

Original Article

Determinants of User Attitude and Behavior Toward e-Government Adoption: Evidence from Sipenduduk System using UMEGA Model

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Citations: Pulungana, B.I., Simina, M.H.A., Kamarudin, M.K.A. & Wedyantiba, M.D. (2025). Determinants of User Attitude and Behavior Toward e-Government Adoption: Evidence from Sipenduduk System using UMEGA Model. *Global Journal of Business, Economics & Social Development*, 3(2), 90-104.

Academic Editor: Assoc. Professor Dr. Agus Sukoco

Received: 5 August 2025

Revised: 17 October 2025

Accepted: 20 November 2025

Abstract: Digital transformation has reshaped public service delivery, yet citizen adoption of e-government systems remains uneven, particularly in local government contexts. This study examines the determinants of user attitudes and behavior toward e-government adoption using the Unified Model of Electronic Government Adoption, with evidence from the Sipenduduk system in Pekanbaru, Indonesia. A quantitative explanatory design was employed, and data were collected from 393 users through a structured questionnaire. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) to assess both direct and indirect relationships among constructs. The results indicate that effort expectancy, performance expectancy, and social influence significantly affect user attitudes, with effort expectancy emerging as the strongest predictor. Attitude is found to be the most influential determinant of behavior, confirming its central mediating role. Trust in government also has a significant direct effect on behavior, highlighting the importance of institutional credibility. Facilitating conditions influence behavior indirectly through effort expectancy and show a weak direct effect. In contrast, perceived risk and hedonic motivation do not significantly influence adoption. These findings suggest that users prioritize usability and functional value over risk considerations and enjoyment. The study concludes that successful e-government adoption depends on integrating user-friendly system design, positive user perceptions, and strong institutional trust. The results provide practical implications for policymakers to enhance digital public services through improved usability, transparency, and citizen engagement strategies.

Keywords: e-Government; UMEGA model; User Attitude; Trust in Government; Behavioral Intention



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1. Introduction

Digital transformation has redefined the structure and delivery of public services. Governments increasingly rely on electronic platforms to enhance efficiency, transparency, and accessibility. E-government is no longer limited to technological deployment. It represents a core mechanism of modern governance, integrating administrative processes with digital infrastructure. Empirical evidence shows that e-government can improve service quality, increase transparency, and strengthen public trust when implemented effectively (Afiyah, 2024; Jopang et al., 2024; Ramadhani et al., 2025). Despite these advantages, adoption outcomes remain uneven, particularly in developing countries where structural and behavioral constraints persist (Hasan et al., 2024; Méndez-Rivera et al., 2023). Low user adoption continues to limit the effectiveness of many local e-government initiatives. Existing studies have extensively examined technological determinants of adoption. Models such as the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology consistently identify performance expectancy and effort expectancy as key predictors of user behavior (Gupta et al., 2016; Ilieva et al., 2024).

Recent research also integrates satisfaction and continuance intention into adoption frameworks, showing that system usefulness and expectation confirmation influence long-term engagement (Kala et al., 2024; Luo et al., 2024). While these studies provide strong explanatory power, they remain largely technology-centric. They often treat adoption as an individual decision process without adequately addressing institutional and governance dimensions. A critical issue emerges from this limitation. E-government adoption is not solely a function of system quality or usability. It is fundamentally shaped by citizen trust, perceived accountability, and institutional credibility. Trust has been identified as a central determinant of adoption since early research in the field (Warkentin et al., 2002). More recent studies confirm that trust in government significantly influences both initial adoption and continued usage of digital public services (Chuah et al., 2024; Luo et al., 2024). Transparency and citizen participation further reinforce this relationship by enhancing perceived legitimacy (Afiyah, 2024; Jopang et al., 2024). However, trust remains fragile in many developing contexts due to concerns about data security, governance quality, and institutional performance (Tassabehji et al., 2007; Hasan et al., 2024).

In addition to trust, user attitude plays a decisive mediating role between perceptions and behavior. Empirical studies consistently show that positive attitudes translate perceived usefulness and ease of use into actual adoption behavior (Jeilani et al., 2025; Nguyen, 2023). Social influence and contextual factors also shape these attitudes, indicating that adoption is embedded within broader social and cultural environments (Aleisa, 2024; Gupta et al., 2016). Nevertheless, the integration of these behavioral factors with institutional variables remains limited. Many studies examine either technological determinants or governance issues, but rarely combine both within a unified analytical framework. This gap becomes more pronounced at the local government level. Local e-government systems operate within specific administrative, cultural, and infrastructural contexts that differ from national-level implementations. Research indicates that local adoption is highly sensitive to infrastructure availability, digital literacy, and policy support (Matlala, 2025; Mphahlele et al., 2025). At the same time, local governments play a direct role in shaping citizen trust through service delivery and interaction quality. Despite this, most existing models remain generalized and do not provide actionable insights for local governance strategies. Tremblay-Cantin et al. (2023) highlight that the current body of knowledge is fragmented and lacks a comprehensive framework that integrates technological, behavioral, and institutional dimensions.

Another important gap relates to the translation of empirical findings into policy-relevant insights. Although prior studies identify key determinants of adoption, they rarely explain how these findings can inform governance practices. For example, studies on trust emphasize its importance but do not specify how governments can operationalize trust-building mechanisms within digital platforms (Khababa et al., 2025). Similarly, research on user satisfaction and system quality often focuses on technical improvements without addressing broader governance implications (Kala et al., 2024; Ilieva et al., 2024). This disconnect limits the practical contribution of e-government research, particularly in developing countries where policy guidance is essential for effective implementation. Given these issues, there is a clear need for an integrated approach that combines technological, behavioral, and institutional perspectives. Such an approach should not only explain adoption behavior but also provide insights that can inform public policy and governance strategies. The Unified Model of Electronic Government Adoption offers a suitable framework for this purpose, as it incorporates key constructs such as performance expectancy, effort expectancy, social influence, facilitating conditions, trust, and attitude into a single model.

Therefore, this study aims to examine the determinants of user attitudes and behavior toward e-government adoption in the context of a local government system, namely the Sipenduduk platform in Pekanbaru, Indonesia. Specifically, the study seeks to analyze the direct and indirect effects of technological factors, social influence, facilitating conditions, perceived risk, and trust in government on user attitudes and behavior. It further aims to evaluate the mediating role of attitude in translating user perceptions into behavioral outcomes. By applying the UMEGA model and employing a robust empirical approach using PLS-

SEM, this research intends to bridge the gap between technology adoption theory and governance practice. The study contributes to the literature by providing an integrated, policy-relevant framework for understanding e-government adoption at the local level and offers practical recommendations for improving system effectiveness, strengthening public trust, and enhancing citizen engagement in digital governance.

2. Literature Review

2.1. E-Government Adoption as a Multidimensional Phenomenon

E-government adoption has evolved into a multidimensional construct that integrates technological efficiency, user behavior, and institutional governance. Early studies emphasize cost reduction and service efficiency as key drivers (Warkentin et al., 2002). Recent evidence shows that e-government enhances transparency, participation, and trust when supported by effective governance mechanisms (Afiyah, 2024; Jopang et al., 2024). Empirical findings in ASEAN contexts further confirm that service quality and citizen engagement are stronger predictors of trust than economic factors (Ramadhani et al., 2025). However, adoption outcomes remain uneven. Structural constraints such as limited infrastructure, digital inequality, and low digital literacy continue to impede adoption, particularly in developing countries (Hasan et al., 2024; Matlala, 2025; Méndez-Rivera et al., 2023). These limitations indicate that technological deployment alone is insufficient to ensure effective adoption.

2.2. Technology-Oriented Determinants and Attitude Formation

Technology acceptance models identify performance expectancy and effort expectancy as primary determinants of adoption. Perceived usefulness improves efficiency and motivates adoption, while ease of use reduces cognitive burden and enhances acceptance (Gupta et al., 2016; Ilieva et al., 2024). Empirical studies confirm that these factors significantly influence user attitudes toward e-government systems (Nguyen, 2023; Méndez-Rivera et al., 2023). Despite their explanatory strength, these models focus mainly on individual cognition and often neglect institutional context. This creates a theoretical limitation, as adoption decisions in public-sector environments are also shaped by governance-related factors.

H1: Performance expectancy has a positive effect on user attitudes toward e-government adoption.

H2: Effort expectancy has a positive effect on user attitudes toward e-government adoption.

2.3. Social Influence and Behavioral Orientation

Social influence plays a significant role in shaping user perceptions and attitudes. Subjective norms and peer recommendations affect how individuals evaluate digital services (Aleisa, 2024; Gupta et al., 2016). In public sector contexts, social endorsement can increase legitimacy and encourage adoption. However, the strength of social influence varies across contexts and is often mediated by user attitudes. Existing studies do not fully explore how social influence interacts with institutional trust and system characteristics.

H3: Social influence has a positive effect on user attitudes toward e-government adoption.

2.4. Facilitating Conditions and Structural Readiness

Facilitating conditions refer to the availability of infrastructure, technical support, and organizational readiness. These factors influence both perceived ease of use and actual system usage (Gupta et al., 2016; Mphahlele et al., 2025). In developing contexts, inadequate infrastructure and support systems remain major barriers (Hasan et al., 2024). Most studies treat facilitating conditions as external variables rather than integrating them into behavioral mechanisms. Yet, they directly shape user experience and adoption outcomes.

H4: Facilitating conditions have a positive effect on effort expectancy.

H5: Facilitating conditions have a positive effect on behavior toward using e-government.

2.5. Trust in Government and Institutional Credibility

Trust is a fundamental determinant of e-government adoption. It reduces uncertainty and enhances user confidence in digital services (Warkentin et al., 2002). Empirical evidence shows that trust significantly influences both adoption and continuance intention (Kala et al., 2024; Luo et al., 2024). Transparency and participation further strengthen trust by improving perceived accountability (Afiyah, 2024; Jopang et al., 2024). However, existing literature often conceptualizes trust narrowly, focusing on technical reliability rather than institutional credibility. There is limited integration of trust within broader governance frameworks.

H6: Trust in government has a positive effect on behavior toward using e-government.

2.6. Perceived Risk and User Perception

Perceived risk, particularly related to data security and privacy, is commonly identified as a barrier to adoption (Tassabehji et al., 2007; Nguyen, 2023). Higher perceived risk reduces user confidence and negatively influences attitudes. Nevertheless, empirical findings remain inconsistent. Some studies report significant effects, while others find limited influence depending on context (Afrizal et al., 2024). This suggests that risk perception interacts with trust and user experience.

H7: Perceived risk has a negative effect on user attitudes toward e-government adoption.

2.7. Hedonic Motivation and Behavioral Engagement

Hedonic motivation reflects the enjoyment derived from using digital systems. While it plays a role in commercial applications, its relevance in e-government remains limited due to the utilitarian nature of public services (Aleisa, 2024). However, user experience can still influence engagement, particularly when systems are intuitive and responsive.

H8: Hedonic motivation has a positive effect on behavior toward using e-government.

2.8. Attitude and Behavioral Outcome

User attitude serves as a central mechanism linking perceptions to behavior. Empirical studies consistently show that positive attitudes lead to higher adoption and usage (Afrizal et al., 2024; Jeilani et al., 2025). Attitude reflects the cumulative evaluation of system usefulness, ease of use, trust, and risk. Despite its importance, many studies do not fully integrate attitude with institutional and technological variables within a single framework.

H9: User attitudes have a positive effect on behavior toward using e-government.

2.9. Mediation Analysis

This study extends the direct effect model by incorporating mediation mechanisms to explain how antecedent variables influence behavior toward using e-government through intermediate constructs. The inclusion of mediation paths strengthens the model's explanatory power by capturing theoretically grounded indirect effects in technology adoption and behavioral theories. Trust in government remains a central institutional determinant of e-government adoption. Empirical evidence consistently shows that trust reduces uncertainty and increases user confidence in digital public services, which directly influences usage behavior.

H9: Trust in government has a positive and significant effect on behavior toward using e-government.

Attitude functions as a key psychological mechanism that translates user perceptions into behavioral outcomes. Prior studies confirm that attitude mediates the effects of perceived usefulness, ease of use, and social influence on adoption behavior. This implies that technological and social factors do not directly shape behavior but operate through users' evaluative judgments. Performance expectancy influences behavior by shaping positive user attitudes toward system usefulness.

H10a: Attitude mediates the relationship between performance expectancy and behavior toward using e-government.

H10b: Attitude mediates the relationship between effort expectancy and behavior toward using e-government.

H10c: Attitude mediates the relationship between social influence and behavior toward using e-government.

H10d: Attitude mediates the relationship between perceived risk and behavior toward using e-government.

Effort expectancy also serves as a mediating construct in the relationship between facilitating conditions and behavior. Facilitating conditions provide the necessary infrastructure and support, which enhance perceived ease of use. This improved ease of use then increases the likelihood of system adoption.

H10e: Effort expectancy mediates the relationship between facilitating conditions and behavior toward using e-government.

2.10 Research Framework

Figure 1 presents the proposed research framework, which illustrates the structural relationships among technological, behavioral, and institutional determinants of user attitudes and behavior toward e-government adoption based on the UMEGA model.

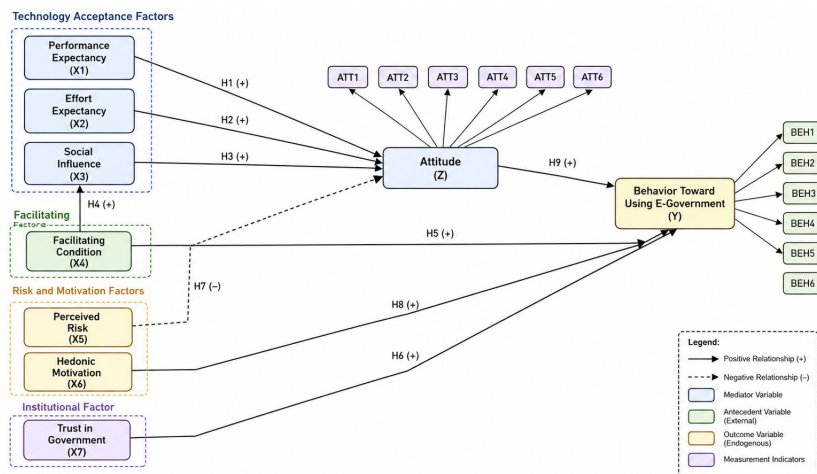


Figure 1. Research Framework

3. Materials and Methods

3.1. Research Design

This study employs a quantitative and explanatory research design to analyze causal relationships among determinants of user attitudes and behavior toward e-government adoption in Pekanbaru City, Indonesia. The explanatory approach is appropriate for testing theoretically derived hypotheses and examining structural relationships within a multivariate framework.

3.2. Population and Sample

The empirical setting is the Sipenduduk system, a municipal e-government platform used by citizens for administrative services. The study population consists of 23,265 registered users in 2024. A sample of 393 respondents was selected using the Slovin formula with a 5 percent margin of error, ensuring adequate representation of large, finite populations. The sampling strategy aims to capture heterogeneity in user characteristics, including demographic and usage differences, to improve the generalizability of the findings.

3.3. Data Collection and Instruments

Data were collected through a structured questionnaire administered to system users. The instrument uses a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Measurement items were adapted from established constructs in e-government and technology acceptance literature. The constructs include performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, hedonic motivation, trust in government, attitude, and behavior toward using e-government. All items were carefully contextualized to reflect the operational features of the Sipenduduk system.

3.4. Data Analysis

The study applies Partial Least Squares Structural Equation Modeling using SmartPLS version 4.0. This method is suitable for complex models that include multiple latent constructs and mediating relationships. It is also robust for moderate sample sizes and does not require strict assumptions of data normality.

3.4.1 Measurement Model Evaluation

The analysis begins with the assessment of the measurement model. Convergent validity is evaluated using factor loadings and Average Variance Extracted. Factor loadings must exceed 0.70, while AVE values must be greater than 0.50. Reliability is assessed using Cronbach's Alpha and Composite Reliability, with threshold values above 0.70 indicating acceptable internal consistency. Discriminant validity is examined using the Fornell-Larcker criterion to ensure that each construct is distinct from others in the model.

3.4.2 Structural Model Evaluation

The structural model is assessed to examine the hypothesized relationships among constructs. The coefficient of determination (R^2) is used to evaluate the model's predictive accuracy. Effect size (f^2) is calculated to determine the strength of each relationship. Hypothesis testing is conducted using a

bootstrapping procedure. A path coefficient is considered significant when the T-statistic exceeds 1.96 and the p-value is below 0.05.

3.4.3. Mediation Analysis

The study also examines indirect effects to assess the mediating role of attitude. Mediation is evaluated by testing the significance of indirect paths between independent variables and behavioral outcomes through the attitude construct. This approach provides a deeper understanding of how perceptions and institutional factors influence user behavior in e-government adoption.

4. Results

4.1. Demography Profile of Respondents

The demographic profile of respondents provides an overview of the sample used in this study. A total of 393 respondents participated in this research, consisting of gender and age distributions as presented in Table 1.

Table 1. Demographic Profile of Respondents

| Demographic | Category | Frequency | Percentage (%) |
|-------------|-------------|-----------|----------------|
| Gender | Male | 279 | 71 |
| | Female | 114 | 29 |
| Age | 17–25 years | 275 | 70 |
| | 26–35 years | 78 | 20 |
| | 36–45 years | 24 | 6 |
| | 46–55 years | 16 | 4 |

Table 1 presents the demographic profile of respondents based on gender and age. The distribution shows that the sample is predominantly male, with 279 respondents (71 percent), while female respondents account for 114 (29 percent). This imbalance suggests that male users are more actively engaged with the Sipenduduk system, which may reflect differences in access to digital technology, usage patterns, or involvement in administrative processes. Such a distribution indicates that gender-related factors may influence user perceptions and behavior toward e-government services. In terms of age, the data reveal a strong concentration of younger users. Respondents aged 17 to 25 years constitute the majority, accounting for 275 individuals (70% of the sample). The 26 to 35 years group represents 78 respondents or 20 percent. In contrast, older age groups are less represented, with only 24 respondents (6 percent) in the 36 to 45 years category and 16 respondents (4 percent) in the 46 to 55 years category. This pattern indicates that e-government adoption is largely driven by younger individuals, who generally possess higher levels of digital literacy and familiarity with online systems.

4.2. Assessment of Measurement Model

4.2.1. Construct Validity and Reliability

The measurement model was evaluated by examining indicator loadings, internal consistency reliability (Cronbach's Alpha and Composite Reliability), and convergent validity using Average Variance Extracted (AVE).

Table 2. Results of Construct Validity and Reliability

| Variable(s) | Item | Loadings | Cronbach's Alpha | Composite Reliability | Average Variance Extracted (AVE) |
|-----------------------------|------|----------|------------------|-----------------------|----------------------------------|
| Performance Expectancy (X1) | PE1 | 0.835 | 0.911 | 0.931 | 0.693 |
| | PE2 | 0.851 | | | |
| | PE3 | 0.850 | | | |
| | PE4 | 0.778 | | | |
| | PE5 | 0.831 | | | |
| | PE6 | 0.847 | | | |
| Effort Expectancy (X2) | EE1 | 0.765 | 0.910 | 0.914 | 0.691 |

| Variable(s) | Item | Loadings | Cronbach's Alpha | Composite Reliability | Average Variance Extracted (AVE) |
|--|------|----------|------------------|-----------------------|----------------------------------|
| Social Influence (X3) | EE2 | 0.852 | 0.922 | 0.924 | 0.721 |
| | EE3 | 0.866 | | | |
| | EE4 | 0.847 | | | |
| | EE5 | 0.823 | | | |
| | EE6 | 0.829 | | | |
| | SI1 | 0.824 | | | |
| | SI2 | 0.840 | | | |
| | SI3 | 0.820 | | | |
| | SI4 | 0.845 | | | |
| Facilitating Condition (X4) | SI5 | 0.896 | 0.904 | 0.905 | 0.677 |
| | SI6 | 0.869 | | | |
| | FC1 | 0.863 | | | |
| | FC2 | 0.869 | | | |
| | FC3 | 0.797 | | | |
| | FC4 | 0.800 | | | |
| | FC5 | 0.838 | | | |
| Perceived Risk (X5) | FC6 | 0.764 | 0.898 | 0.912 | 0.662 |
| | PR1 | 0.754 | | | |
| | PR2 | 0.849 | | | |
| | PR3 | 0.806 | | | |
| | PR4 | 0.851 | | | |
| | PR5 | 0.790 | | | |
| Hedonic Motivation (X6) | PR6 | 0.828 | 0.900 | 0.913 | 0.666 |
| | HM1 | 0.847 | | | |
| | HM2 | 0.806 | | | |
| | HM3 | 0.792 | | | |
| | HM4 | 0.805 | | | |
| | HM5 | 0.829 | | | |
| Trust in Government (X7) | HM6 | 0.817 | 0.902 | 0.909 | 0.670 |
| | TG1 | 0.816 | | | |
| | TG2 | 0.797 | | | |
| | TG3 | 0.825 | | | |
| | TG4 | 0.812 | | | |
| | TG5 | 0.813 | | | |
| Attitude (Z) | TG6 | 0.846 | 0.905 | 0.907 | 0.680 |
| | ATT1 | 0.828 | | | |
| | ATT2 | 0.865 | | | |
| | ATT3 | 0.813 | | | |
| | ATT4 | 0.830 | | | |
| | ATT5 | 0.759 | | | |
| Behavior Toward Using E-Government (Y) | ATT6 | 0.848 | 0.901 | 0.902 | 0.669 |
| | BUE1 | 0.788 | | | |
| | BUE2 | 0.844 | | | |
| | BUE3 | 0.804 | | | |
| | BUE4 | 0.850 | | | |
| | BUE5 | 0.783 | | | |
| | BUE6 | 0.835 | | | |

Table 2 presents the results of construct validity and reliability for all latent variables included in the model. The evaluation focuses on three key criteria: convergent validity, internal consistency reliability, and indicator reliability. Overall, the results demonstrate that all constructs meet the recommended thresholds,

indicating that the measurement model is robust and suitable for further structural analysis. From the perspective of indicator reliability, all item loadings exceed the minimum threshold of 0.70. For Performance Expectancy (X1), the loadings range from 0.778 to 0.851, indicating strong correlations between the observed indicators and the latent construct. Similarly, Effort Expectancy (X2) shows loadings between 0.765 and 0.866, while Social Influence (X3) ranges from 0.820 to 0.896. Facilitating Conditions (X4) also demonstrate acceptable loadings, ranging from 0.764 to 0.869. These results confirm that each indicator contributes meaningfully to its respective construct.

For Perceived Risk (X5), the loadings range from 0.754 to 0.851, indicating adequate representation despite slightly lower values than those of other constructs. Hedonic Motivation (X6) shows consistent loadings between 0.792 and 0.847, while Trust in Government (X7) ranges from 0.797 to 0.846. The Attitude construct (Z) shows strong loadings of 0.759-0.865, and Behavior Toward Using E-Government (Y) ranges from 0.783 to 0.850. These findings indicate that all measurement items are reliable indicators of their respective latent variables. Convergent validity is assessed using the Average Variance Extracted (AVE). All constructs exceed the recommended threshold of 0.50, confirming that each construct explains more than half of the variance of its indicators. Specifically, Performance Expectancy (0.693), Effort Expectancy (0.691), Social Influence (0.721), Facilitating Conditions (0.677), Perceived Risk (0.662), Hedonic Motivation (0.666), Trust in Government (0.670), Attitude (0.680), and Behavior (0.669) all demonstrate strong convergent validity. Among these, Social Influence exhibits the highest AVE, indicating that its indicators have the strongest shared variance.

Internal consistency reliability is evaluated using Cronbach's Alpha and Composite Reliability. All constructs report Cronbach's Alpha values above 0.89, ranging from 0.898 to 0.922, which indicates high internal consistency. Composite Reliability values also exceed the recommended threshold of 0.70, with values ranging from 0.902 to 0.931. Performance Expectancy shows the highest Composite Reliability (0.931), followed closely by Social Influence (0.924), indicating very strong reliability. The results confirm that the measurement model satisfies the criteria for reliability and convergent validity. All constructs demonstrate strong internal consistency, and the indicators are well correlated with their respective latent variables. This provides a solid foundation for proceeding to the structural model analysis and hypothesis testing.

4.2.2. Discriminant Validity

Discriminant validity was assessed using the Fornell-Larcker criterion by comparing the square root of the Average Variance Extracted (AVE) for each construct with the correlations between constructs.

Table 3. Results of Discriminant Validity using Fornell and Lucker Criterion

| Variable (s) | X ₁ | X ₂ | X ₃ | X ₄ | X ₅ | X ₆ | X ₇ | Z | Y |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------|-------|
| Performance Expectancy (X ₁) | 0.832 | | | | | | | | |
| Effort Expectancy (X ₂) | 0.253 | 0.831 | | | | | | | |
| Social Influence (X ₃) | 0.182 | 0.263 | 0.849 | | | | | | |
| Facilitating Condition (X ₄) | 0.171 | 0.315 | 0.254 | 0.823 | | | | | |
| Perceived Risk (X ₅) | 0.157 | 0.220 | 0.197 | 0.199 | 0.814 | | | | |
| Hedonic Motivation (X ₆) | 0.179 | 0.204 | 0.336 | 0.151 | 0.121 | 0.816 | | | |
| Trust in Government (X ₇) | 0.164 | 0.177 | 0.124 | 0.157 | 0.195 | 0.216 | 0.818 | | |
| Attitude (Z) | 0.539 | 0.603 | 0.438 | 0.243 | 0.244 | 0.454 | 0.566 | 0.825 | 0. |
| Behavior Toward using E-Gov (Y) | 0.363 | 0.338 | 0.328 | 0.210 | 0.191 | 0.233 | 0.387 | 0.514 | 0.818 |

Table 3 presents the results of discriminant validity using the Fornell-Larcker criterion. This approach assesses whether each construct is empirically distinct from the others in the model by comparing the square roots of the Average Variance Extracted (shown on the diagonal) with the correlations between constructs. The results indicate that all diagonal values are higher than the corresponding inter-construct correlations in their respective rows and columns. For instance, Performance Expectancy (X1) has a square root of AVE value of 0.832, which is greater than its correlations with Effort Expectancy (0.253), Social Influence (0.182), Facilitating Conditions (0.171), Perceived Risk (0.157), Hedonic Motivation (0.179), Trust in Government (0.164), Attitude (0.539), and Behavior (0.363). This confirms that Performance Expectancy is empirically distinct from the other constructs.

A similar pattern is observed for Effort Expectancy (X2), with a diagonal value of 0.831, exceeding its correlations with all other variables, including Attitude (0.603) and Behavior (0.338). Social Influence (X3)

also demonstrates strong discriminant validity, with a diagonal value of 0.849 that surpasses all associated correlations. Facilitating Conditions (X4) show a diagonal value of 0.823, which is higher than its correlations with other constructs, indicating adequate distinctiveness. For Perceived Risk (X5), the square root of AVE is 0.814, which is greater than its correlations with other variables, including Attitude (0.244) and Behavior (0.191). Hedonic Motivation (X6) has a diagonal value of 0.816, also exceeding all inter-construct correlations. Trust in Government (X7) shows a diagonal loading of 0.818, indicating that it is distinct from other constructs in the model.

The Attitude construct (Z) shows a square root of AVE value of 0.825, which is higher than its correlations with all independent variables and with Behavior (0.514). Similarly, Behavior Toward Using E-Government (Y) has a diagonal value of 0.818, exceeding its correlations with all other constructs. The results confirm that each construct accounts for more variance among its indicators than among those of other constructs. This indicates that discriminant validity is well established across all variables in the model. The findings provide strong evidence that the constructs are conceptually and empirically distinct, supporting the adequacy of the measurement model for subsequent structural analysis.

4.3. Assessment of Structural Model

4.3.1. Coefficient of Determination and Effect Size

The structural model was evaluated by examining the coefficient of determination (R^2) to assess its predictive power. The R^2 value indicates the proportion of variance in the endogenous constructs explained by the exogenous variables.

Table 4. Results of Coefficient of Determination (R^2) and Effect Size (f^2)

| Variable(s) | R-square | f-square |
|--|----------|----------|
| Behavior Toward Using E-Government (Y) | 0.285 | 0.416 |
| Attitude (Z) | 0.583 | |

Table 4 reports the results of the coefficient of determination (R^2) and effect size (f^2), which assess the predictive accuracy and explanatory power of the structural model. The findings indicate that the model demonstrates moderate explanatory capability for both endogenous constructs. The R^2 value for Attitude (Z) is 0.583, indicating that 58.3% of the variance in user attitudes is explained by the exogenous variables: performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, and related factors. This value indicates a substantial level of explanatory power, suggesting that the selected predictors collectively provide a strong explanation of how user attitudes toward e-government are formed. For Behavior Toward Using E-Government (Y), the R^2 value is 0.285, indicating that 28.5 percent of the variance in user behavior is explained by the model. Although this value is lower than that of attitude, it still reflects a moderate level of predictive accuracy. This result implies that user behavior is influenced not only by the variables included in the model but also by external factors not captured in this study, such as the policy environment, service experience, and individual preferences.

The effect size (f^2) for the model is 0.416, indicating a large effect according to established thresholds. This suggests that the exogenous constructs have a substantial combined impact on the endogenous variables, particularly in explaining behavioral outcomes. The large effect size confirms the model's practical significance and supports its relevance for understanding e-government adoption. The results demonstrate that the model has adequate predictive strength and practical relevance. The relatively higher explanatory power for attitude highlights its central role as a mediating construct, while the moderate R^2 for behavior indicates the need to further explore additional determinants in future research.

4.4. Hypothesis Testing

Table 5. Results of Hypothesis Testing for the Direct Effect

| | Relationship | Original Coefficient (O) | Standard Error (SE) | T-Statistic | P-Value | Decision |
|----|--|--------------------------|---------------------|-------------|---------|-----------|
| H1 | Performance Expectancy (X1) → Attitude (Z) | 0.378 | 0.036 | 10.472 | 0.000 | Supported |
| H2 | Effort Expectancy (X2) → Attitude (Z) | 0.433 | 0.036 | 12.098 | 0.000 | Supported |

| Hypothesis | Relationship | Coefficient (β) | Standard Error (SE) | T-Statistic | P-Value | Decision |
|------------|---|-----------------|---------------------|-------------|---------|---------------|
| H3 | Social Influence (X3) → Attitude (Z) | 0.247 | 0.037 | 6.768 | 0.000 | Supported |
| H4 | Facilitating Conditions (X4) → Effort Expectancy (X2) | 0.315 | 0.043 | 7.278 | 0.000 | Supported |
| H5 | Facilitating Conditions (X4) → Behavior (Y) | 0.088 | 0.045 | 1.966 | 0.025 | Supported |
| H6 | Trust in Government (X7) → Behavior (Y) | 0.139 | 0.052 | 2.650 | 0.004 | Supported |
| H7 | Perceived Risk (X5) → Attitude (Z) | 0.041 | 0.033 | 1.230 | 0.109 | Not Supported |

Table 5 presents the results of hypothesis testing for the direct effects in the structural model. The evaluation is based on path coefficients, standard errors, T-statistics, and p-values obtained from the bootstrapping procedure. A hypothesis is considered supported when the T-statistic exceeds 1.96 and the p-value is below 0.05. Overall, the results indicate that six out of seven hypotheses are supported, confirming the robustness of the proposed model. The findings show that Performance Expectancy (X1) has a positive and significant effect on Attitude (Z) ($\beta = 0.378$, $SE = 0.036$, $T = 10.472$, $p < 0.001$). This result indicates that users who perceive the Sipenduduk system as useful and beneficial are more likely to develop favorable attitudes toward its use. The relatively high T-statistic suggests strong statistical significance and stability of this relationship. Similarly, Effort Expectancy (X2) demonstrates the strongest effect on Attitude ($\beta = 0.433$, $SE = 0.036$, $T = 12.098$, $p < 0.001$). This finding highlights that ease of use is the most influential factor in shaping user attitudes. The magnitude of the coefficient indicates that reducing complexity and improving usability are critical for enhancing acceptance of e-government services.

Social Influence (X3) also has a positive and significant effect on Attitude ($\beta = 0.247$, $SE = 0.037$, $T = 6.768$, $p < 0.001$). This suggests that recommendations from peers, family, and social networks contribute to shaping positive perceptions of the system. Although the effect is smaller than that of performance and effort expectancy, it remains statistically meaningful. The relationship between Facilitating Conditions (X4) and Effort Expectancy (X2) is positive and significant ($\beta = 0.315$, $SE = 0.043$, $T = 7.278$, $p < 0.001$). This result confirms that the availability of infrastructure, technical support, and system resources enhances users' perception of ease of use. It indicates that structural readiness indirectly supports e-government adoption through usability. Facilitating Conditions also have a direct effect on Behavior (Y) ($\beta = 0.088$, $SE = 0.045$, $T = 1.966$, $p = 0.025$). Although this effect is statistically significant, the coefficient is relatively small, indicating a weak influence. This suggests that infrastructure alone is not sufficient to drive user behavior, but it does play a supporting role in enabling system use.

Trust in Government (X7) has a positive and significant effect on Behavior ($\beta = 0.139$, $SE = 0.052$, $T = 2.650$, $p = 0.004$). This finding highlights the importance of institutional credibility in encouraging citizens to use e-government services. Users are more likely to engage with digital platforms when they trust the government's integrity and reliability. In contrast, Perceived Risk (X5) does not have a significant effect on Attitude ($\beta = 0.041$, $SE = 0.033$, $T = 1.230$, $p = 0.109$), leading to the rejection of H7. This result indicates that privacy and security concerns are not a primary determinant of user attitudes in this context. It suggests that users may prioritize functional benefits over perceived risks when interacting with the Sipenduduk system. The results confirm that technological factors, particularly effort expectancy and performance expectancy, are the strongest drivers of user attitudes, while attitude and trust play key roles in influencing behavior. The insignificant effect of perceived risk and the weak effect of facilitating conditions on behavior suggest that users are more influenced by usability and institutional trust than by risk considerations or structural support alone.

Table 6. Results of Hypothesis Testing for the Indirect Effects (Mediation)

| Hypothesis | Relationship | Indirect Effect (β) | Standard Error (SE) | T-Statistic | P-Value | Decision |
|------------|---|---------------------|---------------------|-------------|---------|-----------|
| H10a | Performance Expectancy (X1) → Attitude (Z) → Behavior (Y) | 0.156 | 0.027 | 5.778 | 0.000 | Supported |
| H10b | Effort Expectancy (X2) → Attitude (Z) → Behavior (Y) | 0.179 | 0.030 | 5.967 | 0.000 | Supported |
| H10c | Social Influence (X3) → Attitude (Z) → Behavior (Y) | 0.102 | 0.022 | 4.636 | 0.000 | Supported |

| | | | | | | |
|------|--|-------|-------|-------|-------|---------------|
| H10d | Perceived Risk (X5) → Attitude (Z) → Behavior (Y) | 0.017 | 0.014 | 1.214 | 0.112 | Not Supported |
| H10e | Facilitating Conditions (X4) → Effort Expectancy (X2) → Behavior (Y) | 0.106 | 0.025 | 4.240 | 0.000 | Supported |

Table 6 presents the results of hypothesis testing for the indirect effects, which assess the mediating roles of attitude and effort expectancy in the structural model. The mediation analysis evaluates whether the influence of independent variables on behavior toward using e-government operates through intermediate constructs. The results are based on bootstrapping procedures, with significance determined by T-statistics greater than 1.96 and p-values below 0.05. Overall, the findings indicate that most of the proposed mediation relationships are supported, highlighting the importance of indirect pathways in explaining user behavior. The results show that Attitude (Z) significantly mediates the relationship between Performance Expectancy (X1) and Behavior (Y) ($\beta = 0.156$, $SE = 0.027$, $T = 5.778$, $p < 0.001$). This finding supports H10a and indicates that the perceived usefulness of the system influences behavior primarily by shaping positive user attitudes. In other words, users who perceive strong performance benefits develop favorable attitudes, which subsequently lead to higher levels of system usage.

Similarly, Attitude (Z) mediates the relationship between Effort Expectancy (X2) and Behavior ($\beta = 0.179$, $SE = 0.030$, $T = 5.967$, $p < 0.001$), supporting H10b. This result demonstrates that ease of use affects behavior indirectly by shaping user attitudes. The relatively larger indirect coefficient compared to other paths suggests that usability is a critical factor in driving adoption through attitudinal mechanisms. The mediating effect of Attitude is also evident in the relationship between Social Influence (X3) and Behavior ($\beta = 0.102$, $SE = 0.022$, $T = 4.636$, $p < 0.001$), supporting H10c. This indicates that social pressure or recommendations influence behavior by first shaping users' attitudes toward the system. Although the effect size is smaller than those for performance and effort expectancy, it remains statistically significant and meaningful.

In contrast, the mediation effect of Attitude on the relationship between Perceived Risk (X5) and Behavior is not significant ($\beta = 0.017$, $SE = 0.014$, $T = 1.214$, $p = 0.112$), leading to the rejection of H10d. This finding suggests that perceived risk does not substantially influence behavior through attitudinal changes. Users appear to prioritize functional benefits over risk-related concerns, reducing the relevance of this pathway in the model. The results also reveal that Effort Expectancy (X2) significantly mediates the relationship between Facilitating Conditions (X4) and Behavior ($\beta = 0.106$, $SE = 0.025$, $T = 4.240$, $p < 0.001$), supporting H10e. This indicates that the availability of infrastructure and support enhances perceived ease of use, which, in turn, increases the likelihood of system use. This pathway highlights the indirect role of structural readiness in influencing behavior through usability perceptions.

The mediation analysis confirms that Attitude is a central mediating construct that links key technological and social factors to behavioral outcomes. The significant indirect effects of performance expectancy, effort expectancy, and social influence through attitude demonstrate that user perceptions must first translate into favorable evaluations before influencing actual behavior. At the same time, the significant mediation of effort expectancy in the relationship between facilitating conditions and behavior underscores the importance of usability as an intermediate mechanism. The non-significant mediation effect of perceived risk suggests that risk considerations do not play a major role in shaping behavior within this context. This finding reinforces the conclusion that e-government adoption is primarily driven by perceived usefulness, ease of use, and social influence, rather than by risk avoidance. This study provides strong evidence that indirect effects play a critical role in explaining e-government adoption. The results validate the proposed mediation structure and highlight the importance of integrating behavioral and technological factors to better understand user engagement with digital government services.

5. Discussion

This study examines the determinants of user attitudes and behavior toward e-government adoption using an integrated framework that combines technological, social, and institutional factors. The findings provide several important insights that extend existing literature and clarify the mechanisms underlying citizen adoption of digital public services. First, the results confirm that effort expectancy and performance expectancy are the most influential determinants of user attitude, with effort expectancy showing the strongest effect. This finding aligns with prior studies that emphasize the central role of perceived usefulness and ease of use in shaping user acceptance (Gupta et al., 2016; Ilieva et al., 2024). The stronger influence of effort expectancy suggests that usability is more critical than functionality in the context of local e-government systems. This is consistent with evidence that users in developing contexts prioritize simplicity and accessibility due to varying levels of digital literacy (Hasan et al., 2024; Méndez-Rivera et al., 2023).

The finding also supports Nguyen (2023), who demonstrates that ease of use has a dominant effect on behavioral intention, particularly in environments characterized by uncertainty and rapid digital transition.

Second, social influence significantly affects user attitude, indicating that adoption decisions are not purely individual but are shaped by social norms and peer recommendations. This supports earlier findings that subjective norms and social context play a meaningful role in technology adoption (Aleisa, 2024; Gupta et al., 2016). In the public sector, social endorsement enhances perceived legitimacy and reduces uncertainty, which strengthens positive attitudes toward e-government systems. However, the magnitude of this effect is lower than that of technological factors, suggesting that social influence complements rather than replaces functional considerations. Third, the results highlight the critical mediating role of attitude in translating perceptions into behavior. Attitude exerts the strongest direct effect on behavior and significantly mediates the effects of performance expectancy, effort expectancy, and social influence. This finding is consistent with prior research that identifies attitude as a central mechanism in adoption models (Afrizal et al., 2024; Jeilani et al., 2025). It also reinforces the argument that user behavior cannot be explained solely by system characteristics. Instead, behavioral outcomes depend on how users evaluate and internalize these characteristics.

Fourth, the study confirms that trust in government has a significant direct effect on behavior, highlighting the importance of institutional credibility in e-government adoption. This finding is consistent with earlier work that identifies trust as a fundamental driver of digital public service usage (Warkentin et al., 2002). More recent studies also show that trust enhances user satisfaction and continuance intention (Kala et al., 2024; Luo et al., 2024). The result further supports Afiyah (2024) and Jopang et al. (2024), who argue that transparency and participation strengthen trust and encourage citizen engagement. In this study, trust operates independently of attitude, suggesting that institutional confidence directly motivates behavior beyond individual perceptions of system quality. Fifth, facilitating conditions influence both effort expectancy and behavior, although the direct effect on behavior is relatively weak. This indicates that infrastructure and support systems are necessary but not sufficient conditions for adoption. The stronger indirect effect via effort expectancy suggests that facilitating conditions primarily enhance usability, which, in turn, drives behavior. This finding aligns with Mphahlele et al. (2025), who emphasize the role of organizational and technical support in shaping user experience. It also reflects the broader challenge identified by Matlala (2025), where infrastructure alone does not guarantee effective digital engagement without corresponding improvements in user capability and system design.

Sixth, the study finds that perceived risk does not significantly affect attitude or behavior, either directly or indirectly. This result contrasts with studies that identify risk as a major barrier to adoption (Tassabehji et al., 2007; Nguyen, 2023). However, it is consistent with findings that risk perception becomes less relevant when users perceive strong functional benefits and have prior experience with the system (Afrizal et al., 2024). In this context, users appear to prioritize efficiency and convenience over privacy and security concerns. This may also reflect increased familiarity with digital services, which reduces perceived uncertainty. Seventh, hedonic motivation does not significantly influence behavior, confirming that e-government adoption is primarily utilitarian. This finding aligns with the argument that public service platforms are used for functional rather than recreational purposes (Aleisa, 2024). It suggests that efforts to improve adoption should focus on usability and reliability rather than entertainment or user engagement features.

From a theoretical perspective, the findings address the fragmentation identified in prior literature (Tremblay-Cantin et al., 2023). By integrating technological, behavioral, and institutional variables within a single framework, this study provides a more comprehensive explanation of e-government adoption. The results demonstrate that no single dimension is sufficient to explain user behavior. Instead, adoption emerges from the interaction of system characteristics, user perceptions, and institutional trust. From a practical perspective, the findings have clear policy implications. Governments should prioritize improving system usability and accessibility, as these factors have the strongest influence on user attitudes. Investment in infrastructure should be complemented by user-centered design and digital literacy programs to enhance ease of use (Hasan et al., 2024; Chuah et al., 2024). At the same time, building trust through transparency, accountability, and reliable service delivery is essential for encouraging sustained usage (Afiyah, 2024; Ramadhani et al., 2025). This study demonstrates that successful e-government adoption depends on the alignment of technological performance, user perception, and institutional credibility. By highlighting the central role of attitude and trust, the findings contribute to a more integrated understanding of digital governance and provide actionable insights for improving public service delivery in local government contexts.

6. Conclusions

This study examines the determinants of user attitudes and behavior toward e-government adoption by integrating technological, social, and institutional factors within a unified analytical framework. The

findings demonstrate that e-government adoption is primarily driven by usability, perceived usefulness, social influence, and institutional trust. Among these factors, effort expectancy emerges as the strongest predictor of user attitude, indicating that ease of use is critical in shaping positive perceptions. Performance expectancy and social influence also contribute significantly to attitude formation, confirming that both functional benefits and social context influence user evaluation of digital public services. The results show that attitude plays a central role in translating user perceptions into actual behavior. It acts as a key mediating mechanism through which technological and social factors influence adoption.

In addition, trust in government directly affects user behavior, highlighting the importance of institutional credibility in digital governance. Facilitating conditions contribute indirectly through effort expectancy and have a limited direct effect on behavior, suggesting that infrastructure alone is insufficient without corresponding improvements in usability. In contrast, perceived risk and hedonic motivation do not significantly influence adoption, indicating that users prioritize functional value over risk concerns and enjoyment in the context of e-government services. This study confirms that e-government adoption is a multidimensional process shaped by the interaction of system characteristics, user perceptions, and governance-related factors. The integration of these dimensions provides a more comprehensive understanding of citizen engagement with digital public services and offers practical insights for improving system effectiveness and public trust.

6.1. Research Limitations

Despite its contributions, this study has several limitations. First, the research is conducted within a single local government context, which may limit the generalizability of the findings to other regions or countries with different institutional and technological environments. Second, the study relies on cross-sectional data, which captures user perceptions at a single point in time and does not account for changes in behavior over time. Third, the model explains a moderate proportion of the variance in behavior, indicating that additional factors, such as service quality, policy environment, and user experience, may also influence adoption but are not included in this study. Fourth, the sample is dominated by younger users, which may bias the findings toward digitally literate populations and underrepresent older user groups.

6.2. Future Research

Future research should address these limitations by expanding the scope and methodological approach. First, comparative studies across different regions or countries are needed to examine how institutional and cultural differences influence e-government adoption. Second, longitudinal research designs should be employed to capture changes in user attitudes and behavior over time, particularly in response to system improvements or policy interventions. Third, future studies should incorporate additional variables, such as service quality, user satisfaction, digital literacy, and policy trust, to enhance the model's explanatory power. Moreover, further research should explore the role of demographic factors, especially age and gender, in shaping adoption behavior to ensure more inclusive digital governance strategies. Finally, qualitative approaches could complement quantitative findings by providing deeper insights into user experiences and perceptions, thereby enriching the understanding of e-government adoption in diverse contexts.

Author Contributions: Conceptualization, B.I.P. and M.H.A.S.; methodology, B.I.P.; software, B.I.P.; validation, M.H.A.S., M.K.A.K., and M.D.W.; formal analysis, B.I.P.; investigation, B.I.P. and M.H.A.S.; resources, B.I.P.; data curation, M.H.A.S., M.K.A.K., and M.D.W.; writing—original draft preparation, B.I.P. and M.H.A.S.; writing—review and editing, M.H.A.S., M.K.A.K., and M.D.W.; visualization, M.H.A.S.; supervision, M.H.A.S. and M.K.A.K.; project administration, B.I.P.; funding acquisition, B.I.P. All authors have read and agreed to the published version of the manuscript.

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Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with ethical research standards. Informed consent was obtained from all participants, and their responses were kept confidential and utilized exclusively for academic purposes. Formal institutional ethical approval was not required, as the study relied on voluntary participation and did not involve the collection or processing of sensitive personal data.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data for this study were collected from users of the Sipenduduk system in Pekanbaru. The data are not publicly available due to privacy reasons, but can be provided by the corresponding author upon reasonable request.

Acknowledgments: The authors would like to thank Universiti Sultan Zainal Abidin, Terengganu, Malaysia, for its support of this research and publication. We also extend our gratitude to the anonymous reviewers for their constructive comments and suggestions.

Conflicts of Interest: The authors declare no conflict of interest.

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