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Research Article

Adoption Dynamics of Digital Payments: An Urban Case Study on E-Money Using the Technology Acceptance Model

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Abstract: The utilization of e-money in Indonesia has surged, propelled by the expansion of digital payment platforms. Despite their growing prevalence, the dynamics of e-money acceptance within urban environments still need to be explored. This study extends the Technology Acceptance Model (TAM) by incorporating Perceived Security as a new variable alongside traditional factors such as Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using, Behavioral Intention to Use, and Facilitating Condition. The research focuses on Padang City, a representative urban landscape, where data was collected from 201 valid respondents through online platforms. Data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM). The integration of Perceived Security is a novel aspect of this study, reflecting its crucial role in the contemporary urban context of e-money utilization. Results reveal significant relationships among the studied variables, although the impacts of Facilitating Conditions on Perceived Ease of Use and Perceived Usefulness on Behavioral Intention to Use were not supported. The findings underscore that a positive attitude toward e-money significantly boosts behavioral intentions to use it, primarily influenced by security perceptions and ease of use. These insights have substantial implications for policymakers and businesses focused on enhancing e-money adoption in urban settings. Moreover, the study highlights the necessity of addressing user perceptions, particularly security, to foster broader acceptance. Finally, this research contributes to the field by providing a deeper understanding of the factors driving e-money acceptance in urban areas and guiding targeted strategies for digital financial inclusion.

Keywords: digital payment, e-money, security, tam, technology adoption

1 Introduction

The rapid advancement of technology has revolutionized numerous sectors, notably transforming the financial and business payment systems. In Indonesia, the adoption of e-money has surged, significantly influenced by the growing integration of digital payment platforms [1]. This digital payment method offers precise and efficient transactions through automated devices such as PCs, and it simplifies the process by eliminating the need for bank verifications typically required in credit/debit card transactions [2].

E-money facilitates transactions without the physical carriage of cash, enabling quicker exchanges at point-of-sale locations by simply adjusting the e-money balance. Despite its convenience and efficiency, the full potential of electronic money still needs to be utilized in general public transactions. Public authorities continue to prioritize traditional credit systems with initiatives like the 'one individual, one check card' program, overshadowing the adoption of electronic exchange mediums [3]. Further, consumer hesitancy largely stems from concerns over personal data usage, such as card numbers, e-wallet IDs, financial balances, or email addresses [4].

In Padang City, where e-money was only introduced in recent years, there is a significant research gap concerning the user acceptance levels of this technology. As a representative urban landscape, Padang City provides a unique case study to explore these dynamics. This study aims to investigate the acceptance levels of e-money among users in Padang City. Employing the widely recognized Technology Acceptance Model (TAM), this research not only explores traditional variables like usability, convenience, attitudes, and user intentions but also incorporates external variables such as facilitating conditions and security perceptions to provide a comprehensive analysis of e-money as a transaction medium.

Besides, compared with previous studies, such as those in [5], which have emphasized the standard TAM variables—Perceived Usefulness, Perceived Ease of Use, and Attitude Toward Using—none have specifically focused on urban case studies concerning e-money with a strong emphasis on Perceived Security. Moreover, research conducted in [6] and [7] used the Technology Acceptance Model (TAM) to explore e-money adoption in urban areas. Still, it did not include an analysis of the security variable. This omission is significant because security concerns are often critical factors influencing technology adoption, particularly in financial services. By not addressing security, these studies may overlook a key element that could affect the robustness of their findings and the real-world applicability of their conclusions.

Furthermore, although in [8] incorporated aspects like Subjective Norm and Perceived Behavioral Control, the integration of Perceived Security in their study did not specifically target urban dynamics of e-money adoption, indicating a gap this research intends to fill. In addition, in [9], while Facilitating Conditions were considered, the emphasis on Perceived Security was linked more broadly without a direct application to e-money technologies in urban environments, making this research focus distinctly relevant.

In [10] explore TAM in the context of e-learning during the pandemic without delving into the urban-specific challenges and opportunities that e-money adoption faces, which this research addresses. Lastly, the research in [11] extends TAM by including affective factors but does not focus on the security perceptions critical to e-money usage in urban settings, highlighting another novel aspect of this.

Finally, this study contributes to the TAM literature by highlighting the importance of security and reevaluating the role of facilitating conditions in e-money adoption. Moreover, this study holds significant implications for policymakers and financial service providers, aiming to enhance understanding and encourage the broader adoption of e-money, thereby supporting the transition towards digital financial inclusivity in urban settings.

2 Research Method

2.1 Proposed Model and Hypotheses

This research adopts the Technology Acceptance Model (TAM) and utilizes the following variables: Perceived Ease of Use, Perceived Usefulness, Attitude Toward Using, and Behavioral Intention to Use. Additionally, this study incorporates two external variables, Facilitating Condition and Perceived Security, with the intention of exploring new direct relationships. Based on the theoretical review, the conceptual model of this study is illustrated in Figure 1.

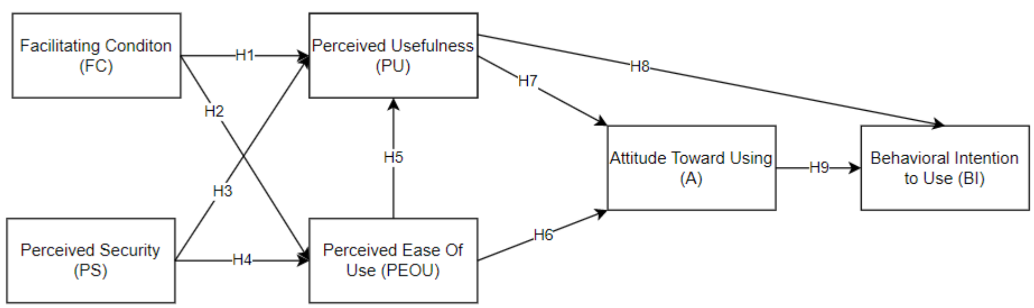

Figure 1: Proposed research model.

The primary variables used by TAM to measure actual system usage are Perceived Usefulness, Perceived Ease of Use, Attitude Toward Using, and Behavioral Intention to Use. In this study, external variables such as Facilitating Conditions and Perceived Security have been added as follows.

1. Facilitating Condition Facilitating conditions relate to perceptions about the resources, infrastructure, and technical aspects necessary for using technology effectively. This factor is crucial for the adoption and successful use of technology [12]. For example, a well-established infrastructure and access to technical support can enhance users' perceived ease of use and perceived usefulness of technology, leading to greater adoption rates.
2. Perceived Security Perceived security encompasses the trust and security users feel when adopting new technology. Research highlights its significant influence on the adoption of technologies and plays a crucial role in user acceptance [13]. Trust in the security of a technology mitigates fears of data breaches or unauthorized access,

which can otherwise be substantial barriers to adoption. As such, perceived security directly impacts users' perceived ease of use and perceived usefulness of the technology.

3. Perceived Ease of Use This variable reflects the degree to which a person believes that using a particular technology will be free of effort. Studies show that perceived ease of use significantly impacts the acceptance and continued use of technologies [14]. If a technology is perceived as easy to use, individuals are more likely to develop positive attitudes toward it, which in turn enhances their intention to use it.
4. Perceived Usefulness Perceived usefulness is the extent to which a person believes that using a technology will enhance their job performance. It has been shown to significantly affect individuals' intentions to use technology and their actual use [15]. This perception strongly influences an individual's intention to use the technology, as users are more inclined to adopt technologies that they believe will offer tangible benefits. Consequently, perceived usefulness is a critical predictor of both the initial adoption and continued use of a technology.
5. Attitude Toward Using Attitude toward using reflects individuals' overall affective reaction to using a technology. Studies indicate that positive attitudes towards technology significantly contribute to its adoption and are influenced by both perceived usefulness and ease of use [16]. A favorable attitude towards a technology increases the likelihood that an individual will intend to use it, thereby facilitating actual usage.
6. Behavioral Intention to Use This refers to the degree of strength of one's intention to use technology. Research suggests that behavioural intentions are a strong predictor of actual technology use, influenced by attitudes towards the technology and its perceived ease and usefulness [17]. This variable is a robust predictor of actual technology use and is influenced by attitudes toward the technology as well as perceived ease of use and usefulness. Strong behavioural intentions typically translate into higher rates of technology adoption and usage.

Furthermore, this study explores the relationships between variables that influence user perceptions and behaviors toward technology. The hypotheses proposed in this study are as follows:

1. Facilitating Condition (FC): Hypothesis 1 (H1): Facilitating Condition positively influences Perceived Usefulness.
   Hypothesis 2 (H2): Facilitating Condition positively influences Perceived Ease of Use.
2. Perceived Security (PS): Hypothesis 3 (H3): Perceived Security positively influences Perceived Usefulness.
   Hypothesis 4 (H4): Perceived Security positively influences Perceived Ease of Use.
3. Perceived Ease of Use (PEOU): Hypothesis 5 (H5): Perceived Ease of Use positively influences Attitude Towards Using the technology.
   Hypothesis 6 (H6): Perceived Ease of Use positively influences Perceived Usefulness.
4. Perceived Usefulness (PU): Hypothesis 7 (H7): Perceived Usefulness positively influences attitude towards using the technology.
   Hypothesis 8 (H8): Perceived Usefulness positively influences Behavioral Intention to Use the technology.
5. Attitude Toward Using (A): Hypothesis 9 (H9): Attitude Toward Using positively influences Behavioral Intention to Use the technology.

These hypotheses aim to explore the direct and indirect impacts of these factors on the adoption and utilization of technology by individuals.

2.2 Population and Sample

The study population was based on the location of the study, which is the city of Padang, with participants being at least 17 years old who have previously used e-money. The population size in this study is unknown and very large; hence, the sample size for the city of Padang's e-money users was determined using the Bernoulli formula [18]:

$$n = \frac{\left(z_{\alpha/2}\right)^2 + pq}{e^2} \tag{1}$$

where:
n : Minimum sample size
α : Accuracy level
z : Area under the normal curve
p : Probability of acceptance
q : Probability of rejection (if p and q are unknown, assume p and q are each 0.5)
e : Error level

In this study, the significance level (α) used is 5%, corresponding to a confidence level of 95%, which gives a z-value of 1.96. The margin of error was set at 10%, and this study assumed the proportion (p) to be 0.5 for maximum variability. Using these parameters in Equation 1, we calculated the minimum required sample size to be 96 respondents. The number of respondents in this study was increased to a minimum of 100 people to enhance the accuracy of the research due to concerns about incomplete questionnaires.

2.3 Data Collection

This study utilizes primary data sources, specifically questionnaires, to collect data. The questionnaires are created using an online platform and then distributed online to residents via social media. To efficiently gather data, this study employs a convenience sampling method, which involves selecting respondents who are readily accessible and willing to participate. This approach is commonly used in studies that utilize online platforms for questionnaire distribution, allowing for quick and cost-effective data collection [19].

2.4 Data Analysis

The data processing and analysis tool used in this study is Structural Equation Modeling (SEM) to test both the Outer and Inner models. SEM is widely utilized in Technology Acceptance Model (TAM) research due to its effectiveness in evaluating complex model structures involving multiple latent variables, which are common in TAM studies. Partial Least Squares SEM (PLS-SEM), in particular, is often chosen for TAM research because it allows for the modeling of complex relationships between observed and latent variables without requiring large sample sizes or normally distributed data, making it highly suitable for exploratory research where theoretical knowledge is still evolving. Moreover, it is particularly useful when the research model includes multiple dependent variables and when the objective is to predict key target constructs [20].

PLS-SEM is especially valuable in TAM research for its robustness in handling models with formative and reflective constructs and its capability to manage small to medium-sized samples effectively. This flexibility is crucial when new technology adoption behaviors are studied, often characterized by complex interrelations between user perceptions and behavioral intentions [21]. Moreover, PLS-SEM supports researchers in understanding the measurement models (outer models) and the structural models (inner models), which are key components of the TAM model, by facilitating the identification of direct, indirect, and total effects among constructs that are essential for drawing meaningful conclusions about technology acceptance [20].

3 Results

3.1 Respondents

In this study, a total of 201 respondents were obtained through the questionnaire. The characteristics of the respondents are shown in Table 1.

Table 1: Characteristics of respondents

Head 1	Category	Total	Percentage
Age	Male	109	54,2%
	Female	92	45,8%
	17-20	34	16,9%
	21-25	63	31,3%
	26-30	12	6%
	>31	92	45,8%
Educational Background	Junior High School	2	1%
	Senior High School	95	47,3%
	Diploma	12	6%
	Bachelors	76	37,8%
	Masters	15	7,5%
	Doctors	1	0,5%
Occupation	Student	83	41,3%
	Employee	101	50,2%
	Entrepreneur	8	4%
	Unemployed	9	4,5%

3.2 Outer Model Analysis

Figure 2 shows the results of the outer model testing. In PLS-SEM, the value of the results from the convergent validity test is indicated by the outer loading values, which are considered high if they exceed 0.6 [21] Additionally, the constructs being measured should have an Average Variance Extracted (AVE) greater than 0.6 [22]. For reliability, both Cronbach's Alpha and Composite Reliability values must exceed 0.7 [23]. This robust approach ensures that the latent constructs are both reliable and valid, reflecting the true nature of the variables being studied. The use of PLS-SEM in this manner is particularly crucial in research where understanding complex relationships and latent structures is essential. The detailed results of the validity and reliability tests are shown in Table 2.

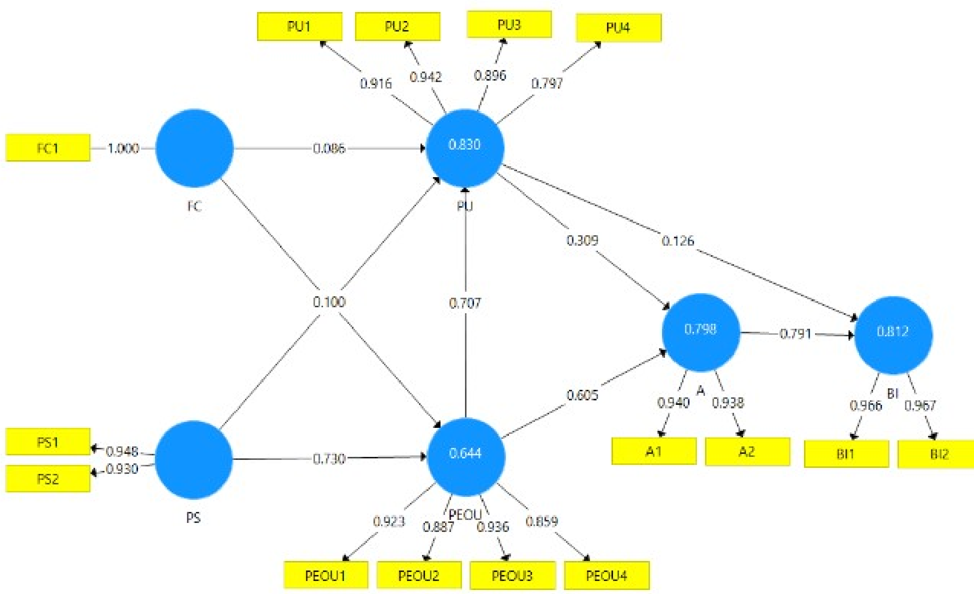

Figure 2: Outer model testing.

Table 2: Validity and reliability testings

Variable	Indicator	Outer Loading	CA	CR	AVE	Result
FC	FC 1	1.000	1.000	1.000	1.000	Valid
PS	PS 1	0.945	0.867	0.937	0.882	Valid
	PS 2	0.933				
PEOU	PEOU 1	0.946	0.871	0.939	0.886	Valid
	PEOU 2	0.936				
PU	PU 3	1.000	1.000	1.000	1.000	Valid
A	A 1	1.000	1.000	1.000	1.000	Valid
BI	BI 1	1.000	1.000	1.000	1.000	Valid

The results from Table 2 reveal a robust measurement model. Each construct and associated indicator demonstrate high reliability and validity, reflected through the metrics of Outer Loadings, Composite Reliability (CR), Cronbach's Alpha (CA), and Average Variance Extracted (AVE).

For the construct Facilitating Conditions (FC), the indicator FC1 displayed an outer loading of 1.000, indicative of a perfect relationship with the latent variable. The construct also recorded maximum scores for CR, CA, and AVE, all at 1.000, confirming its exceptional internal consistency and convergent validity. Such results suggest that the facilitating conditions are well captured by the model and are reliably measured.

In the Perceived Security (PS) construct, the indicators PS1 and PS2 showed high outer loadings of 0.945 and 0.933, respectively. This points to a strong and effective representation of the construct by these indicators. The CR and CA values for this construct stood at 0.937 and 0.867, respectively, well above acceptable thresholds, indicating good reliability. An AVE of 0.882 further underscores the solid convergent validity of this construct, implying that perceived security significantly influences user perceptions.

The Perceived Ease of Use (PEOU) construct, through indicators PEOU1 and PEOU2, had outer loadings of 0.946 and 0.936, signaling strong ties to the construct. With CR at 0.939 and CA at 0.871, the construct demonstrates high reliability. The AVE was also notably high at 0.886, affirming that the construct validly captures users' perceived ease of using e-money.

Perceived Usefulness (PU) was measured by the indicator PU3, which also had an outer loading of 1.000. The perfect scores for CR, CA, and AVE at 1.000 highlight the construct's impeccable internal consistency and convergent validity, indicating that perceived usefulness is a critical factor influencing user attitudes and behaviors.

The constructs Attitude Toward Using (A) and Behavioral Intention to Use (BI), each measured by the indicators A1 and BI1 respectively, both had outer loadings of 1.000. These constructs also achieved the highest possible scores for CR, CA, and AVE, all at 1.000, indicating not only perfect measurement but also that attitudes towards usage and behavioral intentions are crucial and accurately reflected in the model.

The integration of external variables such as Facilitating Condition and Perceived Security has enriched the model, allowing for a deeper understanding of the direct effects these factors have on e-money acceptance. The strong metric outcomes across all constructs signify that the model effectively captures the multifaceted nature of technology acceptance and suggests a robust theoretical framework for investigating e-money utilization in urban landscapes. These insights are instrumental for stakeholders aiming to enhance the adoption and effectiveness of e-money platforms.

3.3 Inner Model Analysis

3.3.1 R Square

The rule of thumb for R^2 values in Partial Least Squares Structural Equation Modeling (PLS-SEM) is 0.75, 0.50, and 0.25, which indicate strong, moderate, and weak models, respectively, in terms of the proportion of variance in the constructs explained by the model. These thresholds help in assessing the explanatory power of a model within the SEM framework, providing a quantitative measure to gauge the effectiveness of the model in capturing and representing the data structure [24].

Table 3: R square

Variable	R^2
Attitude Toward Using	0.622
Behavioral Intention to Use	0.778
Perceived Ease of Use	0.583
Perceived Usefulness	0.688

The results presented in Table 3 indicate the robust explanatory power of the model across different constructs. Specifically, the R-squared values are as follows: Attitude Toward Using (0.622), Behavioral Intention to Use (0.778), Perceived Ease of Use (0.583), and Perceived Usefulness (0.688). These values suggest that the predictors included in the model account for a substantial portion of the variance in each construct. Notably, the Behavioral Intention to Use construct demonstrates the highest explanatory power with an R-squared value of 0.778, indicating that the model is particularly effective in explaining the factors influencing users' intentions to adopt the technology. The relatively high R-squared values for Attitude Toward Using and Perceived Usefulness further underscore the relevance of the theoretical constructs chosen for this study. These findings provide empirical support for the model's utility in capturing significant determinants of technology acceptance and use. Given that each R-squared value exceeds 0.5, thus the model displays significant predictive capabilities.

3.3.2 Q Square

A research model exhibits predictive relevance, indicated by a Q^2 value greater than zero. This suggests that the model can predict the constructs it is intended to measure effectively. In PLS-SEM, a positive Q^2 value is critical as it confirms the model's capability to predict the data points reliably, making it a robust tool for both academic research and practical applications in understanding complex model dynamics [25].

The results of the predictive relevance of the model, as indicated by the Q^2 values in Table 4, provide insightful implications. Specifically, the Q^2 values for the variables are as follows: Attitude Toward Using (0.598), Behavioral Intention to Use (0.764), Perceived Ease of Use (0.503), and Perceived Usefulness (0.668). These values are derived from the formula $Q^2 = 1 - (SSE/SSO)$, where SSE represents the sum of squared errors and SSO denotes the sum of squared observations.

Table 4: Q square

Variable	Q^2
Attitude Toward Using	0.598
Behavioral Intention to Use	0.764
Perceived Ease of Use	0.503
Perceived Usefulness	0.668

The Behavioral Intention to Use exhibits the highest Q^2 value at 0.764, suggesting a substantial predictive relevance of the model regarding users' intentions to adopt the technology. This high value highlights the model's efficacy in forecasting behavioral outcomes based on the included predictors. Attitude Toward Using and Perceived Usefulness also show strong ^{2} values of 0.598 and 0.668, respectively, indicating that the model effectively predicts users' attitudes and perceived benefits from the technology.

Conversely, Perceived Ease of Use displays a Q^2 value of 0.503, which, while above the threshold of 0 (indicating predictive relevance), is relatively lower compared to the other constructs. This suggests that while the model maintains some predictive relevance for this variable, there may be other factors influencing perceived ease of use that are not captured by the current model configuration.

Overall, these Q^2 values affirm the model's capability to not only explain but also predict key factors in technology adoption, providing a reliable tool for understanding user behavior in technology usage contexts.

3.3.3 Hypothesis Testing

The hypothesis results are detailed in Table 5, which includes estimates for the original sample, sample mean, standard deviation, T statistic, P values, and decisions on hypothesis acceptance.

Table 5: Hypothesis testing results

Hypothesis	Original Sample	Sample Mean	Standard Deviation	T Statistic	P Values	Decision
H1: FC -> PU	0.203	0.207	0.084	2.416	0.008	Accepted
H2: FC -> PEOU	0.023	0.021	0.083	0.271	0.393	Rejected
H3: PS -> PU	0.263	0.266	0.099	2.651	0.004	Accepted
H4: PS -> PEOU	0.748	0.752	0.071	10.570	0.000	Accepted
H5: PEOU -> PU	0.463	0.458	0.081	5.698	0.000	Accepted
H6: PEOU -> A	0.403	0.409	0.090	4.480	0.000	Accepted
H7: PU -> A	0.434	0.432	0.091	4.776	0.000	Accepted
H8: PU -> BI	0.068	0.079	0.072	0.940	0.174	Rejected
H9: A -> BI	0.830	0.818	0.062	13.359	0.000	Accepted

Hypothesis 1 (H1: FC -> PU) presents a path coefficient of 0.203 with a sample mean of 0.207 and a standard deviation of 0.084. The T statistic is 2.416, resulting in a P value of 0.008, leading to the acceptance of the hypothesis. This suggests that facilitating conditions significantly influence perceived usefulness. Moreover, Hypothesis 2 (H2: FC -> PEOU) contrasts starkly as it is rejected; its path coefficient of 0.023, a sample mean of 0.021, and a

T statistic of 0.271 indicate a non-significant impact of facilitating conditions on perceived ease of use, evidenced by a P value of 0.393.

Furthermore, Hypothesis 3 (H3: PS -> PU) reports a path coefficient of 0.263, a sample mean of 0.266, and a standard deviation of 0.099. With a T statistic of 2.651 and a P value of 0.004, this hypothesis is accepted, confirming that performance satisfaction positively influences perceived usefulness. Similarly, Hypothesis 4 (H4: PS -> PEOU) demonstrates a strong positive relationship with a path coefficient of 0.748, a sample mean of 0.752, and a low standard deviation of 0.071. The high T statistic of 10.570 and a P value of 0.000 robustly support the acceptance of the hypothesis.

Additionally, Hypothesis 5 (H5: PEOU -> PU) and Hypothesis 6 (H6: PEOU -> A) both show significant positive effects, with path coefficients of 0.463 and 0.403 respectively. Their respective P values of 0.000 confirm their strong influences, with perceived ease of use significantly affecting both perceived usefulness and attitude. Thus, Hypothesis 7 (H7: PU -> A) indicates a significant influence of perceived usefulness on attitude, with a path coefficient of 0.434, a T statistic of 4.776, and a P value of 0.000, leading to its acceptance.

On the other hand, Hypothesis 8 (H8: PU -> BI) is rejected due to a lower T statistic of 0.940 and a P value of 0.174, indicating a non-significant influence of perceived usefulness on behavioral intention. Conversely, Hypothesis 9 (H9: A -> BI) exhibits the strongest relationship among all tested hypotheses with a path coefficient of 0.830, a sample mean of 0.818, and a high T statistic of 13.359, leading to a P value of 0.000, which robustly supports the acceptance of the hypothesis that attitude significantly influences behavioral intention.

Overall, these results provide substantial insights into the various factors influencing user acceptance and usage intentions, confirming the critical roles of perceived ease of use, performance satisfaction, and attitude within the model.

4 Discussion

The analysis of the hypotheses based on the results has shown varied outcomes, which provide insight into the relationships between the variables of the Technology Acceptance Model (TAM) as applied to e-money adoption.

Facilitating conditions significantly predict perceived usefulness. This result aligns with existing research, suggesting that when users perceive adequate support and resources, they are likely to find the technology useful. This finding suggests that facilitating conditions should be emphasized in the implementation strategies for e-money technologies [26,27].

Furthermore, contrary to several studies, facilitating conditions did not predict perceived ease of use in this study. This contradicts findings in [28] and [13], where facilitating conditions were significant predictors of ease of use. This discrepancy could suggest the presence of contextual factors that might influence the impact of facilitating conditions on ease of use in e-money adoptio n, warranting further investigation. Moreover, Perceived Security was found to influence both perceived usefulness and perceived ease of use significantly. This is supported by research that highlights the importance of security in user adoption decisions. These results underscore the critical role of security measures in enhancing the perceived value and ease of use of e-money systems, which could lead to higher adoption rates [29,30].

Additionally, H5 H6 were accepted. These findings suggest that ease of use enhances both perceived usefulness and attitudes towards using e-money, consistent with prior studies showing the critical role of ease of use in shaping positive attitudes and perceived benefits. This further implies that making e-money systems easy to use should be a priority in design and marketing strategies to enhance user acceptance and continuous use [31,32]. Thus, H7 H9: were also accepted. Both perceived usefulness to attitude and attitude to behavioral intention were significant, aligning with the foundational TAM propositions. This suggests that enhancing the perceived benefits of e-money can effectively improve user attitudes and ultimately their intentions to use the technology, thereby guiding educational and promotional strategies to focus on the benefits and real-life applications of e-money adoption [28,33].

However, H8 was rejected. The absence of a direct relationship between perceived usefulness and behavioral intention highlights a potential mediating role of other variables like satisfaction or trust, a finding that diverges from conventional TAM results but is echoed by studies such as in [29] that emphasize the complexity of adoption behaviors in different contexts.

These comparative insights affirm that while many aspects of the TAM hold, certain relationships can vary based on contextual factors such as the type of technology or cultural settings, underscoring the need for nuanced approaches to studying technology adoption in diverse settings.

Moreover, this study contributes to the theoretical body of knowledge in the Technology Acceptance Model by dissecting the influence of perceived security and facilitating conditions on e-money adoption, which has yet to be explored, particularly in the context of developing countries. The finding that facilitating conditions do not predict perceived ease of use calls for a revision of how these elements are conceptualized within the TAM framework in digital financial contexts. This could mean that other factors, perhaps specific technological or socio-economic conditions, play more critical roles in influencing perceived ease of use than previously thought. The integration of perceived security as a strong predictor of both perceived usefulness and ease of use also suggests that future models should consider security as a core component rather than an external influence, reflecting its growing importance in the digital era [13,29].

In addition, from a practical standpoint, the implications of this study are significant for policymakers and businesses involved in the deployment of e-money technologies. Given that perceived usefulness and ease of use are critical drivers of attitude and behavioral intentions, service providers should focus on enhancing these perceptions by improving user interfaces and ensuring that e-money platforms integrate seamlessly into everyday financial activities. Furthermore, the findings highlight the necessity for e-money service providers to bolster security measures, as perceived security directly influences user acceptance and can thus significantly affect adoption rates. Marketing communications that effectively convey the security measures and benefits of e-money could enhance user trust and adoption intentions. Lastly, the rejection of the hypothesis that facilitating conditions influence perceived ease of use suggests that simply providing resources or infrastructural support may not be sufficient. Providers must ensure that these facilities are effectively meeting the actual needs and contexts of the target users [27,30].

5 Conclusion

The analysis of e-money adoption using the Technology Acceptance Model (TAM) has yielded insightful outcomes, particularly highlighting the novel inclusion of perceived security as a significant variable. While facilitating conditions have traditionally been linked to perceived usefulness, this study reaffirms their importance but also reveals an unexpected non-influence on perceived ease of use, suggesting that other contextual factors might be at play. This discrepancy calls for a deeper exploration of how facilitating conditions are applied and perceived in different technological and cultural contexts. Critically, the introduction of perceived security into the model marks a significant advancement. It strongly influences both perceived usefulness and ease of use, underscoring the necessity of robust security measures in the acceptance and widespread adoption of e-money systems. This finding not only enhances the theoretical framework of TAM but also suggests practical implications for the design and promotion of e-money technologies.

Moreover, the study confirmed the fundamental propositions of TAM, with ease of use enhancing perceived usefulness and attitudes, and perceived usefulness effectively boosting attitudes and behavioral intentions. However, the rejection of the direct link between perceived usefulness and behavioral intention highlights the complexity of user adoption behaviors, potentially mediated by satisfaction or trust. This research contributes substantially to the TAM literature by emphasizing the critical role of security and reevaluating the impact of facilitating conditions in the context of digital financial services. For policymakers and business leaders, the study underscores the importance of prioritizing user-friendly design and strong security protocols to enhance user acceptance and integration of e-money into daily financial activities.

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