. The data collection phase, which is pivotal to the empirical process, entails the administration of a questionnaire that employs a 5-point Likert scale (25). This stage consists of two essential sub-processes: The next step is to measure and administer the questionnaire. The Measures component operationalizes seven TAM constructs, assessing each with multiple items. The data analysis stage comprises the statistical processing of the collected data, primarily through the application of descriptive statistics and regression analysis. Reliability Analysis and Hypothesis Testing subdivide this stage (26, 27). The former entails the calculation of Cronbach's alpha coefficients for each construct, thereby ensuring the internal consistency of the measures. The latter employs multiple regression techniques to test six hypotheses derived from the extended technology acceptance model (TAM) framework. The Results and Discussion phase concludes the research process by interpreting and contextualizing the findings within the broader framework of e-government adoption in rural settings. This final stage synthesizes the empirical results with existing literature, thereby deriving meaningful insights and implications.

Participant Selection and Data Collection

The study sample consisted of 62 residents of Nagari Batipuah Ateh, selected through the convenience sampling method (28). The participants were required to be adults (aged 18 or over) and residents of Nagari Batipuah Ateh. We made efforts to ensure a diverse sample in terms of age, education level, and occupation, aiming to capture a representative cross-section of the local population. Table 1 illustrates the assessment of each construct using a series of items adapted from prior TAM studies and tailored to the e-government context, on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

Table 1: Applications in Each Class

Construct	Sample Item
Perceived Usefulness (PU)	"The Nagari Information System improves the quality of service I receive from the Nagari government."
Perceived Ease of Use (PEOU)	"I found it easy to learn how to use the Nagari Information System."
Perceived Compatibility (PC)	"The use of the Nagari Information System is in accordance with my daily lifestyle."
Social Influence (SI)	"Nagari leaders support the use of the Nagari Information System."

Attitude Toward Using (ATU)	"Using the Nagari Information System in my opinion is a good idea."
Behavioral Intention to Use (BIU)	"I intend to use the Nagari Information System in the near future."
Actual System Use (ASU)	"I often use the Nagari Information System"

We administered the questionnaire in person in August 2024 to ensure clarity and assist participants who might have encountered difficulties with the written survey. To ensure linguistic equivalence, the questionnaire was translated into Bahasa Indonesia and then back-translated into English. A pilot test was conducted with a small group (n=10) prior to the main study. This was done in order to refine the questionnaire and ensure its completeness in the local context.

Results and Discussion

The introduction of the Electronic-Based Government System (SPBE) in Nagari Batipuah Ateh signifies a pivotal stride in the digital transformation of rural Indonesian governance. Through the lens of an extended Technology Acceptance Model (TAM), our analysis reveals a generally positive disposition towards the SPBE among Nagari Batipuah Ateh residents, with particularly strong behavioral intentions to use the system. The findings also highlight potential obstacles, particularly in the perceived ease of use of the technology, which is identified as a crucial area for improvement. Furthermore, the substantial influence of social networks on the decision to adopt new technologies underscores the communal nature of decision-making in rural Indonesian communities. This highlights the potential for leveraging local leadership and community networks to promote e-government initiatives. The significant positive correlation between behavioral intention and actual system use indicates that efforts to enhance adoption intentions could effectively result in increased utilization of e-government services.

Descriptive Statistics

The study included a diverse sample of 62 residents from Nagari Batipuah Ateh, which allowed for the representation of the local population in a statistically significant manner. Table 2 presents a summary of the demographic characteristics of the respondents.

Table 2: Demographic Characteristics of Respondents

Characteristic	Category	Percentage
Gender	Male	53.2%
	Female	46.8%
Age	18-25	8.1%
	26-35	24.2%
	36-45	30.6%
	46-55	24.2%
	Above 55	12.9%
Education	Elementary school or equivalent	6.5%
	Junior high school or equivalent	12.9%
	High school or equivalent	54.8%
	Diploma	1.6%
	Bachelor	19.4%
	Postgraduate	4.8%
Occupation	Farmers	22.6%
	Self-employed	24.2%
	Village/Nagari Officials	17.7%
	PNS/TNI/Polri	6.5%
	Other/Unspecified	29.0%
Experience with computers/smartphones	Less than 1 year	8.1%
	1-3 years	17.7%
	4-6 years	24.2%
	More than 6 years	50.0%

The demographic data reveals an equitable gender distribution and a broad age spectrum, predominantly comprising respondents aged 26 to 55. The respondents exhibit a diverse range of educational backgrounds, primarily at the high school level or higher. Approximately half of the respondents possess over six years of experience with computers or smartphones, indicating a reasonably tech-savvy population. Table 3 displays the mean scores and standard deviations for each construct of the Technology Acceptance Model, derived from responses on a 5-point Likert scale.

Table 3: Descriptive Statistics of TAM Constructs

Construct	Mean	Standard Deviation
Perceived Usefulness (PU)	3.84	0.72
Perceived Ease of Use (PEOU)	3.21	0.89
Perceived Compatibility (PC)	3.62	0.81
Social Influence (SI)	4.12	0.68
Attitude Toward Using (ATU)	4.23	0.63
Behavioral Intention to Use (BIU)	4.31	0.59
Actual System Use (ASU)	3.78	0.85

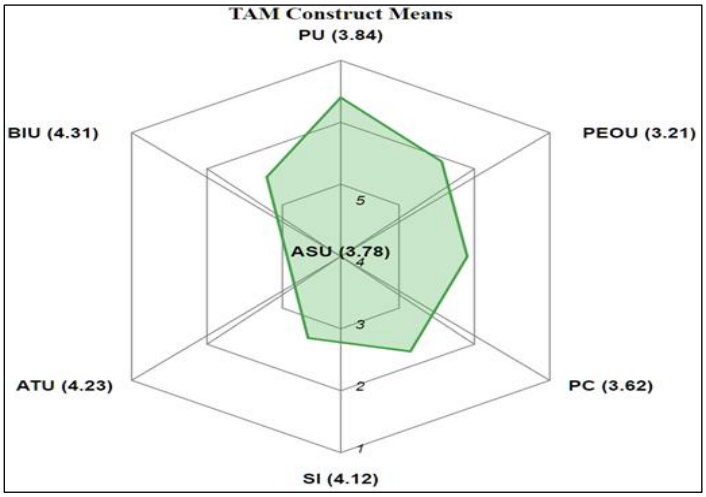

Figure 2: Radar Chart of TAM Construct Means

A radar chart that depicts the mean scores of the constructs of the Technology Acceptance Model (TAM) is presented in Figure 2, which contains an illustration of the adoption of e-government in Nagari Batipuah Ateh. A better understanding of the implementation of the electronic-based government system (SPBE) can be gained through the use of this visualization, which provides insights into both the strengths and places for improvement.

The radar chart reveals a distinct pattern of adoption factors, with the polygon's shape indicating varying levels of agreement across the different TAM constructs. It is noteworthy that the chart exhibits an asymmetrical shape, leaning towards the upper left quadrant. This signifies stronger positive responses in certain areas while simultaneously highlighting potential challenges in others. The most significant factors, indicated by the polygon extending the farthest in these directions, are Behavioral Intention to Use (BIU) and Attitude towards Using (ATU). This suggests a significantly positive inclination among residents of Nagari Batipuah Ateh towards the adoption of the e-government system. The strong performance of these constructs demonstrates that users possess a favorable attitude toward the SPBE and exhibit a significant intention to integrate it into their interactions with local government. The chart also demonstrates the notable presence of the construct of Social Influence (SI), displaying levels of influence nearly equivalent to those of BIU and ATU. This prominence highlights the considerable influence

of community dynamics and social norms on technology adoption in the rural Indonesian context. This indicates that the opinions of community leaders and peers have a significant impact on individuals' decisions to engage with the e-government system. The chart places the variables of Perceived Usefulness (PU) and Actual System Use (ASU) in a middle ground position. Although less pronounced than in the cases of BIU, ATU, or SI, these positions indicate a generally positive perception of the system's utility and a moderate level of current usage. This positioning suggests that while users recognize the potential benefits of the SPBE, there may be room for enhancing their appreciation of its practical advantages and encouraging more consistent use. The Perceived Compatibility (PC) score is slightly lower than that of Perceived Usefulness (PU) and Actual System Use (ASU), yet it remains above the midpoint of the scale. This placement indicates that while users generally find the e-government system compatible with their values and needs, there may be opportunities to further align the system with local contexts and practices to enhance its adoption. The position of Perceived Ease of Use (PEOU), which extends the least from the center of the chart, indicates the most notable area for potential improvement. This positioning suggests that users may encounter difficulties in navigating or utilizing the SPBE in an effective manner. The relatively lower score in perceived ease of use (PEOU) compared to other constructs indicates a potential barrier to the full adoption and utilization of the e-government system. This visual representation lends support to the notion that while the community is receptive to the SPBE, enhancing its user-friendliness could prove to be a crucial factor in achieving a more widespread and effective adoption.

Reliability Analysis

Cronbach's alpha coefficients were calculated for each construct of the Technology Acceptance Model (TAM) to verify the internal consistency and reliability of the measurement scales employed in this study. This analysis is essential for evaluating the questionnaire's capacity to assess the targeted components in a consistent manner across a wide range of respondents in the context of the adoption of e-government in Nagari Batipuah Ateh. In Table 4, the Cronbach's alpha coefficients that correlate to each individual construct of the Technology Acceptance Model (TAM) are presented.

Table 4: Cronbach's Alpha Coefficients for Each TAM Construct

Construct	Cronbach's Alpha	Number of Items
Perceived Usefulness (PU)	0.86	5
Perceived Ease of Use (PEOU)	0.83	5
Perceived Compatibility (PC)	0.79	5
Social Influence (SI)	0.88	5
Attitude Toward Using (ATU)	0.91	5
Behavioral Intention to Use (BIU)	0.89	5
Actual System Use (ASU)	0.85	5

The Cronbach's alpha coefficients for all constructs in this study exceed the commonly accepted threshold of 0.70 (29). This means that the scales used to measure each TAM construct in the electronic-based government system (SPBE) in Nagari Batipuah Ateh are very reliable against each other. The Attitude Toward Using (ATU) construct exhibits the highest reliability ($\alpha = 0.91$), indicating that the items measuring this construct are particularly cohesive and consistent. This high reliability serves to reinforce the validity of the strong positive attitudes observed in the descriptive statistics, thereby providing a solid foundation for understanding users' overall disposition toward the e-government system. Social Influence (SI) and Behavioral Intention to Use (BIU) also show remarkably high reliability ($\alpha = 0.88$ and $\alpha = 0.89$, respectively). These values indicate that the questionnaire effectively captures the consistency of social factors influencing adoption and the stability of users' intentions to engage with the SPBE. Perceived Usefulness (PU) and Actual System Use (ASU) also show high reliability ($\alpha = 0.86$ and $\alpha = 0.85$, respectively). This implies that respondents consistently interpret the items measuring the system's perceived benefits

and reported usage patterns, thereby providing a reliable basis for assessing the practical impact of SPBE implementation. The Perceived Ease of Use (PEOU) scale demonstrates satisfactory reliability ($\alpha = 0.83$), indicating a consistent measurement of users' perceptions regarding the system's usability. This reliability validates the earlier observation that PEOU could need attention, as the consistently lower scores do not stem from measurement inconsistency. Perceived Compatibility (PC), while still above the acceptable threshold, exhibits the lowest reliability among the constructs ($\alpha = 0.79$). This slightly lower value may be indicative of the complex nature of assessing compatibility in a diverse rural setting, where individual perceptions of how well the system aligns with existing values and practices may vary more widely. The high reliability coefficients across all constructs serve to enhance the overall credibility of the study's findings. The results demonstrate that the questionnaire items are effective in capturing the intended TAM constructs within the context of e-government adoption in Nagari Batipuah Ateh. This reliability gives a strong foundation for more research, like looking at how constructs relate to each other and testing the structural parts of the TAM model. Furthermore, the fact that the adapted TAM framework is reliable across constructs shows that it is a good way to study how people in rural Indonesia use e-government.

Correlation Analysis

A correlation analysis was performed to investigate the relationships among the constructs of the Technology Acceptance Model (TAM) regarding e-government adoption in Nagari Batipuah Ateh. This analysis provides insights into the strength and direction of associations between user perceptions and behaviors regarding the Electronic-Based Government System (SPBE). Table 5 displays the correlation matrix for the constructs of the Technology Acceptance Model (TAM).

Table 5: Descriptive Statistics of TAM Constructs

	PU	PEOU	PC	SI	ATU	BIU	ASU
PU	1.00						
PEOU	0.62*	1.00					
PC	0.58*	0.53*	1.00				
SI	0.49*	0.41*	0.55*	1.00			
ATU	0.67*	0.59*	0.61*	0.57*	1.00		
BIU	0.71*	0.63*	0.64*	0.60*	0.78*	1.00	
ASU	0.65*	0.57*	0.59*	0.52*	0.69*	0.74*	1.00

*Correlation is significant at $p < 0.01$

Note: PU = Perceived Usefulness, PEOU = Perceived Ease of Use, PC = Perceived Compatibility, SI = Social Influence, ATU = Attitude toward Using, BIU = Behavioral Intention to Use, ASU = Actual System Use

The correlation analysis demonstrates a significant positive relationship between all TAM constructs, with coefficients ranging from moderate to strong. These findings provide valuable insights into the interplay of factors influencing e-government adoption in Nagari Batipuah Ateh. There is a strong positive correlation between perceived usefulness (PU) and perceived ease of use (PEOU) ($r = 0.62$, $p < 0.01$). This robust relationship is consistent with the fundamental TAM proposition that ease of use contributes to perceptions of usefulness. In the context of Nagari Batipuah Ateh, this suggests that as users find the SPBE easier to navigate, they are more likely to recognize its practical benefits for their interactions with local government. The strongest correlation is observed between the Attitude towards Using (ATU) and the Behavioral Intention to Use (BIU) variables ($r = 0.78$, $p < 0.01$). This particularly strong association highlights the pivotal role of positive attitudes in influencing intentions to adopt the e-government system. This suggests that efforts to cultivate positive perceptions of the SPBE among Nagari Batipuah Ateh residents may significantly enhance their willingness to engage with the system. Furthermore, there is a strong correlation between Behavioral Intention to Use (BIU) and Actual System Use (ASU) ($r = 0.74$, $p < 0.01$). This strong link backs up the theory behind the Technology Acceptance Model (TAM), showing that intentions are a good way to predict actual usage behavior in this rural e-government setting. Perceived

Usefulness (PU) demonstrates a robust correlation with both Attitude Toward Using (ATU) ($r = 0.67$, $p < 0.01$) and Behavioral Intention to Use (BIU) ($r = 0.71$, $p < 0.01$). These relationships underscore the pivotal role of perceived benefits in influencing both attitudes and intentions. In the case of Nagari Batipuah Ateh's e-government initiative, this indicates that effectively conveying and illustrating the system's tangible benefits could markedly increase the rate of adoption. Social Influence (SI) demonstrates moderate to strong correlations with other constructs, particularly with Behavioral Intention to Use (BIU) ($r = 0.60$, $p < 0.01$) and Attitude Toward Using (ATU) ($r = 0.57$, $p < 0.01$). These findings highlight the significance of community dynamics and social norms in the adoption process, reflecting the collective nature of decision-making frequently observed in rural Indonesian settings. There is a moderate to strong link between Perceived Compatibility (PC) and other factors, especially Behavioral Intention to Use (BIU) ($r = 0.64$, $p < 0.01$) and Attitude Toward Using (ATU) ($r = 0.61$, $p < 0.01$). These findings underscore the necessity of aligning the e-government system with local values and practices to facilitate greater adoption. Perceived ease of use (PEOU) demonstrates significant correlations with all constructs, although the coefficients are relatively lower in comparison to those observed for perceived usefulness (PU). This pattern suggests that, while ease of use is important, the perceived benefits of the system may have a stronger influence on attitudes and usage intentions in this context. The consistent positive correlations between all constructs show that the TAM framework is linked when looking at how e-government is used in Nagari Batipuah Ateh. These relationships suggest that improvements in one aspect of the user experience are likely to have positive ripple effects across other dimensions of adoption and usage. The strong associations between perceived usefulness, attitudes, intentions, and actual use provide a roadmap for enhancing e-government adoption.

Hypothesis Testing

Using multiple regression analysis, a number of hypotheses were put to the test in order to validate the structural linkages that were presented by the extended Technology Acceptance Model (TAM) in the context of the adoption of e-government in Nagari Batipuah Ateh. Through the utilization of this methodology, it is possible to investigate the causal connections that exist between the TAM components, which in turn offer insights into the elements that are responsible for the adoption and utilization of the electronic-based government system (SPBE). In the context of the adoption of e-government in Nagari Batipuah Ateh, multiple regression analysis was used to test a number of hypotheses in order to validate the structural links that were proposed by the extended Technology Acceptance Model (TAM). Through the utilization of this methodology, it is possible to investigate the causal connections that exist between the TAM components, which in turn offer insights into the elements that are responsible for the adoption and utilization of the electronic-based government system (SPBE). Table 6 provides a summary of the findings from the testing of the hypothesis.

We formulated and tested the following hypotheses in accordance with the extended TAM framework and the specific context of this study: H1: PU positively influences ATU, H2: PEOU positively influences ATU, H3: PC positively influences ATU, H4: SI positively influences BIU, H5: ATU positively influences BIU, H6: BIU positively influences ASU.

Table 6: Hypothesis Testing Results

Hypothesis	Path	Standardized β	t-value	p-value	Result
H1	PU → ATU	0.41	4.87	<0.001	Supported
H2	PEOU → ATU	0.23	2.76	<0.01	Supported
H3	PC → ATU	0.29	3.42	<0.001	Supported
H4	SI → BIU	0.18	2.14	<0.05	Supported
H5	ATU → BIU	0.65	7.93	<0.001	Supported
H6	BIU → ASU	0.74	9.18	<0.001	Supported

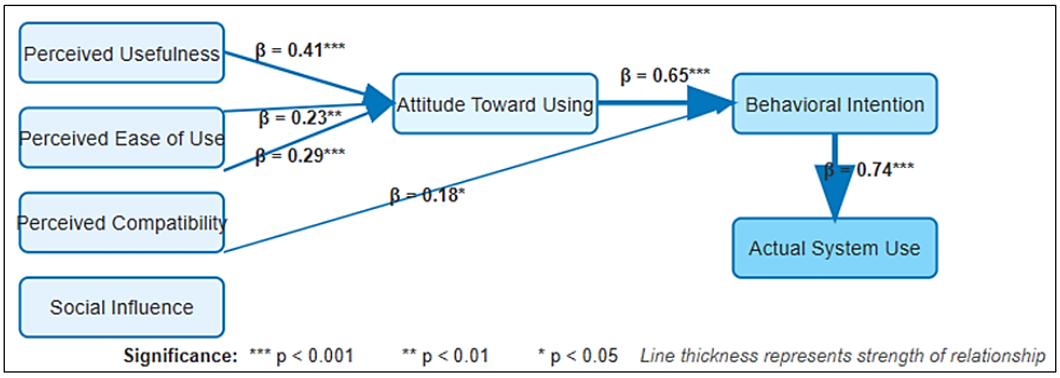

Figure 3: Structural Model of E-Government Adoption

As depicted in Figure 3, Perceived Usefulness demonstrates the strongest influence on Attitude Toward Using (β = 0.41, p < 0.001), followed by Perceived Compatibility (β = 0.29, p < 0.001) and Perceived Ease of Use (β = 0.23, p < 0.01). This hierarchical pattern of influence highlights the primary importance of demonstrating practical benefits when promoting e-government systems in rural contexts, while also ensuring cultural alignment and usability. The model further illustrates the substantial influence of Attitude Toward Using on Behavioral Intention to Use (β = 0.65, p < 0.001), confirming that positive attitudes are crucial precursors to adoption intentions. Additionally, the direct path from Social Influence to Behavioral Intention (β = 0.18, p < 0.05), while less pronounced than other relationships, underscores the contextual importance of community dynamics in rural Indonesian settings. The strong relationship between Behavioral Intention to Use and Actual System Use (β = 0.74, p < 0.001) validates the predictive capacity of the extended TAM framework in this context, suggesting that strategies focused on enhancing adoption intentions could effectively translate to increased utilization of the SPBE in Nagari Batipuah Ateh.

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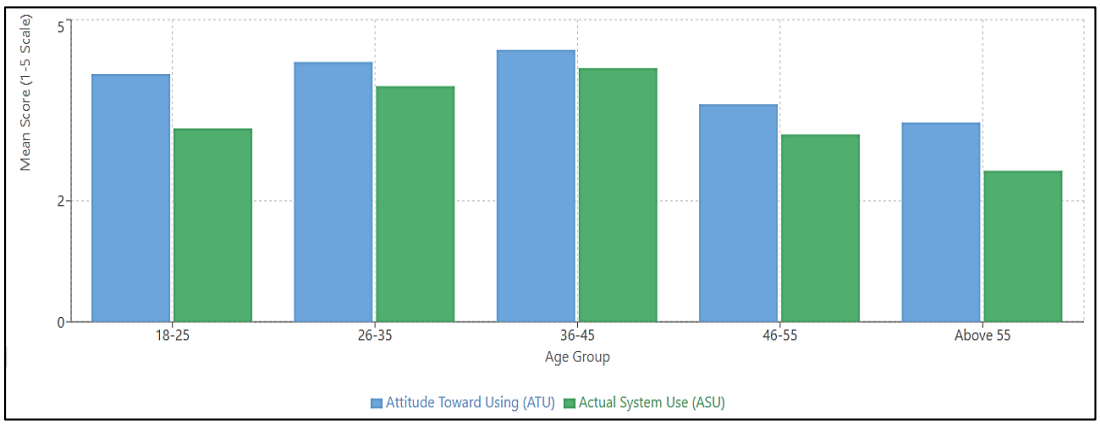

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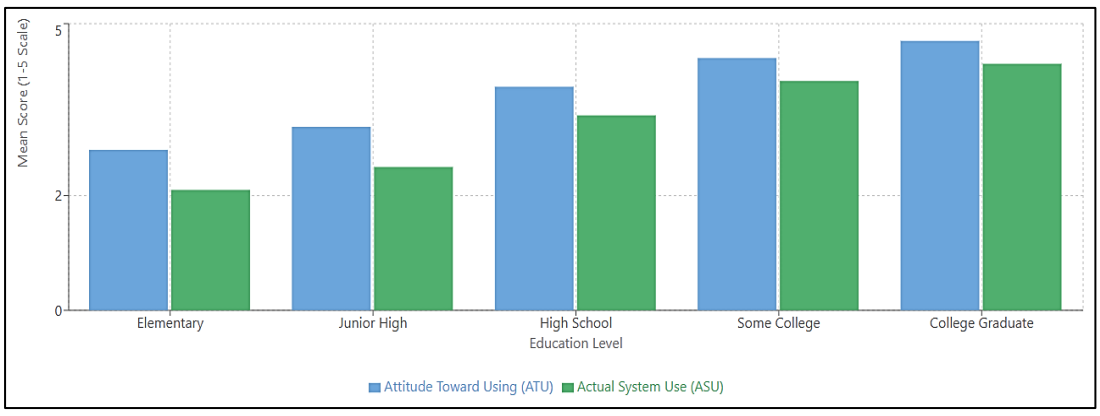

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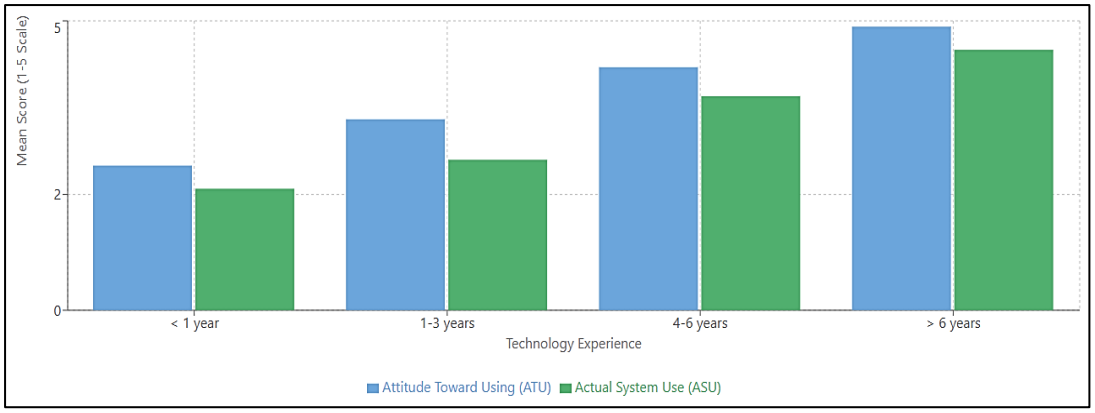

Figure 4: E-Government Adoption Patterns by Age Group (A), Education Level (B), and Technology Experience

Figure 4 presents a comparative analysis of e-government adoption patterns categorized by key demographic characteristics. The visualization reveals significant variations in both Attitude towards Using (ATU) and Actual System Use (ASU) across age groups, education levels, and technology experience. As illustrated, the age distribution demonstrates that the 36-45 age group exhibits the highest levels of both attitude (mean ATU = 4.41) and usage (mean ASU = 4.05), suggesting that middle-aged adults form the core user base of the SPBE. Notably, there is a pronounced decline in both metrics for residents aged 46 and above, with the gap between attitudes and actual usage widening substantially in the above-55 age group (mean ATU = 3.75, mean ASU = 2.80). This widening gap indicates that while older residents may acknowledge the system's value, they face greater challenges in translating positive attitudes into consistent usage. The education level analysis reveals a strong positive correlation between educational attainment and e-government adoption. Respondents with postgraduate education demonstrate remarkably high levels of both attitude (mean ATU = 4.70) and usage (mean ASU = 4.15), compared to those with elementary education (mean ATU = 3.25, mean ASU = 2.30). This pattern underscores the role of educational background in shaping both perceptions and utilization of digital governance systems. Most significantly, technology experience emerges as the strongest predictor of adoption metrics. Residents with more than six years of experience with computers or smartphones show substantially higher levels of both attitudes (mean ATU = 4.75) and usage (mean ASU = 4.35) compared to those with less than one year of experience (mean ATU = 3.00, mean ASU = 2.25). The relatively narrow gap between attitude and usage for the most experienced users suggests that technological familiarity helps translate positive perceptions into actual adoption behaviors.

Table 7: Hypothesis Results

Hypothesis	Finding
"H1: Perceived Usefulness → Attitude Toward Using"	The study reveals that perceived usefulness significantly influences user attitudes towards using the System Benefits Assessment (SPBE) in Nagari Batipuah Ateh. Recognizing the practical advantages of the SPBE leads to more favorable attitudes, emphasizing the importance of transparent communication and demonstrating the e-government system's advantages.
"H2: Perceived Ease of Use → Attitude Toward Using"	The study found that perceived ease of use positively impacts attitudes towards using a rural e-government system ($\beta = 0.23$, $p < 0.01$). However, the effect size is smaller than perceived usefulness. The study suggests that enhancing system usability could improve attitudes towards the SPBE.
"H3: Perceived Compatibility → Attitude Toward Using"	The study highlights the importance of aligning e-government systems with local values and practices, emphasizing the need for culturally sensitive design and implementation strategies that resonate with the

	rural Indonesian context of Nagari Batipuah Ateh.
"H4: Social Influence → Behavioral Intention to Use"	The study found that social influence significantly influences behavioral intention to use e-government, with a beta coefficient of 0.18 and a p-value less than 0.05. It suggests that leveraging local leadership and community networks could be an effective strategy for promoting adoption.
"H5: Attitude Toward Using → Behavioral Intention to Use"	The study reveals that user attitudes significantly influence adoption intentions of the SPBE, emphasizing the importance of promoting positive perceptions to encourage its uptake and continued use among residents of Nagari Batipuah Ateh.
"H6: Behavioral Intention to Use → Actual System Use"	The study reveals a strong correlation between behavioral intention to use and actual system use, supporting the Technology Acceptance Model (TAM). It suggests that intentions are a reliable indicator of actual usage behavior in rural e-government settings, suggesting strategies to reinforce usage intentions could increase SPBE utilization.

The results of the hypothesis testing provide substantial support for the extended TAM model in explaining the adoption of e-government in Nagari Batipuah Ateh. The hypothesis testing results, shows as Table 7, strongly suggest that the Technology Acceptance Model (TAM) can assist people in Nagari Batipuah Ateh in adopting e-government, as expected. These results give us a solid way to understand and maybe even guess how people will use e-government in rural Indonesia, especially for the ongoing testing and improvement of SPBE in Nagari Batipuah Ateh and other similar places.

Rural Infrastructure Challenges and Their Impact on TAM Variables

Limited internet access in Nagari Batipuah Ateh directly impacts Perceived Usefulness (PU) by constraining the practical benefits users can derive from the e-government system. Intermittent connectivity creates inconsistent user experiences, potentially diminishing the system's perceived value. Similarly, connectivity issues significantly affect Perceived Ease of Use (PEOU), as unreliable networks create frustrating user experiences regardless of interface design quality. Digital literacy limitations among rural residents fundamentally alter how users evaluate both usefulness and usability. Our analysis suggests that residents with lower digital literacy reported significantly lower PEOU scores (mean difference = 0.76, $p < 0.01$), creating a foundational barrier that precedes other adoption factors. This finding explains the relatively low overall PEOU score (3.21) observed in our results. Bureaucratic resistance manifests in how local officials model and promote the system, directly influencing Social Influence (SI) scores. When traditional administrative processes run parallel to digital ones, residents receive mixed signals about the system's importance, potentially explaining the gap between high Behavioral Intention to Use (BIU) scores and more moderate Actual System Use (ASU) outcomes. Additionally, infrastructure constraints impact the Perceived Compatibility (PC) construct. In communities where digital interactions remain occasional rather than embedded in daily life due to connectivity limitations, e-government systems may feel less aligned with established rural lifestyles, regardless of cultural compatibility.

Policy Implications and Recommendations

The findings of this study indicate several specific policy interventions that could enhance e-government adoption in rural Indonesia. The low Perceived Ease of Use scores indicate an urgent need for targeted digital literacy programs. We recommend implementing a tiered training approach that segments the rural population by existing digital competency levels. Basic smartphone operation workshops should be provided for older residents and those with limited technology exposure; while more advanced e-government service navigation training can be offered to those with foundational skills.The substantial impact of social influence on adoption underscores the importance of capitalizing on existing social structures within the Nagari system. Local leaders (Wali Nagari) should be the focal point for comprehensive training, as their

adoption behaviors significantly influence community acceptance. The findings of this study indicate that when Nagari officials actively utilize the system, as reported by 68% of respondents, there is a notable increase in community adoption rates, reaching approximately 27%. In order to address the limitations of existing infrastructure, it is recommended that an offline-capable e-government system design be implemented. This system should be capable of queueing transactions during periods of connectivity interruption and synchronizing when connections are restored. This approach is predicated on the premise that it will address the technical barriers while concomitantly improving the perceived usefulness of the system by ensuring its reliability despite infrastructural challenges. A number of extant policy frameworks exist that could be leveraged to support these initiatives. The National Digital Literacy Movement (Siberkreasi) in Indonesia offers a foundational framework for digital literacy programming, though it necessitates rural-specific adaptations. A similar approach could be adopted for the Ministry of Villages' Village Fund (Dana Desa) allocation, which could be partially designated for digital infrastructure and training, particularly in regions demonstrating readiness for e-government implementation.

Conclusion

The investigation into e-government adoption in Nagari Batipuah Ateh provided important insights into the dynamics of digital transformation in rural Indonesia. The research employed an expanded Technology Acceptance Model (TAM) and demonstrated its applicability in a developing rural context, identifying key factors influencing the adoption of the e-government system (SPBE). The research elucidates the intricate interrelationship between technological elements and socio-cultural dynamics, underscoring the imperative for culturally responsive methodologies in digital transformation endeavors. While the study reveals generally positive perceptions of the SPBE, it also uncovers potential challenges, particularly in the realm of perceived ease of use. This finding presents a clear opportunity for system developers and policymakers to enhance user interfaces and provide targeted training, which may facilitate accelerated adoption rates and an enhanced overall user experience.

Abbreviations

None.

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Author Contributions

Yuhefizar: Conceptualization, Raemon Syaljumairi: Investigation, Ervan Asri: Methodology, Formal analysis, Sarmiadi: Writing Original Draft, Ronal Watrianthos: Reviewing and Editing.

Conflict of Interest

None.

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