

# Factors influencing the adoption of cashless transactions: toward a unified view

Factors  
influencing  
cashless  
transactions

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## Abstract

**Purpose** – This study aims to construct an appropriate framework by incorporating essential components from the most renowned theories to investigate the variables that impact behavioural intentions towards embracing cashless transactions (CLT).

**Design/methodology/approach** – A survey was conducted to ascertain the users' intention to adopt CLT in Chennai, Tamil Nadu, India. Further, this study used a "partial least squares-based structural equation modelling" technique to analyse the relationships between latent factors.

**Findings** – The results of the proposed model revealed that 11 independent variables together explain the intention to use CLT with a 60.5% explanatory power. Further, perceived usefulness is the most influential factor in predicting users' willingness to adopt CLT, followed by social influence, perceived costs, attitude, trust and device barriers. Finally, the findings of moderator effects indicate that income and experience interact positively and strongly with behavioural intention to adopt CLT. It indicates that high-income, experienced users are more likely to convert their intentions into actions.

**Originality/value** – This study integrated critical elements from the major theories, such as Theory of Reasoned Action, Technology Acceptance Model, Decomposed Theory of Planned Behaviour, the unified theory of acceptance and use of technology (UTAUT) model and UTAUT2, to investigate the adoption of CLT. As a result, 11 crucial factors were identified from the existing literature that impacts CLT adoption without overlapping. Consequently, the model presented in this study provides a more profound understanding than previous research regarding why individuals adopt CLT systems. Accordingly, these results could aid policymakers in addressing people's concerns and facilitating a seamless transition to a cashless society.

**Keywords** Cashless transactions, Behavioural intention, TAM, UTAUT, PLS-SEM, India

**Paper type** Research paper

## 1. Introduction

The prevention of crimes has been regarded as superior to the punishment of criminals after the crime has been committed. Despite the efforts of governments to enhance the resources available to the criminal justice system, the crime has continued to surge and negatively affect our daily lives (Warwick, 1993). Further, a substantial proportion of these crimes involve stealing cash or property to obtain cash, which is the primary source of revenue for illegal activities (Warwick, 1993; Armev *et al.*, 2014). In addition, criminals often deposit their illicit profits in financial institutions using cash transactions, which can make it difficult for law enforcement to trace the money (Alba, 2003; Goel and Mehrotra, 2012). Therefore, countries with high cash volumes may be more susceptible to corruption among officials and bribe-takers.

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Moreover, cash provides anonymity for terrorists and rebels to engage in undetected transactions (Lipow, 2010), and even a minimal quantity of physical cash in circulation is adequate to finance a broad range of illegitimate operations (Wright *et al.*, 2017). Hence, governments must move towards a completely cashless economy to combat these crimes effectively (Warwick, 1993). Further, eliminating physical currency would force criminals to use cashless transactions (CLT), which are traceable, leading to increased transparency and economic security (Vimal Raj *et al.*, 2023; Raj *et al.*, 2021). The shift to cashless economies can also reduce government spending and promote employment. However, the full benefits of a cashless economy cannot be realised until a significant percentage of the population regularly engages in CLT (Vimal Raj *et al.*, 2023). Furthermore, “cashless transactions (CLT)” were described as modes of payment that do not require the exchange of tangible currency. Such methods include “Real Time Gross Settlement (RTGS),” “National Electronic Fund Transfer (NEFT),” “Immediate Payment Service (IMPS),” “Unified Payments Interface (UPI),” “Near Field Communication (NFC)” technology, payment via mobile wallets, banking cards, “Quick Response (QR)” codes and other payment methods that do not involve cash (Raj *et al.*, 2021).

In India, the CLT systems have become widely promoted after implementing the Digital India campaign in 2015. In addition, the “Reserve Bank of India (RBI),” the central bank of India responsible for monetary policy implementation, has undertaken multiple campaigns to promote the use of CLT among the general public (Vimal Raj *et al.*, 2023). Consequently, according to the RBI’s annual reports, this has resulted in an enormous increase in the entire volume of CLT in India, which has gone from 7,046.6 million in the fiscal year 2015–2016 (Reserve Bank of India Annual Report, 2017) to 71,953.1 million in the fiscal year 2021–2022 (Reserve Bank of India Annual Report, 2021), marking a growth rate of 921.10%. However, despite this surge in the adoption of CLTs, the rate in India is still relatively low compared to the rates in developed countries. For example, according to “Bank for International Settlements (BIS)” Statistics Explorer (BIS Statistics Explorer, n.d.): Table CT5, India’s average CLT per capita in 2021 was just 47 units, whereas the figure for advanced economies was above 400 units. Additionally, according to the RBI Bulletin published in August 2019, the average value of CLT made in India is 3,910 United States Dollars per person. In contrast, the value of CLT in developed nations was above 500,000 (Reserve Bank of India Bulletin, 2019). Based on these findings, it seems that the implementation of CLT in India is still in its infancy and has substantial opportunities for growth. Consequently, it is essential to comprehend users’ acceptance of CLT and identify the factors influencing their intent to use it through an extensive study model.

## 2. Theoretical background

Previous studies have demonstrated that multiple theories have been widely employed to explore individuals’ adoption and usage of new “Information Technology (IT).” These models include the “Theory of Reasoned Action (TRA),” “Social Cognitive Theory (SCT),” “Technology Acceptance Model (TAM),” “Theory of Planned Behaviour (TPB),” “Model of PC Utilization (MPCU),” “Decomposed Theory of Planned Behaviour (DTPB),” “Innovation Diffusion Theory (IDT)” and “Unified Theory of Acceptance and Use of Technology (UTAUT).” Additionally, the TAM and the UTAUT are among the most commonly utilised theories to elucidate users’ behavioural intentions to engage in any technology.

Davis developed the TAM model in 1989 and derived it from TRA, which assesses an individual’s willingness to participate in a technological activity. The TAM was explicitly designed for the IT field and is utilised to forecast the adoption and usage of IT. The model is intention-based, estimating usage based on behavioural intention. The model has five key components: “perceived usefulness,” “perceived ease of use,” “attitude toward use,” “intention to use” and “actual use.” Further, the TAM model has been extensively used to investigate the acceptance of online banking, mobile banking and other CLT systems, owing to its

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effectiveness, conciseness and simplicity (Sarmah *et al.*, 2021; Shin, 2009; Williams, 2021; Lisana, 2021; Alshurideh *et al.*, 2021; Saha *et al.*, 2022; Flavian *et al.*, 2020; Chawla and Joshi, 2019; Priya *et al.*, 2018; Bailey *et al.*, 2017; Koksai, 2016; Bashir and Madhavaiah, 2015a, b).

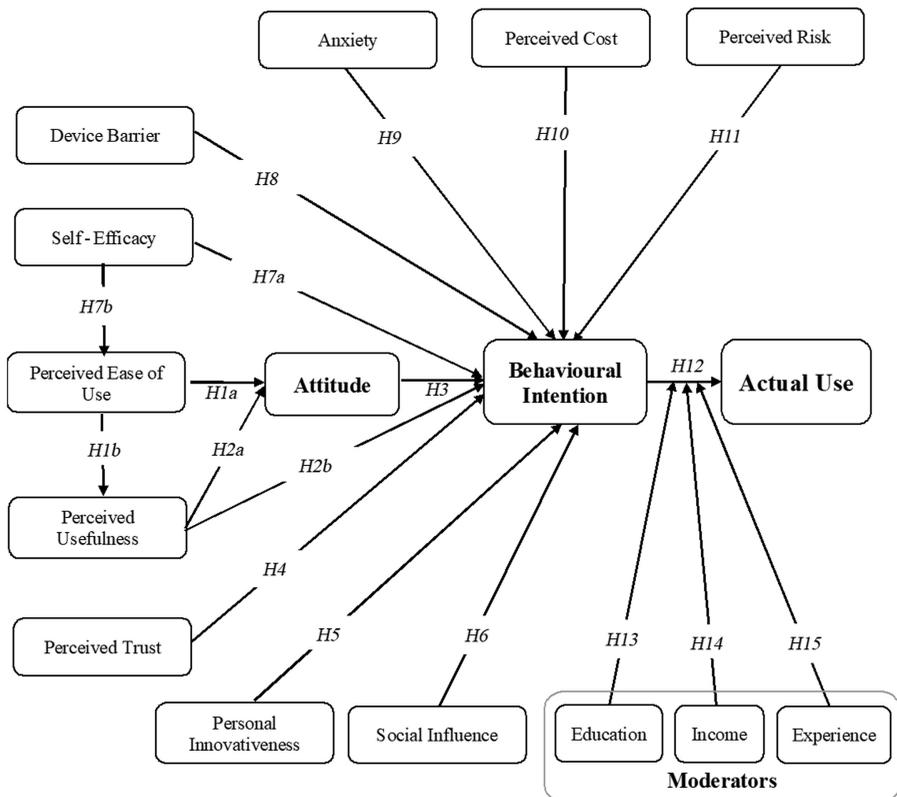
Venkatesh *et al.* (2003) integrated major information system (IS) theories to develop UTAUT, which includes four fundamental constructs, namely “performance expectancy,” “effort expectancy,” “social influence,” and “facilitating conditions” that impact intention and use. Moreover, they employed “gender,” “age,” “experience,” and “voluntariness of use” as moderators in this model. Additionally, Venkatesh *et al.* (2012) expanded on UTAUT and introduced UTAUT2, which included three extra elements, namely “hedonic motivation,” “price value,” and “habit.” Furthermore, earlier researchers in this area have extensively utilised UTAUT2 in their investigations due to its capacity to provide comprehensive and explanatory information (Sivathanu, 2019; Raj *et al.*, 2023; Gupta and Arora, 2020; Vimal Raj *et al.*, 2023; Alalwan *et al.*, 2017; Sripalawat *et al.*, 2011). In addition, earlier research in the field of CLT has employed UTAUT2 due to its significant association with this domain (Abegao Neto and Figueiredo, 2022; Al-Saedi *et al.*, 2020; Giovanis *et al.*, 2019; Patil *et al.*, 2020). Nevertheless, previous studies have not covered the full spectrum of adoption factors in CLT due to the following deficiencies:

The existing theoretical models, such as UTAUT, UTAUT2, and TAM, were developed to explore the acceptance of technological devices such as computers and mobile phones. Accordingly, these models do not take into account several additional factors that could impact the adoption of CLT. In addition, prior literature comprises numerous analogous constructs, leading to the redundancy of its components. Further, given the context of CLT acceptance, a number of the assumptions made in UTAUT2 are rendered meaningless. As an illustration, the UTAUT2 incorporates the significant construct of hedonic motivation, which gauges individuals’ enjoyment while playing games or watching movies in the context of adopting mobile or computer technology. However, this construct is not applicable in the area of CLT adoption. Consequently, these theories did not provide a completely accurate explanation for adopting CLT. Therefore, to address these deficiencies, it is necessary to amalgamate all existing literature on CLT to formulate a complete model that incorporates all positive/negative factors and interaction variables. Accordingly, the subsequent sections describe how this research framework establishes a suitable model to elucidate the uptake of CLT.

### 3. Conceptual framework and hypothesis development

The present research began with a literature review to establish an appropriate model that comprehensively encompasses various factors influencing behavioural intentions to adopt CLT without overlapping constraints. The following is an overview of the processes that were included in the literature study that was carried out as a part of the current inquiry to get a glimpse of the antecedents that are relevant to the suggested research model:

In the initial stage of this research, over 110 previously published research articles were reviewed and analysed using several online databases, including “Science Direct,” “Emerald,” “Sage,” “Springer,” “Taylor & Francis,” “IEEE,” and “Google Scholar.” Accordingly, this research identified 63 factors that directly influence the behavioural intention towards using CLT. Further, the identified factors were classified based on similarity to prevent overlapping. Furthermore, the essential elements of the CLT adoption process were determined to be picked from each of the groups investigated in this research. Consequently, to develop a comprehensive model that explains the uptake of CLT, this study has identified 13 dimensions, including “Perceived Usefulness (PU),” “Perceived Ease of Use (PEoU),” “Attitude (ATT),” “Perceived Trust (PT),” “Personal Innovativeness (PI),” “Social Influence (SI),” “Self-Efficacy (SE),” “Perceived Risk (PR),” “Perceived Costs (PC),” “Anxiety (ANX),” “Device Barrier (DB),” “Behavioural Intention (BI)” and “Actual Use (AU)” (Figure 1 illustrates the research framework).



**Figure 1.**  
The research  
framework of  
this study

**Source(s):** Authors' own creation

### 3.1 Perceived ease of use (PEoU)

“Perceived ease of use refers to the degree to which a person believes that using a particular system would be ‘free of effort’ (Davis, 1989).” This definition focuses on the user’s impression of the effort required to utilise technology and is an essential component in forecasting the propensity to accept new kinds of technology (Williams, 2021; Lisana, 2021; Alshurideh *et al.*, 2021). The significance of PEoU is particularly relevant in determining the acceptance of CLT systems, as it is the most important and frequently cited precursor (Alhassany and Faisal, 2018; Koksai, 2016; Bashir and Madhavaiah, 2015b). Several researchers have investigated the impact of PEoU on PU and ATT towards adopting CLT systems (Sarmah *et al.*, 2021; Sripalawat *et al.*, 2011; Priya *et al.*, 2018). As such, we hypothesise:

*H1a.* PEoU positively influences individuals’ ATT towards the adoption of CLT.

*H1b.* PEoU positively influences individuals’ PU of CLT.

### 3.2 Perceived usefulness (PU)

“Perceived usefulness defines the degree to which a person believes that using a particular system would enhance his or her job performance (Davis, 1989).” As a result, users perceive increased value in adopting new technology (Lisana, 2021; Alshurideh *et al.*, 2021). In the

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context of CLT, PU refers to how effective an individual believes using a CLT method is compared to using cash (Flavian *et al.*, 2020; Chawla and Joshi, 2019). In addition, this can result in individuals developing positive ATT towards CLT (Alhassany and Faisal, 2018; Flavian *et al.*, 2020; Koksal, 2016). These unique features of CLT are likely to reinforce these positive views. Further, in previous research, it has been shown that there is a substantial correlation between an individual's PU of CLT, their ATT towards it, and their BI to use it (Williams, 2021; Sripalawat *et al.*, 2011; Chawla and Joshi, 2019, 2020; Priya *et al.*, 2018; Bashir and Madhavaiah, 2015b). Therefore, we hypothesise:

H2a. PU positively influences individuals' ATT towards the use of CLT.

H2b. PU positively influences individuals' BI towards the adoption of CLT.

### 3.3 Attitude (ATT)

"Attitude" refers to a person's overall evaluation of a particular object or behaviour (Davis, 1989). This concept has been evaluated through various influential theories on the adoption of IT, such as the TRA and the TAM (Flavian *et al.*, 2020). These theories propose that a person's BI to use an IT is determined by their ATT (Patil *et al.*, 2020). Similarly, if an individual has a positive ATT towards CLT, they are more likely to have a higher BI to adopt it. On the other hand, if an individual has a negative ATT towards CLT, they are less likely to embrace it (Flavian *et al.*, 2020). Besides, several studies on CLT have demonstrated a robust association between ATT and BI towards utilising CLT (Chawla and Joshi, 2019, 2020; Shin, 2009; Bailey *et al.*, 2017; Bashir and Madhavaiah, 2015a). Therefore, we hypothesise:

H3. ATT positively influences individuals' BI towards the adoption of CLT.

### 3.4 Perceived trust (PT)

The notion of "perceived trust" refers to a person's impression of the reliability of the institutional surroundings (Vimal Raj *et al.*, 2023; Alalwan *et al.*, 2017). This concept encompasses trust in service providers such as financial institutions and telecommunications companies (Sarmah *et al.*, 2021). Further, this trust might result from pleasant previous experiences or a well-established reputation (Raj *et al.*, 2023). Additionally, security, convenience, prestige, familiarity, and regulation build trust among consumers and encourage them to embrace CLT methods (Chawla and Joshi, 2020; Giovanis *et al.*, 2019). Furthermore, prior studies provide evidence of a meaningful and positive relationship between PT and the BI to adopt CLT (Sarmah *et al.*, 2021; Shin, 2009; Raj *et al.*, 2023; Lisana, 2021; Alshurideh *et al.*, 2021; Bashir and Madhavaiah, 2015a). Therefore, we hypothesise:

H4. PT positively influences individuals' BI towards the adoption of CLT.

### 3.5 Personal innovativeness (PI)

"Personal innovativeness" pertains to an individual's readiness and openness to adopt and utilise novel technologies (Raj *et al.*, 2023). Similarly, the CLT methods, such as mobile payments, e-wallets and contactless cards, are relatively new technologies that require users to be comfortable with and willing to use them (Williams, 2021; Saha *et al.*, 2022). Therefore, individuals who are more innovative and open to using new technologies may have a higher BI to use CLT compared to those who are less innovative (Raj *et al.*, 2023; Vimal Raj *et al.*, 2023). Moreover, prior research found a positive link between PI and individuals' BI towards adopting CLT (Williams, 2021; Vimal Raj *et al.*, 2023; Raj *et al.*, 2023). Therefore, we hypothesise the following:

H5. PI positively influences individuals' BI towards the adoption of CLT.

### 3.6 Social influence

“Social influence” refers to other people’s impact on an individual’s attitudes, beliefs and behaviours (Venkatesh *et al.*, 2003). In the context of CLT, SI can come from various sources, such as family, friends, peers and even strangers. These individuals can influence their perception of CLT and their decision to use them (Sivathanu, 2019). Similarly, SI can also be amplified by social media and other digital platforms, which can spread information and opinions about CLT. The use of influencers and social media marketing by companies offering several CLT methods can also positively influence an individual’s decision to use them (Patil *et al.*, 2020). Additionally, earlier research has shown that there is a favourable correlation between SI and BI in the adopting of CLT (Raj *et al.*, 2023; Lisana, 2021; Patil *et al.*, 2020; Vimal Raj *et al.*, 2023; Giovanis *et al.*, 2019). Therefore, we hypothesise the following:

H6. SI has a positive effect on a person’s willingness to adopt CLT.

### 3.7 Self-efficacy

The term “self-efficacy” refers to an individual’s conviction in their capacity to successfully use CLT systems to conduct financial transactions (Lisana, 2021; Raj *et al.*, 2023; Al-Saedi *et al.*, 2020). Further, individuals with a strong sense of SE regarding CLT are usually self-assured in their capacity to utilise these payment methods proficiently, tackle potential challenges and feel comfortable with the technology used (Vimal Raj *et al.*, 2023). On the other hand, individuals with low levels of self-efficacy regarding CLT may exhibit reluctance to employ these payment systems, lack faith in their abilities, and reject adopting them (Singh and Srivastava, 2018). Moreover, previous studies have shown that SE significantly predicts an individual’s intention to adopt CLT methods (Lisana, 2021; Bashir and Madhavaiah, 2015b). Therefore, we hypothesise:

H7a. SE positively influences individuals’ PEOU in CLT.

H7b. SE positively influences individuals’ BI towards the adoption of CLT.

### 3.8 Device barrier (DB)

“Device barriers” can pose challenges to the adoption of CLT. Factors such as the user interface, ease of navigation and input, display clarity, and the quality of the mobile device can all impact the user’s perception of the service quality and affect their willingness to use mobile payment methods (Laukkanen, 2008). Additionally, the small screen size of mobile devices can present obstacles to adopting CLT, particularly for services requiring complex or detailed inputs (Sripalawat *et al.*, 2011). Hence, to encourage greater adoption of CLT, it is essential to address these DB and tailor mobile content to the limitations and preferences of the user’s device. Moreover, prior research demonstrates significant associations between DB and users’ BI to engage in cashless transactions (Laukkanen, 2008; Sripalawat *et al.*, 2011). Therefore, we hypothesise:

H8. DB negatively influences individuals’ BI towards the adoption of CLT.

### 3.9 Anxiety (ANX)

Anxiety refers to the concerns and worries that users may have regarding the security and usability of CLT applications (Raj *et al.*, 2023). Users could be worried about the safety of the CLT apps, which might result in ANX and a lack of faith in the system (Vimal Raj *et al.*, 2023). In addition, forgetfulness can be a source of ANX, and users may fear that they will forget their usernames and password, resulting in the loss of account access (Bailey *et al.*, 2017). Furthermore, users may be concerned about the physical security of their devices and the

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possibility of theft, loss, or misappropriation by third parties (Celik, 2016). Thus, reducing CLT's ANX may enhance users' opinions of the technology and increase their desire to use it (Patil *et al.*, 2020). Besides, previous research on the acceptance of CLT has verified that ANX is a crucial factor in shaping people's technology adoption (Bailey *et al.*, 2017; Patil *et al.*, 2020; Celik, 2016). Therefore, we hypothesise:

H9. ANX negatively influences individuals' BI towards the adoption of CLT.

### 3.10 Perceived cost

The expression "perceived cost" pertains to an individual's perception of the expenses linked to utilising CLT techniques (Abegao Neto and Figueiredo, 2022). These costs can encompass the expenses incurred in acquiring the required devices, Internet charges, transaction processing fees levied by banks or other financial institutions and any additional charges necessary to finalise the transaction (Vimal Raj *et al.*, 2023). Further, a high PC may discourage individuals from adopting or using these methods, whereas a low PC may enhance their inclination to adopt and use them (Singh and Srivastava, 2018). Moreover, earlier studies have shown that an users' comprehension of the PC has an adverse effect on their BI to adopt CLT methods (Abegao Neto and Figueiredo, 2022; Vimal Raj *et al.*, 2023; Raj *et al.*, 2023; Priya *et al.*, 2018; Al-Saedi *et al.*, 2020). Therefore, we hypothesise the following:

H10. PC has an adverse effect on individuals' BI concerning adopting CLT methods.

### 3.11 Perceived risk

"Perceived risk" is the degree to which people believe CLT procedures will lead to adverse outcomes, including money loss, fraud or identity theft (Raj *et al.*, 2023). Further, this certainty makes CLT approaches less appealing since it raises concerns about transaction security (Vimal Raj *et al.*, 2023). Moreover, previous research has shown that the associated PR negatively impacts BI using CLT technologies (Abegao Neto and Figueiredo, 2022; Raj *et al.*, 2023; Priya *et al.*, 2018; Vimal Raj *et al.*, 2023; Bashir and Madhavaiah, 2015b; Giovanis *et al.*, 2019). Therefore, we hypothesise the following:

H11. PR has an adverse impact on individuals' BI concerning accepting CLT methods.

### 3.12 Behavioural intention

The term "BIs" refers to an individual's subjective propensity or willingness to partake in a particular behaviour, such as using CLT (Raj *et al.*, 2023). The concept was first introduced in the TPB and TRA technology adoption models and has since been combined into consequent adoption models (Alalwan *et al.*, 2017). Moreover, earlier research has indicated a robust association between BI and actual behaviour (Sivathanu, 2019; Raj *et al.*, 2023; Sarmah *et al.*, 2021; Gupta and Arora, 2020; Alalwan *et al.*, 2017; Sripalawat *et al.*, 2011; Vimal Raj *et al.*, 2023; Shin, 2009; Patil *et al.*, 2020). Therefore, we hypothesise the following:

H12. BI positively influences individuals' adoption of CLT.

### 3.13 Moderators

The intention is a crucial element in decision-making that determines subsequent actions. However, no empirical evidence in the current literature supports the hypothesis that the effects of education, income and experience act as moderators between BIs and performance. Thus, this study investigates the factors that moderate the relationship between intentions and actions. Conversion of intentions into actions necessitates knowledge and experience, and education directly influences the knowledge acquired. Similarly, cash availability at the

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bank is essential for CLT since they cannot be conducted without money. As a result, higher-income individuals may have more opportunities to engage in CLT. Consequently, this research examines the interactive impact of education, income and experience with CLT on the relationship between behavioural intention and performance. Based on this, we propose the following hypothesis:

*H13.* The influence of BI on the AU of CLT will be moderated by education.

*H14.* The influence of BI on the AU of CLT will be moderated by income.

*H15.* The influence of BI on the AU of CLT will be moderated by experience.

## 4. Research methodology

### 4.1 Data and sample

A poll was performed to determine the factors influencing BI in adopting CLT. Further, the respondents were CLT users in Chennai, India. As this population is unknown, this study collected 456 responses using convenience sampling (Alalwan *et al.*, 2017; Vimal Raj *et al.*, 2023; Al-Saedi *et al.*, 2020). Further, 438 valid responses were taken for final analysis from the 456 respondents who replied. Additionally, the study utilised previously published instruments with slight modifications to measure agreement using a “seven-point Likert scale,” ranging from “strongly disagree” to “strongly agree.” Furthermore, the scales were initially pretested twice with 110 participants to ensure validity and appropriateness.

### 4.2 Data analysis technique

The study utilised a method called “partial least squares-based structural equation modelling (PLS-SEM)” to examine how different factors are correlated. Further, the research was conducted in two stages. The first stage used SEM to explore how observed and latent variables were connected in the measurement model. In the second stage, the study employed the PLS method in the structural model to investigate how the latent constructs were related to each other. Therefore, the research was split into two phases.

## 5. Data analysis and results

### 5.1 Measurement model

The measurement model’s reliability and validity are essential for accurate results. The analysis shows high Cronbachs Alpha readings ranging from 0.721 to 0.937 and “composite reliability” values ranging from 0.837 to 0.952 (Table 1), both surpassing the recommended thresholds of 0.7 (Hair *et al.*, 2014). These outcomes indicate that the measurement model has dependable internal consistency. Further, “convergent validity (CV),” which examines the conceptual relationship between multiple items, was evaluated by analysing factor loadings and “average variance extracted (AVE)” values. All factor loading levels exceeded 0.7, and AVE values ranged from 0.632 to 0.823 (Table 1), surpassing the threshold of 0.5 (Hair *et al.*, 2010). Thus, the convergence approach is valid. “Discriminant validity” was tested by comparing correlation coefficients with the square root of AVEs (Table 2). The square roots of AVEs were higher than the corresponding correlation coefficients, indicating high discriminant validity (Fornell and Larcker, 1981; Aparna *et al.*, 2023).

### 5.2 Structural model

Researchers used  $R^2$  and  $Q^2$  values and path significance to assess a structural model’s quality. A high-quality model has an  $R^2$  value of 0.1 or higher for the dependent variable and

Latent factors	Factor loadings	VIF	Cronbach's alpha	Composite reliability	AVE
Perceived usefulness (PU)			0.908	0.929	0.686
PU1	0.836	2.682			
PU2	0.832	2.515			
PU3	0.771	1.893			
PU4	0.827	2.712			
PU5	0.833	2.848			
PU6	0.866	3.252			
Perceived ease of use (PEoU)			0.929	0.942	0.700
PEoU1	0.879	3.397			
PEoU2	0.893	3.885			
PEoU3	0.867	3.436			
PEoU4	0.835	2.639			
PEoU5	0.818	2.342			
PEoU6	0.846	2.904			
PEoU7	0.704	1.905			
Attitude (ATT)			0.928	0.949	0.823
ATT1	0.934	4.154			
ATT2	0.854	2.54			
ATT3	0.906	3.401			
ATT4	0.932	4.331			
Perceived trust (PT)			0.879	0.910	0.670
TR1	0.876	2.563			
TR2	0.787	2.067			
TR3	0.740	2.079			
TR4	0.796	2.339			
TR5	0.885	3.169			
Personal innovativeness (PI)			0.905	0.920	0.744
PI1	0.961	3.15			
PI2	0.763	2.863			
PI3	0.823	2.433			
PI4	0.891	3.814			
Social influence (SI)			0.885	0.920	0.743
SI1	0.884	2.412			
SI2	0.868	2.335			
SI3	0.845	2.321			
SI4	0.850	2.365			
Self-efficacy (SE)			0.885	0.920	0.743
SE1	0.872	2.040			
SE2	0.912	2.940			
SE3	0.815	2.310			
SE4	0.808	2.268			
Perceived risk (PR)			0.931	0.941	0.667
PR1	0.714	2.390			
PR2	0.802	3.993			
PR3	0.841	3.207			
PR4	0.851	2.962			
PR5	0.885	3.031			
PR6	0.741	2.893			
PR7	0.802	3.556			
PR8	0.882	3.922			
Perceived costs (PC)			0.906	0.928	0.722
PC1	0.800	3.030			
PC2	0.880	3.289			

Factors influencing cashless transactions

**Table 1.**  
Results of the measurement model  
(continued)

Latent factors	Factor loadings	VIF	Cronbach's alpha	Composite reliability	AVE
PC3	0.892	2.574			
PC4	0.876	3.549			
PC5	0.796	3.153			
Anxiety (ANX)			0.937	0.952	0.798
ANX1	0.866	2.810			
ANX2	0.905	3.763			
ANX3	0.872	3.358			
ANX4	0.915	4.191			
ANX5	0.908	3.722			
Device barrier (DB)			0.850	0.892	0.675
DB1	0.825	1.418			
DB2	0.800	2.343			
DB3	0.821	2.311			
DB4	0.838	2.377			
Behavioural intention (BI)			0.894	0.927	0.76
BI1	0.893	2.751			
BI2	0.850	2.173			
BI3	0.883	2.725			
BI4	0.860	2.288			
Use behaviour (UB)			0.721	0.837	0.632
UB1	0.804	1.611			
UB2	0.724	1.433			
UB3	0.852	1.335			

**Note(s):** All factor loadings are statistically significant at a significance level of 0.05; AVE, "average variance extracted;" VIF, "variance inflation factor;"

**Source(s):** Authors' own creation

**Table 1.**

	ANX	ATT	BI	DB	PC	PEoU	PI	PR	PT	PU	SE	SI	UB
ANX	0.893												
ATT	0.069	0.907											
BI	0.286	0.292	0.872										
DB	0.328	-0.147	0.216	0.821									
PC	-0.125	0.220	-0.299	-0.300	0.850								
PEoU	0.133	0.345	0.278	0.089	-0.074	0.836							
PI	0.246	0.278	0.117	-0.077	0.411	0.054	0.863						
PR	-0.123	0.307	-0.149	-0.363	0.444	0.009	0.417	0.817					
PT	0.239	0.046	0.334	0.101	-0.016	0.207	0.051	0.018	0.819				
PU	0.345	0.304	0.690	0.285	-0.244	0.489	0.087	-0.105	0.328	0.828			
SE	0.292	0.038	0.313	0.192	-0.170	0.305	-0.035	-0.300	0.186	0.363	0.853		
SI	0.363	0.124	0.603	0.417	-0.288	0.181	0.061	-0.261	0.186	0.539	0.239	0.862	
UB	0.294	0.122	0.569	0.167	-0.238	0.399	0.052	-0.198	0.237	0.443	0.375	0.381	0.795

**Table 2.**

Discriminant validity

**Source(s):** Authors' own creation

all paths (Hair *et al.*, 2014). Table 3 shows all  $R^2$  values are above 0.1, indicating excellent predictive ability. A  $Q^2$  value larger than 0 indicates the model is meaningful in its predictions (Hair *et al.*, 2017), and the constructs studied have significant predictability. The model's "Goodness-of-fit (GoF)" is evaluated with the standardized root mean square residual (SRMR) value, which compares the fit to a baseline. The SRMR value of 0.066 is below the acceptable threshold of 0.10 (Hair *et al.*, 2014), indicating a satisfactory model fit.

Furthermore, in addition to assessing the GoF, hypotheses were examined to determine the significance of the relationships. The findings of this investigation, as presented in Table 4, revealed that PU, ATT, PT and SI have a statistically significant and positive impact on BI to engage in CLT. Hence, H2b ( $\beta = 0.423, t = 7.688$ ), H3 ( $\beta = 0.133, t = 4.080$ ), H4 ( $\beta = 0.121, t = 3.327$ ) and H6 ( $\beta = 0.310, t = 3.968$ ) are supported. However, while PI and SE positively affect BI to use CLT, they are not statistically significant. Therefore, H5 ( $\beta = 0.126, t = 1.729$ ) and H7a ( $\beta = 0.056, t = 1.538$ ) are not supported. Additionally, the effects of PEoU on ATT, PEoU on PU, PU on ATT, SE on PEoU and BI on AU are all significantly and positively correlated to one another. Hence, H1a ( $\beta = 0.258, t = 4.016$ ), H1b ( $\beta = 0.489, t = 10.059$ ), H2a ( $\beta = 0.179, t = 3.476$ ), H7b ( $\beta = 0.305, t = 6.004$ ), and H12 ( $\beta = 0.570, t = 11.90$ ) are supported (Figure 2).

Moreover, the present study found that the DB and PC have a considerably negative impact on the BI to use CLT, while ANX and PR have an insignificant negative impact. As an outcome, the hypotheses H8 ( $\beta = -0.080, t = 2.151$ ) and H10 ( $\beta = -0.182, t = 4.781$ ) are supported, and H9 ( $\beta = -0.044, t = 1.225$ ) and H11 ( $\beta = -0.056, t = 1.256$ ) are not supported.

	$R^2$	Adjusted $R^2$	$Q^2 (=1-SSE/SSO)$
ATT	0.143	0.139	0.113
BI	0.605	0.586	0.438
PEoU	0.138	0.091	0.056
PU	0.239	0.237	0.161
UB	0.324	0.323	0.189

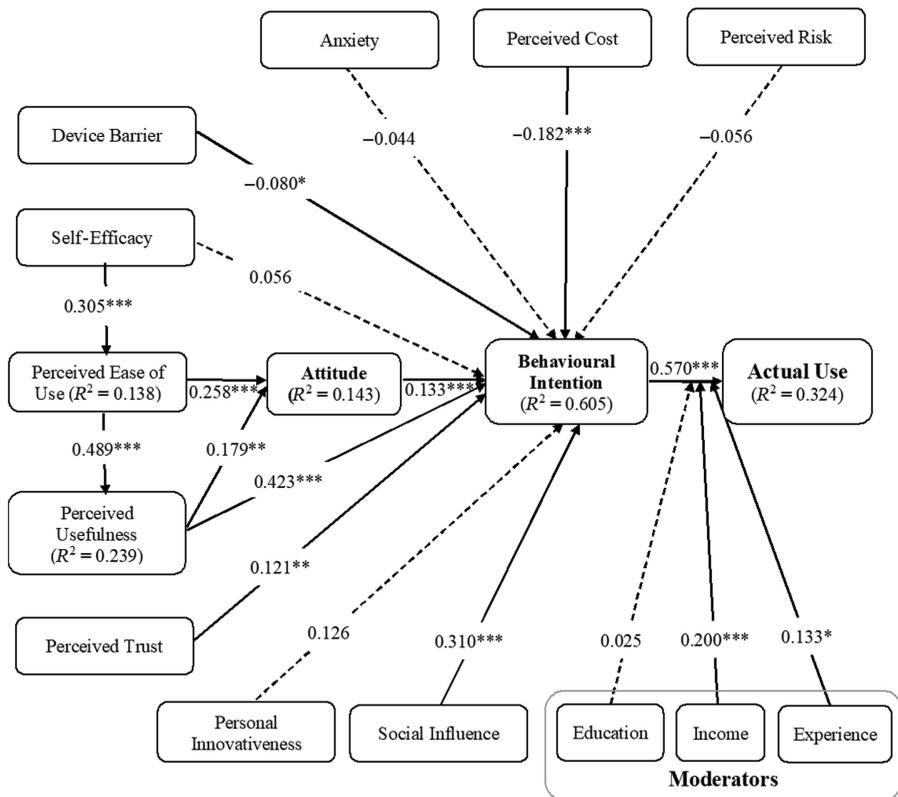
**Note(s):** SRMR = 0.066; SSE = sum of squared errors; SSO = sum of squares of off-diagonal elements  
**Source(s):** Authors' own creation

**Table 3.**  
 $R^2$ , adjusted  $R^2$  and  $Q^2$

H	Relationships	$\beta$	STDEV	t-value	p-value	Results
<i>Direct effects</i>						
H1a	PEoU→ATT	0.258	0.064	4.016	0.000	Supported
H1b	PEoU→PU	0.489	0.049	10.059	0.000	Supported
H2a	PU→ATT	0.179	0.051	3.476	0.001	Supported
H2b	PU→BI	0.423	0.055	7.688	0.000	Supported
H3	ATT→BI	0.133	0.033	4.080	0.000	Supported
H4	PT→BI	0.121	0.036	3.327	0.001	Supported
H5	PI→BI	0.126	0.073	1.729	0.084	Not supported
H6	SI→BI	0.310	0.078	3.968	0.000	Supported
H7a	SE→BI	0.056	0.037	1.538	0.125	Not supported
H7b	SE→PEoU	0.305	0.051	6.004	0.000	Supported
H8	DB→BI	-0.080	0.037	2.151	0.032	Supported
H9	ANX→BI	-0.044	0.036	1.225	0.221	Not supported
H10	PC→BI	-0.182	0.038	4.781	0.000	Supported
H11	PR→BI	-0.056	0.044	1.256	0.210	Not supported
H12	BI→AU	0.570	0.048	11.90	0.000	Supported
<i>Interaction Effects</i>						
H13	BI × Education→AU	0.025	0.039	0.649	0.517	Not supported
H14	BI × Income→AU	0.200	0.041	4.893	0.000	Supported
H15	BI × Experience→AU	0.133	0.055	2.416	0.016	Supported

**Note(s):**  $p < 0.05$ , Supported;  $p > 0.05$ , Not supported  
**Source(s):** Authors' own creation

**Table 4.**  
Path analysis



**Figure 2.**  
The results of the structural path analysis for the research model and the testing of hypotheses

**Note(s):** \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ; SRMR = 0.066;

————→ Indicates significant path -----→ Indicates insignificant path

**Source(s):** Authors' own creation

Besides, the study examined the moderating effects of education, income and experience on the relationship between the independent and dependent variables. The findings suggest that education does not have a statistically significant effect on BI to use CLT. Therefore, H13 ( $\beta = 0.025$ ,  $t = 0.649$ ) is not supported. However, income and experience significantly and positively moderate the relationship between the BI and AU of CLT. Consequently, H14 ( $\beta = 0.200$ ,  $t = 4.893$ ) and H15 ( $\beta = 0.133$ ,  $t = 2.416$ ) are supported.

## 6. Discussion

This study proposes a comprehensive model that integrates all the existing research on CLT to explore its widespread adoption. Consequently, this research provides a more thorough comprehension of the roles played by various factors such as PU, PEOU, ATT, SE, PT, SI, PI, ANX, PR, DB, PC and BI in the CLT adoption process among users of such transactions.

According to the findings of this research, the PEOU has a substantial influence on users' ATT towards the use of CLT. This finding aligns with previous studies (Bashir and Madhavaiah, 2015a; Shim, 2009). It recommends that individuals are more likely to have a positive ATT towards CLT if they find them easy to use. Additionally, users' perception of

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the PEOU of CLT significantly affects their PU. This result aligns with previous studies (Sarmah *et al.*, 2021; Williams, 2021; Lisana, 2021; Alshurideh *et al.*, 2021). It indicates that, if users perceive CLT as easy to use, they are more expected to perceive them as useful. Therefore, banks and other service providers of CLT should promote their usage and prioritise designing user-friendly systems to enhance users' perception of the usefulness of CLT. Furthermore, the study reveals that individuals' positive ATT towards CLT are influenced by their PU. Moreover, the research confirms that this positive perception of use also affects the BI in adopting CLT, consistent with earlier studies (Chawla and Joshi, 2019, 2020; Flavian *et al.*, 2020; Patil *et al.*, 2020). This indicates that individuals who view CLT as beneficial are more inclined to have a favourable ATT towards their use than those who do not perceive their advantages. Consequently, developers of CLT systems should prioritise creating user-friendly applications that improve the efficacy of CLT for their users.

Likewise, the investigation discovered that PT substantially affected individuals' BI to utilise CLT. This outcome corresponds with findings from prior studies (Sarmah *et al.*, 2021; Vimal Raj *et al.*, 2023; Lisana, 2021; Raj *et al.*, 2023; Alshurideh *et al.*, 2021; Chawla and Joshi, 2020), which also found that the trustworthiness of the CLT system positively affected the BI to use it. Therefore, providers of CLT services must continuously enhance the trustworthiness of their payment applications to preserve optimistic BI among CLT users. The study also revealed that SI significantly and positively impacted individuals' BI towards using CLT. This finding aligns with prior research (Vimal Raj *et al.*, 2023; Giovanis *et al.*, 2019). Further, previous studies have demonstrated a positive relationship between SI and BI in the context of CLT (Sivathanu, 2019; Raj *et al.*, 2023; Lisana, 2021; Giovanis *et al.*, 2019; Patil *et al.*, 2020), which found that social pressure and the opinions of essential peers significantly influenced the BI to use CLT. Therefore, to encourage the adoption of CLT systems, service providers must consider the influence of social factors and develop strategies to positively influence individuals' perspectives towards their use.

The study also found that perceived SE did not directly affect BI but rather an indirect effect through PEOU and ATT. This result differs from previous studies (Singh and Srivastava, 2018). This suggests that most users believe they can use CLT and are willing to use them based on their ability. Furthermore, PI had a positive but not yet significant association with BI, contrasting with earlier studies (Williams, 2021; Vimal Raj *et al.*, 2023; Giovanis *et al.*, 2019) that found users were generally eager to adopt new CLT technology, regardless of their level of adoption.

In terms of impediments, devices still have limitations such as screen size and processing power, which can hinder the use of CLT. Therefore, the device constraint is one of the reasons why individuals may resist using CLT methods. Hence, service providers should consider developing applications optimised for devices with small screens and limited processing power to ensure users can easily and quickly complete transactions. Additionally, the research indicates that PR has a small and negative impact on the BI to adopt CLT. These outcome contrasts previous studies (Abegao Neto and Figueiredo, 2022; Raj *et al.*, 2023; Priya *et al.*, 2018; Vimal Raj *et al.*, 2023; Alhassany and Faisal, 2018), which suggest that higher PR is associated with lower BI to use CLT systems. Therefore, users of CLT should be informed about the potential risks associated with these systems. Further, this study is consistent with previous research that suggests PC significantly negatively impacts the BI to use CLT (Raj *et al.*, 2023; Vimal Raj *et al.*, 2023; Saha *et al.*, 2022). This could be because users are less likely to use CLT systems when the cost of the device and the transaction fees are high. Therefore, service providers of CLT systems should focus on developing applications that can operate smoothly on various device types, ensuring that all CLT users have equal access to services regardless of their device's cost. This study found that ANX has a minor negative impact on the BI to use CLT. It recommends that users of CLT understand how the system operates while using the technology.

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Furthermore, the study's results suggest that income and experience significantly positively impact the relationship between BI and the use of CLT. This indicates that users with higher incomes and more experience are likelier to act on their intentions to use these transactions. However, while education positively influences the BI in adopting CLT, it is not statistically significant. This suggests that most respondents, including both low and high users of CLT, have a good education.

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## 7. Conclusions

### *7.1 Theoretical implications*

The findings of this research provide several significant contributions to the theoretical frameworks. First, to explore the factors influencing the adoption of CLT, this study incorporated relevant components from renowned theories like TAM, TRA, DTPB, UTAUT and UTAUT2. As a result, the study identified 11 essential components from the existing body of research that impacts the adoption of CLT without overlapping one another. These factors are PU, PEoU, ATT, PI, PT, SI, SE, PR, PC, ANX and DB. Consequently, the proposed model provides an explanation for why individuals obtain CLT methods that is more comprehensive than any previous study. Furthermore, this investigation effectively analysed the impact of education, income and experience as moderators on BI and performance, which had not been explored previously. The results of this study indicate that income and experience play a significant role in moderating users' BI towards their actual behaviour.

### *7.2 Practical implications*

In terms of practical implications, this study first quantifies the factors influencing the adoption of CLT. Accordingly, this would improve the comprehension of policymakers and bankers concerning the influence of these factors on the growth of CLT infrastructure. Additionally, the presented findings would enlarge the knowledge of CLT application developers by prompting them to consider these issues when designing such applications. Specifically, application developers should focus on creating CLT applications that are compatible with multiple devices, efficient in task completion, improve payment transaction performance, user-friendly, easy to use and socially responsible to sustain the positive intention of using CLT systems. Moreover, bank decision-makers should organise awareness programmes to educate CLT users on the risks of improper use of CLT systems. Furthermore, CLT service providers should ensure that their channels for CLT conduct financial transactions securely and efficiently, regardless of the location or time. As a result, this study would lead to the creation of user-friendly and secure CLT methods that match the preferences and demands of users.

### *7.3 Limitations and future research perspectives*

Although this study contributes to the existing knowledge, particularly in the Indian context, it has several limitations. First, this inquiry focuses on Chennai, where CLT is prevalent, and the residents are relatively more educated than in other parts of the nation. In addition, people with higher levels of education tend to be more aware and adaptive towards novel technologies. Thus, this study recommends exploring the situation in rural areas of the country, which require more investigation. In addition, users' viewpoints are the only ones considered in this study. Yet, while conducting this research, it would have been prudent to consider the perspectives of a broader range of stakeholders, including non-users, merchants, retailers and business owners. Finally, despite the present research having enough participants, it is possible that the findings cannot be generalised to all Indian customers.

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