

A TAM-Based Study of Online Payment Adoption Among Sri Lankan Students with a Focus on Security and Awareness

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Abstract

The use of Digital Financial Technologies (DFTs) as a form of making transactions and purchasing goods and services is becoming increasingly common among young people in developing countries. Extending the Technology Acceptance Model (TAM), this paper investigates the adoption of online payment by undergraduates in Sri Lanka, extending TAM by introducing Trust and Security (TS) and Awareness (AWA). The factors used in the research model are Perceived Usefulness (PER), Perceived Ease of Use (EAS), Trust and Security (TS), Awareness (AWA), Attitude toward Use (ATT) and Actual Usage (ACT). This research model is used to analyze the factors that influence the students directly and indirectly. Data were collected from 367 university undergraduates of University of Jaffna in Sri Lanka. This study was used a structured online self-reported questionnaire, and were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0 modeling tool. The results show that all four independent variables (PER, EAS, AWA, and TS) had a meaningful and positive effect on ATT. However, PER and EAS were not directly related to ACT, except through the ATT path. This indicates that besides ATT, users' awareness, trust and security perceptions were important in influencing undergraduates' behavior regarding their online payment adoption. Thus, online payment initiatives aimed at undergraduates should include education among the trust of its use, ease of use, and security to convince users to adopt the technology. An extended TAM model may have wider implications for understanding how students in developing countries adopt online payment technology, assist banks and fintech in implementing strategies to encourage cashless payment adoption in emerging markets.

Keywords: Technology Acceptance Model, Online Payment, Undergraduates, Trust, Awareness, SmartPLS, Sri Lanka.

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Introduction

The global rise of digital finance technology and subsequent advancements in distributed online payment systems have created cashless economies, financial inclusion, and convenience in transactions. In a developing country such as Sri Lanka, the use of online payment systems is on the rise, particularly among tech-aware groups such as university students. Undergraduate students constitute an important user group because they are digital natives who regularly interact with smartphones, online platforms, and mobile applications. At the same time, they differ from working adults because many have limited income, restricted financial autonomy, and varying levels of exposure to formal financial services. These characteristics make them an important population for examining online payment adoption behavior and provide insights into future patterns of digital financial service usage. Digital payments in Sri Lanka have seen an increase in recent years. Online banking, QR code-based payments and mobile wallets such as LankaQR, eZ Cash, PayHere and mCash have been promoted by the Central Bank of Sri Lanka. Banks like People's Bank, Bank of Ceylon, Commercial Bank and Sampath Bank also provide real-time mobile and internet banking. Digital payment adoption among young Sri Lankans has increased considerably in recent years due to the expansion of mobile banking, QR-based payment systems, and fintech services (Central Bank of Sri Lanka, 2023; DataReportal, 2024). This pattern of adoption appears to hold at the undergraduate level, but is less explored. Although previous studies have examined digital payment adoption among Sri Lankan youth, empirical evidence focusing specifically on undergraduate students and their actual usage behavior remains limited.

Sri Lanka represents a distinctive context for examining digital payment adoption due to the rapid implementation of the LankaQR payment infrastructure, increasing policy support from the Central Bank of Sri Lanka, growing fintech participation, and continuing disparities in digital financial inclusion across regions. Unlike mature digital payment markets such as China and Singapore, Sri Lanka remains in a transitional stage where awareness, trust, and accessibility continue to influence adoption decisions. Therefore, understanding factors affecting digital payment usage among young consumers is particularly important.

The phenomenon described above can be explained by the Technology Acceptance Model (TAM). According to this model proposed by Davis (1989), the individual's Behavioral Intention of using a technology is influenced by Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of the technology. These two constructs shape users' attitudes and intentions to use which in turn affects actual use. Especially the novel setting of online transactions involving sensitive financial and personal information as well as its active evolution require the addition of Trust and Security (TS) and Awareness (AW) as extended constructs. As for Sri Lankan undergraduates, aspects such as digital literacy, cyber safety awareness and cyber-vulnerability levels differ across Sri Lanka regionally, institutionally and socioeconomically. This study empirically investigates the determinants of online payment system adoption among Sri Lankan undergraduates by extending the Technology Acceptance Model (TAM) incorporating the Trust and Security (TS), Awareness (AW) attributes as fundamental antecedents of usage behavior.

Perceived Usefulness (PU) for online Payment Systems as the degree to which a user believes that using the system improves the efficiency of their financial management. This is

paramount for undergraduates since they have a variety of payments to make such as university fees, mobile top-ups, utility bills, shopping, food deliveries, etc. Students are more likely to use e-payment systems in everyday transactions if they are perceived to be useful, quick, and dependable.

Perceived Ease of Use (PEOU), or the degree to which a person believes that using a particular system would be free of physical and mental effort, was also an important influence on students' online transactional intentions. Sri Lankan banks have made progressive improvements to the design and structure of their mobile banking applications. Banks' mobile applications are less likely to be adopted by undergraduates if they find them to be complex (Ha et al., 2023). This finding is particularly applicable to undergraduates who are not based in large urban centers and may have less familiarity with technology.

The issue of Trust and Security (TS) is a major prerequisite for online payment acceptance (Lim et al., 2024). Cybercrime and fraud in internet transactions have been reported in Sri Lanka (Sri Lanka Computer Emergency Readiness Team, 2023). Although e-payment systems provide greater efficiency and effectiveness, online payment adoption would be low if consumers are not confident about the safety and security of their personal and financial data (Lallmahamood, 2007). Where people feel secure in the authentication and protection from unauthorized access to financial services, they are more likely to use them.

As the country is a developing nation with regional disparity in technology adoption, the role of awareness towards digital tools is considered an important factor for undergraduates' acceptance of digital tools. The students' online presence is dependent on the efficiency of marketing, peer-to-peer influence and institutional acceptance (such as university cashless application fees, paying for hostel fees with apps); yet many students with smartphones and internet access are unaware of these digital tools.

ATT (attitude towards use) is the user's overall evaluation of using the system and functions as a mediator in the TAM. A student positive towards online payment might frequently use it to pay for different things (for example, mobile bills, tuition or e-learning subscriptions) in different applications and contexts. A negative student perspective would decrease frequency and variety of use. Undergraduate students at Sri Lankan state and private universities have different profiles of using smartphones to access the internet and other online services and some have different financial independence/customary literacy skills. The majority of students access the internet through smartphones and other mobile devices, consistent with the high level of mobile connectivity reported in Sri Lanka (DataReportal, 2024).

This study is timely and intends to investigate the adoption of online payment among Sri Lankan undergraduates using the TAM and introduces security and awareness as the key extensions.

Trust and Security and Awareness were selected because online payment adoption in emerging economies is influenced not only by perceptions of usefulness and ease of use but also by users' confidence in transaction safety and their knowledge of available digital payment services. In Sri Lanka, the coexistence of increasing digital payment infrastructure and uneven

levels of financial and digital literacy makes these constructs particularly relevant for explaining adoption behavior among university students.

The research seeks to address the following questions:

1. How do perceived usefulness, ease of use, trust and security, and awareness influence students' attitude toward online payment usage?
2. What is the effect of these variables on actual system usage among undergraduates?

This study may also have practical implications for banks and fintech as well as university administration in case they want to find ways to better convert students to digital payments. Furthermore, the use of SmartPLS as the methodological tool for the analysis in addition allows to identify various indirect effects (e.g. through mediation studies), providing additional insights to this study.

Literature Review

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is one of the most widely used models to explain and predict user behavior for technology acceptance. Proposed by Davis (1989), the model states that beliefs directly influence technology acceptance. The beliefs are created by Perceived Usefulness (PER), or the belief that using technology will improve job performance, and Perceived Ease of Use (EAS), or the belief that using the system requires little effort. These beliefs in turn affect user's Attitude Toward Use (ATT), which then affects Behavioral Intention and Actual Usage of the system (ACT) (Davis, 1989). With the emergence of moderators like Trust and Security (TS), Awareness (AW), etc., TAM has evolved to cover the dynamics of digital financial transactions in developing countries. For instance, in a study on mobile payments, Jameel et al., (2022) added trust and security as moderators to TAM and concluded that perceived security influences intention and use of mobile payments. Likewise, Ha et al. (2023) found Vietnamese students influenced by their knowledge of and perception of the risk related to e-wallets, as were students in Malaysia and Sri Lanka.

Perceived Usefulness (PER)

The perceived usefulness (PER) of e-payment systems describes the belief that an individual's use of an online payment system will improve their effectiveness in conducting financial transactions. PER is one of the strongest drivers of technology adoption. In a study of Malaysian university students, Ho et al. (2024) reported that e-wallets were viewed as convenient and useful, especially during the COVID-19 pandemic. Ho et al. (2024) also found that perceived usefulness significantly influenced continuance usage intention among Generation Alpha users. Previous studies have consistently found that perceived usefulness positively influences digital payment adoption because users value speed, convenience, and transaction efficiency (Ha et al., 2023; Ho et al., 2024; Ramadhani et al., 2022). Since the socioeconomic realities are unlikely to escape the influence of system usefulness, their findings also apply to the Sri Lankan undergraduates who have accepted digital apps for fee payments, e-commerce and subscriptions.

Perceived Ease of Use (EAS)

Perceived Ease of Use (EAS) is defined as the degree to which a person believes that using a system would be free of physical and mental effort, and may influence perceived usefulness and attitude. In the Sri Lankan context note that ease of navigation of the mobile banking application increases the continuance intention to use it among university students. Likewise, Cashless Payment Hesitancy Amongst University Students (Sidek et al., 2024) notes the negative influence of interface issues. In line with this, Ramadhani et al. (2022) found usability attributes of e-wallet apps like easy login, user error recovery, and transaction confirmation to be meaningful antecedents of the actual use of the e-wallet apps, as students with many apps are much less tolerant of technical problems than the average user.

Trust and Security (TS)

Trust and security (TS) is important for e-wallets that process sensitive personal and financial information. According to a study by Jameel et al. (2022), the trust that users have in the safety of their money and personal information is an important factor influencing their intention to keep using e-wallets. In markets where digital crime is more visible (such as Sri Lanka), these security features, including two-factor authentication and biometric logins, can increase trust in a digital service. A study by Wiryawan et al. (2023) in Indonesia indicated security is a key consideration of QR code-based payment systems, and has a positive influence on perceived reliability. Likewise, a study by Lim et al. (2024) in Malaysia found that secure platforms have a negative effect on perceived risk, with younger users developing strong brand associations early in their QR code payments use.

Awareness (AW)

Awareness (AW), though not originally one of the TAM components, is considered vital for use and adoption of digital finance, especially among users with less technical knowledge. It is defined as knowledge of the technology, understanding of its benefits and awareness of its possible use cases. According to Apriani and Wuryandari (2023), lack of awareness (rather than technical limitations of e-wallets) was the main barrier to their implementation by Indonesian SMEs. The Sri Lankan university students exposed to a financial literacy intervention were more likely to adopt digital payment methods, Ha et al. (2023) concluded that promotion of an e-wallet through university campaigns or peer referral is likely to positively influence university students' electronic wallet adoption. This is thought to be due to education, advertisements, and seeing friends use a product, making the intention stronger.

Attitude Toward Use (ATT)

Attitude Toward Use (ATT), or the students' general view of using technology, is positive if the system is perceived to be both useful and easy to use. Attitude positively affects the intention and use of the system. According to Ramadhani et al. (2022), the compatibility of lifestyle (one of the attitudinal factors) influences the adoption of online payment systems. For example, students are more likely to adopt online payment systems compatible with their needs for food, utility bills, and tuition fees. Furthermore, Sidek et al. (2024) discovered that the role of cultural values, peer influence, and branding in influencing university students' attitudes in

Malaysia was minimal; therefore, attitude remained an important mediating variable between the core constructs of TAM and actual use.

Actual Usage (ACT)

Actual use (ACT) reflects the types and frequencies of online payment behaviors, and even though behavioral intention explains a high amount of use variance, some contextual factors close the divide. Amankwa et al. (2023) conducted a multi-group analysis in Ghana and found that merchant support access, device quality and digital literacy can strengthen or lower this relationship. Although Seng et al. (2023) and Che Nawi et al. (2022) found high intent among students to use e-wallets while shopping, the usage was only moderate due to the limited number of merchants accepting e-wallets and a low level of cash-backs or rewards. In Sri Lanka, canteens, bookstores and inter-faculty buses in public universities largely adopt cash even though many supports digital wallets.

Existing studies have examined digital payment adoption among students in countries such as Malaysia, Vietnam, Indonesia, and Sri Lanka. However, most studies have focused primarily on behavioral intention rather than actual usage behavior. Furthermore, limited evidence exists regarding the simultaneous influence of awareness and trust/security on actual online payment usage among Sri Lankan undergraduates within the country's evolving digital payment ecosystem. Therefore, this study extends TAM by examining both attitudinal and behavioral outcomes in a unique emerging-market context.

Methodology

Thus, this study employed a quantitative research approach based on the TAM by adding TS and AWA to determine the effect on ACT (Actual Usage) among undergraduates in Sri Lanka. The model was further examined using the Partial Least Squares Structural Equation Modeling (PLS-SEM) using the SmartPLS 4.0 which has been proven effective for developing and testing theories of models with complex structures involving multiple latent variables. It is useful when the data are not normally distributed and sample sizes are moderate (Leguina, 2015).

The study used a web survey among undergraduates at the University of Jaffna. Sri Lanka, where stratified convenience sampling was employed to maintain proportional representation across multiple faculties. The strata were based on faculty, and the online questionnaire was distributed through faculty networks obtain representation from different academic and district backgrounds. Since the survey was distributed online and participation was voluntary, the sampling procedure cannot be considered fully probability-based. This limitation is acknowledged in the study. A total of 367 usable questionnaires were collected. This resulted in meeting the minimum sample size required for PLS-SEM analysis and the "10-times rule" for structural paths. Participation was voluntary and confidentiality guaranteed.

The questionnaire comprised 28 items measuring the following latent variables: Perceived Usefulness (PER), Perceived Ease of Use (EAS), Trust and Security (TS), Awareness (AWA), Attitude Toward Use (ATT), and Actual Usage (ACT). The participants rated each item on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). PER measured perceived effectiveness of an online payment system in improving the efficiency and productivity of payment transactions (e.g., "Using online payment improves the efficiency of my payment

transactions"). EAS measured the perceived ease of learning and using an online payment system (e.g., "I find online payment simple to use"). TS captured the perceived security, privacy and reliability of the transaction to online payment service providers (e.g., "I believe my financial information is safe when using online payment"). AWA measured the knowledge of students on online payment services/processes and its benefits (e.g., "I know the benefits of using online payment over other payment methods").

Students' overall evaluation towards online payment, both emotional and cognitive, was measured by the ATT variable (e.g., "I have a positive attitude toward using online payment"). Actual behavior towards online payment was measured by the ACT variable (e.g., "I use online payment regularly for my transactions"). The measurement items for Perceived Usefulness (PER), Perceived Ease of Use (EAS), and Attitude Toward Use (ATT) were adapted from Davis (1989) and Venkatesh and Davis (2000). Trust and Security (TS) items were adapted from Jameel et al. (2022) and Lim et al. (2024), while Awareness (AWA) items were adapted from Apriani and Wuryandari (2023) and Nasiketha et al. (2023). Minor wording modifications were made to ensure relevance to the Sri Lankan online payment context and undergraduate population.

The measurement model was tested for construct reliability and validity, showing a Cronbach's Alpha above 0.75, Composite Reliability above 0.87, and Average Variance Extracted above 0.5, showing good reliability and convergent validity of constructs (Hair et al., 2021). Discriminant validity was assessed using the Fornell-Larcker criterion. In all cases the constructs correlated more strongly with their items than with other constructs. All of the path coefficients were tested for importance using the bootstrapping procedure with 5000 samples. The results showed that Perceived Ease of Use ($\beta = 0.350$), Trust and Security ($\beta = 0.114$) and Awareness ($\beta = 0.234$) considerably influence Attitude Toward Use, while Perceived Usefulness has a lesser influence ($\beta = 0.073$). In turn, ATT was positively correlated with ACT ($\beta = 0.175$), AWA ($\beta = 0.395$), and TS ($\beta = 0.175$), suggesting the existence of direct and indirect effects of ATT on ACT, AWA, and TS. Variance inflation factors (VIFs) were below 5, indicating that there were no issues with multicollinearity. The model fit was also adequate, with an SRMR (Standardized Root Mean Square Residual) value of below 0.08.

Research Questions

Based on the theoretical model and previous studies, the study addresses the following research questions:

1. **RQ1:** How do Perceived Usefulness (PER), Perceived Ease of Use (EAS) Awareness (AWA) and Trust and Security (TS), influence students' Attitude Toward Use (ATT) of online payment?
2. **RQ2:** How do Attitude Toward Use (ATT) and Actual Usage (ACT) relate to the online payment?
3. **RQ3:** How do Perceived Usefulness (PER), Perceived Ease of Use (EAS) Awareness (AWA) and Trust and Security (TS), influence students' Actual Usage (ACT) of online payment?

Hypothesis

From these questions, the following nine hypotheses were developed

- H1: Perceived Usefulness (PER) has a significant effect on Attitude Toward Use (ATT)
- H2: Perceived Ease of Use (EAS) has a significant effect on Attitude Toward Use (ATT).
- H3: Awareness (AWA) has a significant effect on Attitude Toward Use (ATT).
- H4: Trust and Security (TS) have a significant effect on Attitude Toward Use (ATT).
- H5: Perceived Usefulness (PER) has a significant effect on Actual Usage (ACT).
- H6: Perceived Ease of Use (EAS) has a significant effect on Actual Usage (ACT).
- H7: Awareness (AWA) has a significant effect on Actual Usage (ACT).
- H8: Trust and Security (TS) have a significant effect on Actual Usage (ACT).
- H9: Attitude Toward Use (ATT) has a significant effect on Actual Usage (ACT).

The adopted methodology ensured both theoretical rigor and empirical robustness in analyzing the online payment behavior of Sri Lankan undergraduates. The use of SmartPLS facilitated a detailed path analysis and confirmed the significance of awareness and trust in shaping both attitudes and actual usage behaviors.

Results and Analysis

This study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) to examine the factors influencing the adoption of online payment systems among Sri Lankan undergraduates. The model included four independent variables, Perceived Usefulness (PER), Perceived Ease of Use (EAS), Trust and Security (TS), and Awareness (AWA); a mediating variable, Attitude Toward Use (ATT); and one dependent variable, Actual Usage (ACT).

Table 1. Construct Validity and Composite Reliability

Variable	Item	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
Perceived Usefulness	PER1	0.75	0.85	0.89	0.62
	PER2	0.75			
	PER3	0.8			
	PER4	0.8			
	PER5	0.83			
Perceived Ease of Use	EAS1	0.78	0.86	0.9	0.59
	EAS2	0.77			
	EAS3	0.69			
	EAS4	0.81			
	EAS5	0.8			
Awareness	AWA1	0.86	0.83	0.89	0.66
	AWA2	0.83			
	AWA3	0.8			
	AWA4	0.77			
Trust and Security	TS1	0.84	0.88	0.92	0.74
	TS2	0.86			
	TS3	0.9			

	TS4	0.85			
Attitude Toward Use	ATT1	0.8			
	ATT2	0.81	0.85	0.9	0.69
	ATT3	0.85			
	ATT4	0.85			
Actual Usage	ACT1	0.84			
	ACT2	0.88	0.85	0.9	0.69
	ACT3	0.85			
	ACT4	0.74			

Source: Survey data

Note: *PER* - Perceived Usefulness; *EAS*- Perceived Ease of Use; *AWA*-Awareness; *ATT*-Attitude Toward Use; *TS*- Trust and Security; *ACT*-Actual Usage.

To evaluate the quality of the measurement model, this study examined the reliability and validity of each construct using outer loadings, Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE), shown in Table 1. All constructs in the model demonstrated satisfactory internal consistency reliability, with Cronbach's Alpha values ranging from 0.829 to 0.884. These exceed the recommended threshold of 0.70 (Hair et al., 2021), indicating that the indicators consistently represent their respective latent variables. For example, the construct Trust and Security (TS) displayed the highest internal consistency, with a Cronbach's Alpha of 0.884 across four items.

Composite Reliability values were similarly strong, ranging from 0.886 (Awareness) to 0.920 (Trust and Security), further confirming the reliability of the constructs. These results suggest that the items for each variable are largely free from measurement error. The AVE values for all constructs were also above the minimum acceptable threshold of 0.50, ranging from 0.593 to 0.741, thereby confirming convergent validity. Notably, Trust and Security achieved the highest AVE (0.741), followed by Actual Usage (0.687) and Attitude Toward Use (0.685), indicating that these constructs capture a substantial portion of the variance in their indicators.

The outer loadings of all measurement items were above the standard 0.70 benchmark, with the exception of one item under Perceived Ease of Use (EAS3 = 0.690), which is still within the acceptable range (Chin, 1998) and was retained to preserve content validity. These results confirm that the constructs exhibit both unidimensionality and strong indicator reliability.

Overall, the measurement model exhibits high reliability and convergent validity for all constructs, including Perceived Usefulness (PER), Perceived Ease of Use (EAS), Awareness (AWA), Trust and Security (TS), Attitude Toward Use (ATT), and Actual Usage (ACT). The robust psychometric properties observed ensure that the indicators are appropriate for use in the subsequent structural model analysis using PLS-SEM.

Table 2. Discriminant Validity: Fornell-Larcker Scale results.

Variable	Actual Usage	Attitude Toward Use	Awareness	Perceived Ease of Use	Perceived Usefulness	Trust and Security
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SS						
Actual Usage	0.83					
Attitude Toward Use	0.56	0.83				
Awareness	0.64	0.64	0.81			
Perceived Ease of Use	0.51	0.71	0.59	0.77		
Perceived Usefulness	0.42	0.65	0.5	0.62	0.79	
Trust and Security	0.52	0.53	0.57	0.48	0.42	0.86

Source: Survey data

As illustrated in Table 2, the assessment of discriminant validity using the Fornell-Larcker criterion (Fornell & Larcker, 1981; Hair et al., 1998) confirms that all constructs in the model are empirically distinct from one another. According to this method, the square root of the Average Variance Extracted (AVE) for each latent variable should exceed its correlations with any other construct in the model. In this study, all constructs met this condition, thereby establishing adequate discriminant validity. Based on the observed result in Table 3, it is evident that the discriminant validity is ascertained.

Table 3. Cross-Loadings results

	Actual Usage	Attitude Toward Use	Awareness	Perceived Ease of Use	Perceived Usefulness	Trust and Security
ACT1	0.84	0.51	0.53	0.43	0.38	0.44
ACT2	0.88	0.47	0.55	0.45	0.37	0.44
ACT3	0.84	0.5	0.58	0.45	0.36	0.41
ACT4	0.74	0.38	0.46	0.34	0.28	0.46
ATT1	0.45	0.81	0.55	0.61	0.59	0.46
ATT2	0.38	0.8	0.47	0.54	0.52	0.49
ATT3	0.51	0.85	0.52	0.62	0.53	0.43
ATT4	0.52	0.85	0.57	0.58	0.5	0.38
AWA1	0.53	0.59	0.86	0.53	0.42	0.46
AWA2	0.51	0.56	0.83	0.5	0.48	0.47
AWA3	0.47	0.48	0.8	0.47	0.42	0.48
AWA4	0.58	0.45	0.77	0.43	0.32	0.45
EAS1	0.39	0.58	0.49	0.78	0.51	0.33
EAS2	0.33	0.52	0.39	0.77	0.43	0.36
EAS3	0.29	0.44	0.37	0.69	0.4	0.39
EAS4	0.42	0.55	0.54	0.81	0.48	0.36
EAS5	0.41	0.51	0.46	0.8	0.46	0.37
EAS6	0.47	0.64	0.47	0.77	0.57	0.42
PER1	0.32	0.5	0.37	0.52	0.75	0.35

PER2	0.22	0.42	0.29	0.42	0.75	0.2
PER3	0.33	0.48	0.39	0.51	0.8	0.3
PER4	0.39	0.55	0.47	0.46	0.8	0.42
PER5	0.35	0.57	0.43	0.53	0.83	0.35
TS1	0.46	0.48	0.49	0.44	0.4	0.84
TS2	0.45	0.43	0.5	0.39	0.34	0.86
TS3	0.48	0.49	0.48	0.43	0.39	0.9
TS4	0.41	0.41	0.5	0.39	0.32	0.85

Source: Authors' estimation

Table 4. R-Square

ATT	0.628
ACT	0.477

Source: Authors' estimation

As illustrated in table 4 the model explains 62.8% of the variance in Attitude Toward Use (ATT) and 47.7% of the variance in Actual Usage (ACT), indicating moderate-to-substantial explanatory power according to Hair et al., (2021).

Table 5. f Square

Path	f ²
ATT -> ACT	0.02
AWA -> ACT	0.15
AWA -> ATT	0.08
EAS -> ACT	0
EAS -> ATT	0.16
PER -> ACT	0
PER -> ATT	0.11
TS -> ACT	0.04
TS -> ATT	0.02

Source: Authors' estimation

The effect size analysis (Table 5) revealed that Perceived Ease of Use exerted the strongest influence on Attitude Toward Use ($f^2 = 0.163$), representing a medium effect, followed by Perceived Usefulness ($f^2 = 0.108$), Awareness ($f^2 = 0.077$), and Trust and Security ($f^2 = 0.022$), all of which demonstrated small effects. Regarding Actual Usage, Awareness exhibited the largest effect size ($f^2 = 0.146$), approaching a medium effect, indicating its substantial role in promoting online payment adoption among undergraduates. Trust and Security ($f^2 = 0.036$) and Attitude Toward Use ($f^2 = 0.022$) showed small effects, while Perceived Ease of Use ($f^2 = 0.004$) and Perceived Usefulness ($f^2 = 0.000$) had negligible practical influence on Actual Usage. These findings suggest that awareness is the most important practical driver of online payment usage, whereas ease of use primarily shapes user attitudes rather than directly influencing behavior.

Table 6. Specific Indirect Effect

Indirect Path	β	t	p
AWA -> ATT -> ACT	0.04	1.99	0.05
EAS -> ATT -> ACT	0.06	2.18	0.03
PER -> ATT -> ACT	0.05	1.99	0.05
TS -> ATT -> ACT	0.02	1.79	0.07

Source: Authors' estimation

The indirect effects of Perceived Usefulness, Perceived Ease of Use, and Awareness on Actual Usage through Attitude Toward Use were statistically significant, whereas the indirect effect of Trust and Security was not significant.

Overview of Structural Model Evaluation

The assessment of the structural model involved evaluating the significance and strength of hypothesized relationships between constructs. Path coefficients indicate the strength and direction of relationships, while t-values (above 1.96) and p-values (below 0.05) are used to determine statistical significance (Hair et al., 2021).

As shown in Figure 1, the structural model which assessed the relationship between constructs in the extended Technology Acceptance Model (TAM) in Table 4, all four independent variables, namely Perceived Usefulness (PER), Perceived Ease of Use (EAS), Awareness (AWA), and Trust and Security (TS) had a positive meaningful impact on the mediator ATT. The Hypothesis Testing Results of Hypothesis 01, based on the impact of PER on ATT, showed that it had a positive and important impact on ATT ($\beta = 0.264$, $p < 0.01$) on the part of students, as they found the online payment systems useful. The findings supporting Hypothesis 02 showed that Perceived Ease of Use has an important positive relationship with ATT ($\beta = 0.350$, $p < 0.01$). Likewise, a meaningful positive effect of AWA on ATT was

demonstrated with ($\beta = 0.233$, $p < 0.01$), indicating that it had a positive impact on students' attitude toward the adoption of online payment systems when they were more aware of or exposed to them. Trust and Security (TS) also had a smaller but statistically meaningful effect on Attitude Toward Use (ATT) ($\beta = 0.114$, $p = 0.012$).

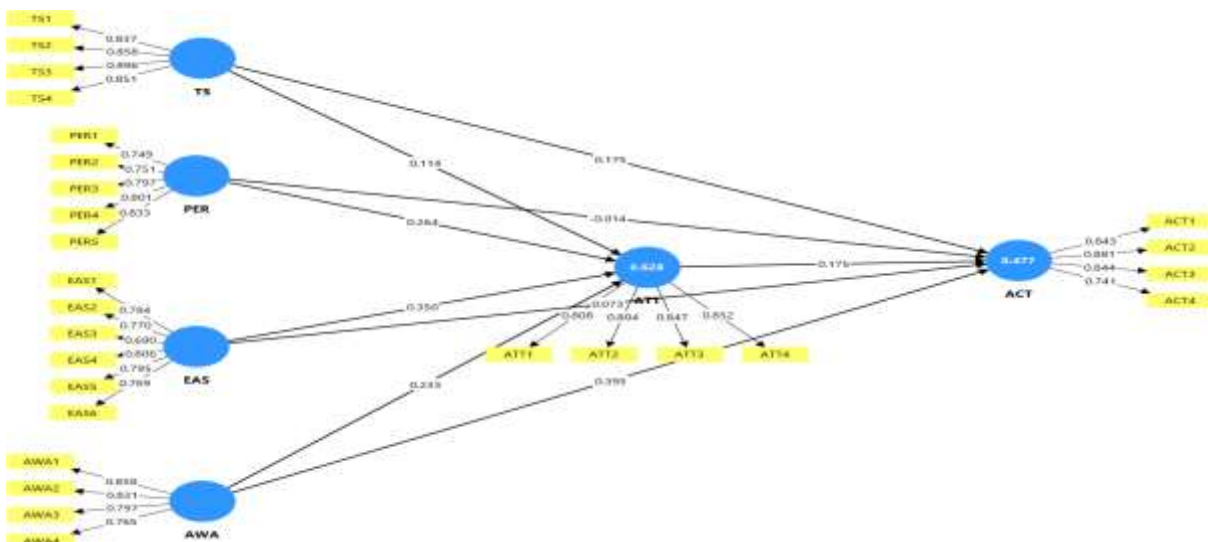


Figure 1. Structural Model

When the direct effects of Perceived Usefulness (PER) and Perceived Ease of Use (EAS) on the dependent variable Actual Usage (ACT) were tested, the results showed that the effect of Perceived Usefulness (PER) on the dependent variable was not meaningful ($\beta = 0.015$, $p = 0.793$). In addition, Perceived Ease of Use (EAS) also had no effect on the dependent variable ($\beta = 0.111$, $p = 0.161$). The same was found in the actual use case. Awareness (AWA) has a meaningful positive impact on Actual Usage (ACT) ($\beta = 0.395$, $p < 0.01$), supporting that awareness of system usage can be an important antecedent of system usage among undergraduates. Trust and Security (TS) also has an important positive impact on Actual Usage (ACT) ($\beta = 0.175$, $p = 0.005$). The direct relationship between ATT and ACT was also statistically meaningful ($\beta = 0.175$, $p = 0.015$), thereby confirming the role of ATT as a mediating variable in TAM. While user attitude is influenced by PEOU and PU, awareness and trust have a direct effect on user behavior. Thus, trust and awareness were key determinants of online payment adoption among Sri Lankan undergraduates.

Table 7. Results of structural Model – Research Hypotheses Significant at $p^{**} < 0.01$, $p^* < 0.05$

H		Path	T-Statistics	P values	Decision
H1	Perceived Usefulness -> Attitude Toward Use	0.26	4.05	0	Supported**
H2	Perceived Ease of Use ->Attitude Toward Use	0.35	5.4	0	Supported**
H3	Awareness -> Attitude Toward Use	0.23	3.52	0	Supported**
H4	Trust and Security -> Attitude Toward Use	0.11	2.5	0.01	Supported**
H5	Perceived Usefulness -> Actual Usage	0.02	0.26	0.79	Not Supported
H6	Perceived Ease of Use -> Actual Usage	0.07	1.4	0.16	Not Supported
H7	Awareness -> Actual Usage	0.4	6.57	0	Supported**
H8	Trust and Security -> Actual Usage	0.18	2.79	0.01	Supported**
H9	Attitude Toward Use -> Actual Usage	0.18	2.44	0.02	Supported**

Source: Survey data

Conclusion

This study seeks to identify the factors affecting online payment behavior of undergraduate students in Sri Lanka based on an extended Technology Acceptance Model by introducing Trust and Security (TS) and Awareness (AWA) as additional factors. It also investigates the direct and indirect influence of Perceived Usefulness (PER), Perceived Ease of Use (EAS), Trust and Security (TS), Awareness (AWA), Attitude Toward Use (ATT), and Actual Usage (ACT).

Quantitative data were collected via an online survey to test the framework on a sample of 367 undergraduate students from the University of Jaffna.

The structural model results of the extended TAM showed that Perceived Usefulness (PER) had an important influence on the Attitude Toward Use of online payment (ATT) ($\beta = 0.264$, $p < 0.01$). This indicates that students are more likely to have a positive attitude toward using online payment when they consider it time-saving, efficient, and productive. On the contrary, there was no direct effect of PER on ACT ($\beta = 0.015$, $p = 0.793$). Studies such as Davis (1989) showed that perceived usefulness affects attitude, but does not always result in the intention to use the technology.

Second, EAS predicted meaningful amounts of ATT, $\beta = 0.350$, $p < 0.01$. This was also expected from the TAM2 model (Davis, 1989; Venkatesh & Davis, 2000). Likewise, if EAS did not predict important amounts of ACT ($\beta = 0.073$, $p = 0.161$), it could be argued that while usability influences positive feelings, it cannot fully predict usage behavior on its own without additional influences on trust or awareness of the perceived usefulness. (Sidek et al., 2024).

Awareness (AWA) generates the strongest path coefficients in the model, as it affects Attitude Toward Use ($\beta = 0.233$, $p < 0.01$) and Actual Usage ($\beta = 0.395$, $p < 0.01$). Thus, the findings indicate that education, promotion and social influence constitute important constructs that help educate students about the availability, advantages and utility of digital payments as suggested by Nasiketha et al.(2023) found that awareness is an important antecedent of online financial behavior among Sri Lankan youth.

Another meaningful predictor was Trust and Security (TS), which predicted ATT ($\beta = 0.114$, $p = 0.012$) and ACT ($\beta = 0.175$, $p = 0.005$) with a moderate and strong effect, respectively. Overall, the results suggest that Sri Lankan undergraduates are cautious about using online financial services, similar to other developing countries where cybercrime and fraud are major obstacles to financial digitization (Jameel et al., 2022; Wiryawan et al., 2023). Secure account authentication methods, encryption, and explicit privacy policies may help build trust.

ATT was an important mediator of the relationship between Actual Usage ($\beta = 0.175$, $p = 0.015$). This is in agreement with the original TAM, where attitude is a mediator between beliefs (usefulness and ease) and the Actual Usage (Davis, 1989). From the formal mediation analysis, the results indicate that, indirect-only mediation for Perceived Usefulness and Perceived Ease of Use, complementary partial mediation for Awareness, and a direct-only effect for Trust and Security.

Theoretically, this study contributes to the TAM literature by complementing the literature on TAM extension in developing countries. Trust and Security as well as Awareness were proven applicable in the case of Sri Lanka. Previous research has focused on perceived risk and convenience. However, our findings have shown that information and security issues are equally important, if not more important, than perceived risk and convenience, particularly for younger individuals (Ho et al., 2024; Ha et al., 2023).

An important finding of this study is that Perceived Usefulness and Perceived Ease of Use did not directly influence Actual Usage. One explanation is that these variables primarily

influence behavior through the formation of positive attitudes, consistent with the original TAM (Davis, 1989; Venkatesh & Davis, 2000). Furthermore, actual usage among undergraduates may be shaped more strongly by awareness, habitual payment practices, and contextual factors such as merchant acceptance and financial autonomy. Many students depend on parental financial support and may have limited opportunities for independent financial transactions. In addition, the continued reliance on cash payments in many university and local commercial settings may restrict actual usage despite favorable perceptions of online payment systems. These findings suggest that behavioral and contextual factors play an important role in converting positive perceptions into actual adoption behavior.

The findings can help banks, fintech, universities, and policymakers. Practical intervention avenues can include peer education, workshops, and incentives to university students to increase usage of these services. Likewise, to reduce consumer friction, streamlining app interfaces, as well as implementing stronger encryption, biometric logins, and effective fraud measures, can help build user trust in the process. Guidance on digital payments can be adjusted by national regulators, such as the Central Bank of Sri Lanka. University administrators are also involved. Enabling online payment systems for campus services (tuition fees, canteen payments, library fines etc.) allows students to get comfortable with online payments in a non-intimidating environment. This would close the gap between intention and habitual use (Che Nawi et al., 2022).

Limitations and Future research

The household income and financial independence may influence online payment adoption behavior. However, these variables were outside the scope of the present TAM-based framework. Future research may incorporate socioeconomic characteristics as control variables to provide a more comprehensive understanding of adoption behavior.

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