

Received: November 20, 2024

Revised: December 12, 2024

Accepted: December 31, 2024

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MARKETING | RESEARCH ARTICLE

The Continuance Usage Intention of E-Government Services Based on Technology Continuance Theory

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Abstract: The growing adoption of e-Government services, such as Satu Data Indonesia (SDI), requires a deeper understanding of factors that influence the long-term usage of these services. This study aims to explore the continuance usage intention of e-Government services by applying Technology Continuance Theory (TCT). The research examines the roles of Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Satisfaction (SAT), and Attitude (ATT) in driving the sustained use of SDI. Data were collected through an online survey involving 175 respondents who have used the SDI platform. The findings reveal that while PU significantly influences both satisfaction and attitude, PEOU only affects PU and does not directly influence attitude. Furthermore, ATT is the strongest predictor of continuance intention (CI), with SAT indirectly influencing continuance intention through ATT. These results suggest that user retention depends more on developing positive attitudes through satisfying experiences rather than solely focusing on system usability or usefulness. The study provides valuable insights for policymakers and service developers to enhance e-Government services for sustained user engagement.

Keywords: e-Government, continuance usage, satisfaction, attitude, Technology Continuance Theory (TCT), Satu Data Indonesia.

JEL Classification Code: O33

1. INTRODUCTION

E-Government services have become an important focus in improving the quality of public services, especially in terms of transparency, efficiency, and citizen participation. Initiatives such as Open Government Data (OGD) enable governments to provide data access to the public, which can be utilized for data-driven decision-making (Attard et al., 2015). In Indonesia, the Satu Data Indonesia (SDI) platform has been implemented to support government transparency (Bernot et al., 2024). However, the biggest challenge is ensuring that citizens not only adopt these services but also continue to use them sustainably. The adoption of information technology at the early stage is often driven by factors such as Perceived Ease of Use and Perceived Usefulness. However, continuance usage requires a deeper understanding of user satisfaction after the initial adoption phase. For example, Technology Continuance Theory (TCT) combines attitude and satisfaction as important determinants in the sustained intention to use technology (Rahi et al., 2019).

Although e-Government initiatives in Indonesia are increasingly growing, there is the phenomenon of an acceptance-discontinue anomaly, where users initially accept the technology but later stop using it. This phenomenon often occurs when users' expectations are not met, or the technology is perceived as irrelevant after initial use (Ramdhani et al., 2019). In the context of e-Government, it is crucial to understand the factors that drive users to continue using these services, especially considering the complexity of users' needs at different stages of the technology usage lifecycle. Sustained use of e-Government services is critical for the long-term success of these systems.



As stated by the Expectation Confirmation Model (ECM), satisfaction plays a key role in retaining users during the post-adoption phase. This research is highly relevant for the Indonesian government to understand the factors influencing continued usage, enabling more targeted policies to increase citizen participation in these services.

Most previous studies on technology adoption, particularly in the e-Government context, have focused on the initial adoption phase (Titah & Barki, 2008); (Lin et al., 2011) using models like the Technology Acceptance Model (TAM) and post-adoption usage (Anil Kumar & Natarajan, 2020) using the Expectation Confirmation Model (ECM). These models, while proven effective in explaining initial technology acceptance, have limitations in explaining post-adoption behavior or continuance usage. Studies examining the continuance usage aspect of e-Government services are still very limited, especially in developing countries like Indonesia. This research addresses this gap by adopting the Technology Continuance Theory (TCT), which is an extension of TAM and ECM. TCT offers a more comprehensive approach by combining attitude and satisfaction as key determinants of continuance usage intention (Liao et al., 2009). The model also considers the role of user experience, which varies from initial adoption to long-term use, an aspect that is rarely studied in the e-Government context. Thus, this research provides new contributions to understanding the factors that influence the sustained use of e-Government services in Indonesia.

This study aims to identify and understand the factors influencing the intention to continue using e-Government services in Indonesia. Specifically, it will assess the impact of perceived usefulness, ease of use, and satisfaction on continuance usage. This approach will provide deeper insights into how the government can improve e-Government services to ensure sustainable user participation. This study is organized as follows: Chapter 2 includes the literature review, and the hypotheses developed in the study. Chapter 3 details the methodology used. Chapter 4 presents the results along with a discussion of the findings. The final section, Chapter 5, provides the conclusion, highlights the limitations, and offers recommendations for future research.

2. RESEARCH METHOD AND MATERIALS

Technology Continuance Theory (TCT) extends the well-established frameworks of the Technology Acceptance Model (TAM) and the Expectation Confirmation Model (ECM) to explain the sustained use of technology beyond the initial adoption phase. While TAM focuses on how users initially accept technology based on perceived usefulness (PU) and perceived ease of use (PEOU), and ECM highlights satisfaction as a driver for continued use, TCT incorporates these aspects and places emphasis on long-term usage behaviors by combining user attitudes, satisfaction, and prior experiences (Liao et al., 2009). TCT is particularly relevant for understanding post-adoption behavior, addressing the gap in technology adoption research where sustained engagement is not always guaranteed even after initial acceptance.

In the context of e-Government services, TCT provides a comprehensive framework to analyze factors that influence users' decision to continue using such services. Governments around the world, including Indonesia with its Satu Data Indonesia (SDI) initiative, have adopted open government data platforms aimed at increasing transparency and citizen engagement. Despite these efforts, continued usage of these services is not always ensured. TCT helps bridge this understanding by investigating the key determinants that influence users' long-term engagement with e-Government services. These determinants include perceived usefulness (PU), perceived ease of use (PEOU), and satisfaction, which play a pivotal role in shaping user attitudes towards the technology. TCT emphasizes that users' attitudes and past experiences with the service significantly impact their intention to continue using it. This theory suggests that while initial adoption may be driven by curiosity or external pressures, sustained use depends on how the service meets or exceeds user expectations over time (Rahi et al., 2019). Figure 1 represents the proposed research model of the study.

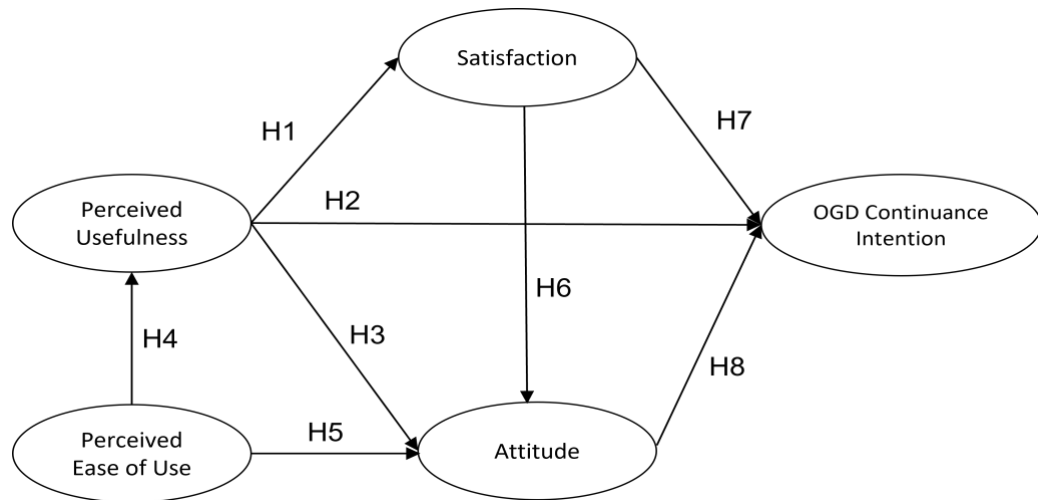


Figure 1. Proposed Research Model

Based on the core principles of TCT and the specific context of e-Government service continuance, the following hypotheses are proposed to further understand the factors influencing users' intentions to continue using the services.

Perceived Usefulness (PU)

- H1: PU has a significant influence on satisfaction
- H2: PU has a significant influence on continuance intention to use
- H3: PU has a significant influence on attitude

Perceived Ease of Use (PEOU)

- H4: PEOU has a significant influence on PU
- H5: PEOU has a significant influence on attitude

Satisfaction

- H6: Satisfaction has a significant influence on attitude
- H7: Satisfaction has a significant influence on continuance intention to use

Attitude

- H8: Attitude has a significant influence on continuance intention to use

3. RESEARCH METHOD

3.1. Instrument Design

A survey questionnaire was employed to gather data for testing the research model. To ensure the survey's content validity, all construct measurements were sourced from established literature. The survey used a five-point Likert scale, where responses ranged from 1 ('strongly disagree') to 5 ('strongly agree'). It was divided into two sections: the first section collected demographic details such as gender, age, and education level, while the second section explored participants' views on e-Government, focusing on PEOU, PU, satisfaction, attitude and intention to continue using the e-Government service. PEOU items were adapted from Abdul Rahim et al. (Abdul Rahim et al., 2023), PU from Davis (Davis, 1989), SAT from (Belanche et al., 2014), ATT from (Liao et al., 2009) while CI items from Afrizal & Wallang (Afrizal & Wallang, 2021). A pre-test was carried out to confirm the instrument's clarity and accuracy before distributing the survey.

3.2. Data Collection

This study gathered data using a structured questionnaire to measure each variable. The data collection was done online in Indonesia, targeting Indonesian citizens who have used Satu Data Indonesia (SDI), an open government data service. The survey was conducted from June to August 2024. The Indonesia One Data Portal (SDI) is the official open data portal of Indonesia, managed by the Indonesia One Data Secretariat at the national level, under the Ministry of National Development Planning/Bappenas. SDI can be accessed through the website <https://www.data.go.id>.

The sampling method employed was convenience sampling, following the approach of Almahamid & McAdams (Almahamid & McAdams, 2010). To determine the appropriate sample size, we referred to (Pinem et al., 2018). According to (Urbach & Ahlemann, 2010), the required sample size is calculated by multiplying ten by the highest number of independent variables leading to a latent variable, which in this case is three. Therefore, the minimum sample size was set at 30 participants. A total of 193 individuals completed the survey, and the data were analyzed using the PLS-SEM method with Smart PLS version 3.2.8. Of the 193 online responses, 175 were valid for analysis. The sample consisted of 43.52% female and 56.48% male respondents. In terms of age, the majority (63.25%) were between 26 and 35 years old, followed by 29.42% aged between 36 and 45 years. Regarding education, most respondents (52.74%) held a bachelor's degree, while 22.86% had a high school degree.

3.3. Data Analysis

We utilized partial least squares (PLS) analysis through SmartPLS 3.0 software to evaluate the hypotheses (Sarstedt et al., 2021). PLS was selected over the covariance-based SEM approach because the study focuses on prediction, specifically examining how effectively the external constructs predict the internal ones (Kim et al., 2019); (Minh et al., 2019). Moreover, PLS-SEM was suitable for this research as it addresses challenges with non-normally distributed data and can work with smaller sample sizes (Nabavi et al., 2016). Following the recommendation of Anderson & Gerbing (Anderson & Gerbing, 1988) suggestion, we adopted a two-phase analysis method, first assessing the measurement model, then testing the structural model (Ali et al., 2019); (Foroughi et al., 2019).

4. RESULTS AND DISCUSSION

4.1. Analysis Result

In this section, the first result presents the measurement model analysis, which includes testing the validity and reliability of each model construct. The second result provides the structural model analysis used to test the six proposed hypotheses.

4.2. Measurement Model

At this stage, convergent validity and reliability were assessed for the three measured constructs. Convergent validity was evaluated using factor loading and average variance extracted (AVE), while reliability was assessed using composite reliability (CR). According to (Hair Joseph et al., 2010), factor loading must exceed 0.7, AVE must be above 0.5, and CR must be 0.7 or higher to be considered reliable. Table 1 shows that the factor loadings are all above 0.7, AVE is greater than 0.5, and CR is higher than 0.7, meaning the model meets these requirements.

Table 1. The Result of Measurement Model

Construct	Item	Convergent Validity		
		Factor Loading	AVE	Composite Reliability
Perceived Usefulness (PU)	PU1	0.955	0.857	0.947
	PU2	0.878		

Construct	Item	Convergent Validity		
		Factor Loading	AVE	Composite Reliability
Perceived Ease of Use (PEOU)	PU3	0.941	0.910	0.968
	PEOU1	0.955		
	PEOU2	0.941		
	PEOU3	0.965		
Satisfaction (SAT)	SAT1	0.946	0.886	0.959
	SAT2	0.942		
	SAT3	0.936		
Attitude (ATT)	ATT1	0.964	0.901	0.965
	ATT2	0.961		
	ATT3	0.921		
Continuance Intention to Use (CI)	CI1	0.959	0.872	0.953
	CI2	0.930		
	CI3	0.911		

Discriminant validity was evaluated using the square root of AVE. According to Fornell & Larcker (Fornell & Larcker, 1981), a construct achieves discriminant validity if its square root AVE is higher than its correlation with other constructs. The results confirm that discriminant validity is achieved in this study.

4.3. Structural Model

In the structural model phase, the relationships between the constructs in the research model (Figure 1) were assessed. The coefficient of determination (R^2) and path analysis significance were calculated to evaluate the hypotheses (Santhanamery & Ramayah, 2014). R^2 ranges from 0 to 1, with higher values indicating better predictive accuracy. The findings reveal that the three exogenous constructs (Attitude, PU, and satisfaction) explain 62.4% of the variance in CI, while satisfaction is explained by 69.7% through PU. PEOU explains 51.7% of the variance in PU while ATT is explained by 85.1% by PEOU, PU and SAT. Since an R^2 of more than 26% is considered a good model (Hair Joseph et al., 2010), the results indicate a satisfactory model. The endogenous constructs also demonstrate good explanatory power with R^2 values higher than the recommended threshold.

Furthermore, there are 3 (three) hypotheses to be tested in this structural model where the path coefficient value (β), T-Statistic dan significance (P-Value) should meet the requirements to support the proposed hypothesis. According to (Hair Joseph et al., 2010), the path coefficient shows how strong the relationship between the two constructs is. The path coefficient value must be greater than 0.1 with a significance equal to or less than 0.05. The recommended T-Statistic value must also be greater than 1.96.

In Table 2, PU construct has a significant effect on SAT ($\beta=0.835$, T-statistic=15.026, $p<0.05$) and ATT ($\beta=0.555$, T-statistic=3.983, $p<0.05$). PEOU has significant relationship with PU ($\beta=0.719$, T-statistic=7.342, $p<0.05$). However, PEOU have no significant effect on ATT ($\beta=0.177$, T-statistic=1.054, $P\text{-value}>0.05$). In addition, SAT has significant impact on ATT ($\beta=0.550$, T-statistic=2.936, $p<0.05$). While PU ($\beta=0.141$, T-statistic=0.517, $p>0.05$) and SAT ($\beta=0.221$, T-statistic=0.590, $p>0.05$) would have not significant influence on CI based on the result, ATT have significant impact on CI ($\beta=0.849$, T-statistic=2.207, $p<0.05$). Table 1 shows that hypothesis support for positive relationships for H1, H3, H4, H6 and H8 while H2, H5 and H7 are not supported.

Table 2. Hypotheses Testing

Hyphoteses	Path	Path Coefficient (β)	T-Statistic	P-Value	Result
H1	PU -> SAT	0.835	15.026	0.000	Significant
H2	PU -> CI	0.141	0.517	0.695	No Significant
H3	PU -> ATT	0.555	3.983	0.000	Significant

Hyphoteses	Path	Path Coefficient (β)	T-Statistic	P-Value	Result
H4	PEOU -> PU	0.719	7.342	0.000	Significant
H5	PEOU -> ATT	0.177	1.054	0.292	No Significant
H6	SAT -> ATT	0.550	2.936	0.003	Significant
H7	SAT -> CI	0.221	0.590	0.555	No Significant
H8	ATT -> CI	0.849	2.207	0.028	Significant

If further observed, it is obtained that the ATT is the only significant predictor of CI instead of PU and SAT. In addition, our result reveals that PU has more significant impact on ATT than SAT.

4.4. Discussion

This study provides important insights into the factors that influence the continued use of e-Government services in Indonesia, specifically focusing on the Satu Data Indonesia (SDI) platform. Using Technology Continuance Theory (TCT), the research identifies key factors such as Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Satisfaction (SAT), and Attitude (ATT) in explaining user behavior after initial adoption. Perceived Usefulness (PU) has a significant impact on satisfaction and attitude (Liao et al., 2009). This means that when users find SDI useful and able to meet their needs, their satisfaction and positive attitude toward the service increase. However, it is interesting to note that PU does not directly influence the intention to continue using SDI (Shih, 2004). While users may see the service as useful, that alone is not enough to ensure they will continue using it in the long term. Instead, factors like attitude and experience play a bigger role in retaining users than just the perception of usefulness. Users who have moved beyond the initial adoption stage focus less on the usefulness of the service and more on their overall experience and attitude towards it.

Additionally, Perceived Ease of Use (PEOU) significantly affects PU, showing that a user-friendly interface helps improve users' perception of the system's usefulness (Davis, 1989). However, PEOU does not have a significant effect on attitude (Kumar & Krishnan, 2020). This suggests that while ease of use is important during the early stages of adoption, its influence on user attitude may decrease over time as users become more familiar with the service. The most notable finding is that attitude is the strongest predictor of continued use intention. A positive attitude, built through satisfying experiences and perceived usefulness (Liao et al., 2009), becomes the main factor driving users to continue using e-Government services. Satisfaction also influences attitude but does not directly affect the intention to continue using the service (Liao et al., 2007). This indicates that user satisfaction tends to influence decisions indirectly by shaping a positive attitude.

These findings highlight that to ensure the continued use of services like SDI, it is not enough to simply focus on improving usefulness or ease of use. Service developers and policymakers should pay more attention to creating positive user experiences and long-term satisfaction to encourage sustained engagement.

5. RESULTS AND DISCUSSION

This study provides a deeper understanding of the factors influencing the continuance intention to use e-Government services, particularly in the context of the Satu Data Indonesia (SDI) platform. By applying Technology Continuance Theory (TCT), the research highlights that while perceived usefulness and perceived ease of use are important in shaping user satisfaction and attitude, they are not sufficient to directly drive continued usage.

The findings show that attitude is the strongest factor in determining whether users will continue to engage with the platform. Positive experiences and satisfaction help shape a favorable attitude, which in turn plays a critical role in retaining users over time. This suggests that simply offering a useful and easy-to-use service is not enough to ensure long-term engagement. Instead, efforts should be directed towards enhancing user satisfaction and fostering positive attitudes through consistent, high-quality experiences. For policymakers and service developers, this study emphasizes the need to focus beyond

the initial adoption phase. Long-term strategies should aim at improving overall user satisfaction and experience, ensuring that e-Government services like SDI can meet user expectations and encourage sustained use.

Despite its contributions, this study has some limitations. First, the data was collected only from users of the Satu Data Indonesia (SDI) platform, which may limit the generalizability of the findings to other e-Government services or contexts. Future studies should consider including a more diverse range of e-Government platforms to enhance the applicability of the results. Second, this research used a cross-sectional approach, capturing user perceptions at a single point in time. A longitudinal study could provide better insights into how user attitudes, satisfaction, and continuance intentions evolve over time. Lastly, the sample was limited to Indonesian citizens, which may not fully capture the broader challenges and factors influencing e-Government usage in other regions. Future research should explore these factors in different cultural or geographical contexts to see if the findings hold across diverse populations.

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