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The technological shift towards embedded payments: an examination of young consumers' intention

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Abstract

The surge in digital payment technologies and the swift transition to a cashless society have propelled the adoption of embedded payment systems, marking a significant shift in the payments landscape. Despite its increasing prevalence, the factors influencing the intention to use embedded payment systems remain underexplored in the academic literature. This study addresses this gap by analyzing the factors affecting young people's intention to use embedded payment systems in Türkiye. Through a questionnaire survey of 807 respondents, the data was analyzed using Structural Equation Modeling. The findings reveal that lifestyle compatibility, social influence, personal innovativeness, hedonic motivation, and perceived trust collectively account for 72.6% of the variation in the intention to use embedded payment systems. However, the statistical insignificance of perceived ease of use and facilitating conditions suggests that other factors may significantly influence the intention to use these systems. This empirical study is the first of its kind on embedded payment systems, providing valuable insights into digital payments literature and guiding private sector professionals in devising effective strategies to promote widespread adoption of this payment method in Türkiye.

Keywords Embedded payments, Digital payments, Mobile payments, Cashless payments, SEM

Introduction

The global adoption of lifestyles that prioritize less physical contact in commercial and social domains has accelerated the shift towards a society that relies on digital transactions, thereby driving the widespread use of Digital Payment (DP) technology [41]. Consumers seeking speed, convenience, and ubiquitous accessibility in

their payments have started to utilize various payment options, including digital and mobile wallets, QR-based, and contactless payments. The persistence of DP behaviors and the increasing digital demand among customers have led to radical changes in the payment ecosystem. New generation DP solutions have emerged, such as P2P (Peer to Peer), biometric payments, BNPL (Buy Now, Pay Later), and embedded payments. Although each payment method adds value to the payments industry with its unique features, embedded payment systems are the focus of this research due to their frequently emphasized importance and rapidly increasing usage volume.

Embedded payments is a sub-application of embedded finance, which refers to the integration of financial instruments into a non-finance-focused institution's platform. In other words, instead of a traditional financial institution such as a bank, a non-financial institution provides financial services through a partnership with a

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technology provider. Two main technologies are involved in the provision of these services. The first is BaaS technology, which allows banks to share their infrastructure with third parties, and the second is API software, which facilitates the interaction and data interchange between different applications [47].

Embedded finance encompasses various applications such as payments, lending, insurance, cards, and investment instruments [57]. Among these, one of the most prominent and widely adopted application types is embedded payments. The application or service itself seamlessly integrates the customer's payment experience with embedded payments [1, 12]. With this payment mechanism, customers can finalize transactions without relying on an external payment provider. For instance, Starbucks incorporates the payment process directly into its mobile application, enabling customers to complete purchases without the use of physical cash or cards [48]. Similarly, Uber offers customers an embedded payment solution to settle fares at the conclusion of each ride, eliminating the need for cash transactions [57, 70]. Thus, it can be asserted that embedded payments facilitate swift transactions with a single click, streamlining financial processes for both customers and practitioners. The Global Embedded Finance Market research, issued by KBV Research in 2023 [30], predicts that the embedded finance sector would reach a volume of USD 384.8 billion by 2029, accounting for about 20% of the payments market. Additionally, research conducted by IDC Financial Insights suggests that by 2030, an estimated 74% of payments will be conducted through non-financial digital platforms [27].

Despite its rapid development and widespread adoption, the concept of embedded payment systems has not yet received empirical research in the literature [47]. Current research mostly examines the adoption of advanced payment methods such as NFC [38], e-Wallet [69], QR code [63], and P2P [35]. As far as we know, no empirical research examines individuals' behavioral intentions and adoption of embedded payment systems.

Since embedded payment systems are not sufficiently researched in academic literature compared to other DP methods, this study aims to enhance the existing knowledge in this sector by conducting an empirical investigation into the factors that impact the adoption of embedded payment technology. Studies investigating individuals' intention to use and adopt various payment methods in different contexts of the country have noted that the effective factors vary depending on the country and payment type [43, 67]. Therefore, it is crucial to identify the determinants that influence the adoption of new technologies in societies with varying levels of development and socio-cultural characteristics.

The objective of this research is to examine the factors that influence the intention to use embedded payment systems among young individuals in Türkiye. The young population has become the largest user group of digital finance technologies, especially in the post-2020 period (COVID-19 and beyond), with the rapid spread of digital finance technologies worldwide [42]. In Turkey, various reports emphasize that young consumers primarily adopt and prefer digital finance technologies like digital wallets and mobile payment systems [59–61]. Leading studies on DP systems also demonstrate the intensive use of these technologies, particularly among the younger population. For example, Chawla and Joshi [14] found that 88.5 percent of their participants were in the 18–35 age group in their study on mobile payments and wallet users. Similarly, Liébana-Cabanillas et al. [35] stated that 75% of the sample group was between the ages of 18–34 in their study on P2P mobile payment systems. Türker et al. [63], which analyzed QR code payments in Turkey, also shows that users between the ages of 18 and 34 constitute 86% of the sample. These findings reveal that young individuals are frequently examined in studies on DP systems and that this demographic group is highly interested in digital payment technologies. Therefore, analyzing the adoption and usage trends of embedded payment systems among the young population in Turkey offers an approach that aligns with digital payment trends. Since young users are the main driver of the growth in digital payments, the research focus on this group makes an essential contribution to understanding the dynamics of the field.

The intention to use DP technologies is commonly investigated through the application of the TAM and UTAUT2 models. These models offer valuable insights into understanding individual adoption behavior. However, given the diverse and rapidly evolving payments ecosystem of today, it is crucial to augment these models with new variables to elucidate variations in the intention to use novel technologies. Therefore, this research integrates eight factors identified in previous DP literature as influential and likely to affect embedded payment intention. We propose a new research model that incorporates variables such as perceived ease of use from TAM [15], social influence, hedonic motivation, lifestyle compatibility from UTAUT2 [65], personal innovativeness [34], facilitating conditions [20, 69], and perceived trust [35, 69]. The study examines the correlation between the variables in the research model and the intention to use them, utilizing the structural equation modeling (SEM) technique. Data is acquired through a survey conducted among young customers of a coffee company in Türkiye, where embedded payment systems are widely used.

This study has several possible contributions to the DP literature, private sector professionals, and researchers.

To the best of our knowledge, this is the first study to empirically investigate the factors that influence the intention to use embedded payments. Since embedded payment technology has not been researched as extensively as other DP technologies, this study represents a significant step toward addressing this gap in the field. In this respect, it fills the literature gap and serves as a guide for researchers working in this field. Furthermore, the results of this research can guide private-sector professionals who want to use embedded payment systems in their companies. Similar to other DP technologies, understanding individuals' preferences and usage motivations is crucial for the widespread adoption of embedded payment systems. Therefore, the identification of major factors influencing the adoption of embedded payment technologies in Türkiye can aid in the formulation of efficient strategies to facilitate this process.

Conceptual framework

Background

In studies addressing the intention to use DP systems, the Technology Acceptance Model (TAM) has emerged as a widely accepted framework [9]. Originally developed by Davis in the 1980s, TAM builds upon Fishbein and Ajzen's [17] Theory of Reasoned Action (TRA). Unlike TRA, TAM focuses on two critical variables: perceived ease of use and perceived usefulness. According to TAM, as perceived usefulness and perceived ease of use increase, individuals are more likely to accept new technologies. While existing literature emphasizes the predictive power of TAM in predicting the acceptance of new technologies [13], some researchers argue that TAM assumptions fail to fully meet people's demands for modern technologies [39]. Therefore, the literature on the adoption of DP technologies has also extended the original TAM model with various additions and modifications. For example, Matemba and Li [39] added trust, security, and privacy factors to TAM frameworks in their study examining the acceptance of P2P services through WeChat wallets in South Africa. Liébana-Cabanillas et al. [35], based on TAM and TRA models, attempted to explain Spanish users' intentions to use P2P mobile payment systems by considering individual mobility, hedonic motivation, personal innovativeness, trust, and perceived risk factors. Yan et al. [68], on the other hand, incorporated Diffusion of Innovation Theory (DOI) [52] variables into the TAM model to examine the intentions of mobile users in China to use mobile payments.

Another theory frequently encountered in the DP literature is the Unified Theory of Acceptance and Use of Technology (UTAUT) [64], which can be considered an extended version of TAM. UTAUT aims to explain the intention and acceptance of information technologies

by combining the fundamental structures of eight theories¹ previously used in research. This model considers four basic constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions, along with moderators such as gender, age, experience, and voluntary usage. Alduais & Al-Smadi [4] examined the intention of users in Yemen to use e-payment systems using the UTAUT model. Munikrishnan et al. [45] expanded the UTAUT model with perceived security and lifestyle compatibility factors to analyze users' intentions to adopt cashless payment methods. Chawla & Joshi [14] combined the TAM and UTAUT models to investigate the intentions of users in India regarding mobile wallet usage. Similarly, Liébana-Cabanillas et al. [34] analyzed the intention of users in Spain to use the Apple Pay mobile payment system by combining the TAM and UTAUT models with variables such as mobile user skill, personal innovativeness, convenience, perceived value, and perceived risk. Ali et al. [5] investigated the intention of users in Pakistan to use mobile payments by adding factors that explain perceived trust, satisfaction, and barriers to adopting mobile payments (operational constraints, perceived risk, stress, lack of facilitating conditions) to the TAM, UTAUT, and DOI models.

The UTAUT model has been revised over time, adding three new constructs: hedonic motivation, price value, and habit, enhancing its explanatory power for variations in intention to use new technologies. Referred to as UTAUT2 (Extended Unified Theory of Acceptance and Use of Technology) [65], this model has been frequently utilized in studies addressing the adoption of DP technologies. For instance, Rahman et al. [51] examined the factors influencing the adoption of cashless payments in Malaysia using UTAUT2. Lian & Li [33] investigated users' intentions to use mobile payment systems in Taiwan by combining UTAUT2 with trust transfer dimensions proposed by Strub and Priest [58]. Balakrishnan & Shuib [9] investigated the adoption of cashless payments in Malaysia by adding factors of awareness deficiency and perceived risk to the combination of TRI (Technology Readiness Index) 2.0 and UTAUT2. Sivathanu [54] examined factors influencing the actual usage of DP systems in India by adding the "Stickiness to use Cash Payment Systems" variable to the theoretical frameworks of UTAUT2 and IRT (Innovation Resistance Theory). Similarly, Migliore et al. [43] integrated UTAUT and IRT, investigating the adoption of mobile payment systems for Italy

¹ Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB), Motivational Model (MM), The Model of Personal Computer Utilization (MPCU), Diffusion of Innovations Theory (DOI), The Combined Technology Acceptance Model and Theory of Planned Behavior (C-TAM-TPB) and Social Cognitive Theory (SCT).

and China samples, while also exploring the moderating role of cultural dimensions (individualism, uncertainty avoidance, power distance, long-term orientation) from Hofstede et al. [26]. Likewise, Hameed et al. [23] explored determinants of mobile payment system adoption in the travel industry using UTAUT2, IRT, and Coping Theory (incorporating variables of perceived value, perceived threat, and perceived controllability). Additionally, Sleiman et al. [56] contributed to the literature by investigating factors influencing mobile payment usage and continuance intention in Sudan through the integration of UTAUT2 and the Expectation Confirmation Model (ECM) [10].

Based on the literature reviewed, theories such as TAM, UTAUT, and UTAUT2 provide robust predictions for understanding technology acceptance and use. However, it is also clear that factors influencing the acceptance of continuously evolving and changing technologies, such as DP, go beyond the theoretical frameworks provided by these models. Table 1 presents variables that have been found to be effective in recent prominent studies in the digital payments literature.

Hypothesis development

In this study, seven variables are identified to conceptualize the research framework, considering the empirical evidence of various types of DP on usage intention or adoption from previous studies. Considering the sample from Türkiye, the variables in the proposed research model include perceived ease of use (TAM—[15]), social influence, hedonic motivation, and lifestyle compatibility (UTAUT2—[65]), personal innovativeness [34], facilitating conditions [20, 69], and perceived trust [35, 69]. Figure 1 presents the proposed conceptual framework, and the subsequent section explains how each factor is described and how hypotheses are derived.

Social influence (SI)

Social influence is defined by Venkatesh et al. [65] as “the degree to which consumers perceive that significant other (e.g., family and friends) believe that they should use a particular technology”. The positive perception of people important to the consumer positively affects their intention to use and adoption of technological innovation [35]. This effect has been supported in related studies on cashless payments [51], digital payments [54], e-payments [3, 4], mobile payments [8, 43] and e-wallets [69].

In line with the relevant studies in the literature, social influence is expected to affect the intention to use of embedded payment systems, one of the DP methods, and the following hypothesis is proposed:

H1: Social influence has a positive effect on consumers’ intention to use of embedded payment systems.

Personal innovativeness (PI)

Agarwal and Prasad [2] define personal innovativeness as “an individual’s willingness to try a new information technology”. Individuals with high levels of personal innovativeness have strong intrinsic motivations to try new technologies. Therefore, personal innovativeness has a positive effect on users’ intention to use and adoption of technological innovation [28, 67]. This effect has been revealed in studies on mobile payments [8], P2P mobile payments [35] and cashless payments [9, 51].

In this direction, the following hypothesis is proposed by assuming that personal innovativeness affects the intention to use of embedded payment systems, one of the DP methods:

H2: Personal innovativeness has a positive effect on consumers’ intention to use embedded payment systems.

Perceived ease of use (PE)

According to Davis [15], perceived ease of use is “the degree to which a person believes that using a particular system will not require effort”. A technology that is easy to use facilitates the implementation of activities, positively influencing users’ intention to use and adopt the technology [15, 62]. This effect has been corroborated in studies related to e-wallets [62, 69], cashless payments [9], and mobile payments [5].

Given these studies, perceived ease of use is anticipated to impact the intention to use embedded payment systems, which are one of the DP methods. Therefore, the following hypothesis is proposed:

H3: Perceived ease of use has a positive effect on consumers’ intention to use embedded payment systems.

Hedonic motivation (HM)

Hedonic motivation, as defined by Venkatesh et al. [65], refers to the enjoyment or pleasure experienced from utilizing technology, making it a crucial determinant of behavioral intention. If a technology provides users a feeling of enjoyment and pleasure, leading them to desire its continued use, this will positively affect their intention to use and adoption of the technology [33]. Studies conducted on digital payments [54], cashless payments [51], and mobile payments [23, 33] have confirmed this effect.

Thus, assuming that hedonic motivation affects the intention to use of embedded payment systems, one of the DP methods, the following hypothesis is proposed:

H4: Hedonic motivation has a positive effect on consumers’ intention to use embedded payment systems.

Lifestyle compatibility (LC)

Compatibility is related to how innovations align with consumers’ values, needs, and experiences [52]. When individuals perceive a technological innovation as

Table 1 Prior digital payment studies

References	Basic theories	Independent variables	Country	Dependent variables
[34]	TAM, UTAUT	Mobile skillfulness, Personal innovation, perceived usefulness, effort expectation, convenience, perceived value, perceived risk	Spain	Intention to use of mobile payment
[33]	UTAUT2	Performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, habit, perceived value, overall trust in mobile payment trust, trust in service providers, trust in mobile devices, trust in mobile network service providers, Trust in merchants providing mobile payment	Taiwan	Continuous usage Intention to use of mobile payment
[9]	TRI2, UTAUT2	Ease of Use, Usefulness, Optimism, innovativeness, lack of awareness, intrinsic motivation, risk, cashless readiness	Malaysia	Cashless readiness on digital payment intention to adopt
[51]	UTAUT2	Performance expectancy, facilitating condition, social influence, innovativeness, perceived Technology security, hedonic motivation	Malaysia	Adoption of cashless payment
[69]	UTAUT	Perceived usefulness, perceived ease of use, social influence, facilitating conditions, lifestyle compatibility, perceived trust	Indonesia	Intention to use and adoption of an e-wallet
[54]	UTAUT2, IRT	Performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, habit, usage barrier, value barrier, risk barrier, traditional barrier, image barrier	India	Intention to use on actual usage of digital payment systems
[14]	TAM, UTAUT	Perceived ease of use, perceived usefulness, trust, security, facilitating conditions, lifestyle compatibility, attitude	India	Intention to adopt mobile wallet
[35]	TRA, TAM	Perceived usefulness, perceived ease of use, individual mobility, perceived trust, personal innovativeness, subjective norms, hedonic motivation, perceived risk	Spain	Intention to Use P2P Mobile Payment
[28]	TAM, TPB, DOI, UTAUT2	Perceived satisfaction, subjective norms, perceived trust, perceived Usefulness, perceived risk, perceived enjoyment, personal innovativeness,	Spain	Intention to Use P2P Mobile Payment
[5]	TAM, UTAUT, DOI	Perceived innovativeness, perceived trust, perceived ease of use, perceived usefulness, perceived satisfaction, relative advantage, compatibility, complexity, observability, trialability, operational constraints, perceived risk, stress, unavailability of facilitating condition	Pakistan	Intention to adopt mobile payment
[62]	TAM, TBP	Perceived usefulness, perceived ease of use, attitude, subjective norms, perceived behavioral control, behavioral intention, perceived trust, perceived service quality	Malaysia	Use behavior of e-wallet system
[23]	UTAUT2, IRT	Performance expectancy, effort expectancy, hedonic motivation, habit, usage barrier, value barrier, risk barrier, psychological barriers, tradition barrier, image barrier, perceived value, perceived threat, perceived controllability, satisfaction	Multiple countries	Adoption of Mobile Payment
[56]	ECM, UTAUT2	Confirmation, performance expectancy, satisfaction, effort expectancy, social influence, facilitating condition, hedonic motivation, price value, habit	Sudan	Continuance Intention to Use Mobile Payment

Table 1 (continued)

References	Basic theories	Independent variables	Country	Dependent variables
[8]	UTAUT2, TRI	Performance expectancy, effort expectancy, social influence, facilitating conditions, perceived quality, bank trust, system confidence, consumer innovativeness	Columbia	Mobile Payment use intention
[63]	TAM	Perceived usefulness, perceived ease of use, perceived trust, subjective norms, perceived compatibility, perceived security	Türkiye	User acceptance of QR code mobile payment system
[4]	UTAUT,	Performance expectancy, effort expectancy, social influence, facilitating conditions	Yemen	Intention to UseE-Payments
[67]	UTAUT2	Perceived risk, personal innovativeness, social influence, performance expectancy, effort expectancy, facilitating conditions, hedonic motivation, price value, habit	China, America, Belgium	behavioral intention to use of Mobile Payment
[45]	UTAUT	Performance expectancy, effort expectancy, social influence, lifestyle compatibility, perceived security, facilitating conditions	Malaysia	Intention and adoption of cashless payment
[3]	UTAUT	Performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, price saving orientation, habit, trust, technology security, innovation resistance, perceived risk, psychological empowerment	Iraq	Intention to accept and using e-Payment system
[68]	TAM, DOI	Perceived usefulness, perceived ease of use, compatibility, perceived risks, security concerns, privacy concerns, subjective norms, internet experience	China	Intention to use mobile payment
[43]	UTAUT2, IRT	Performance expectancy, social influence, facilitating conditions, hedonic motivation, price value, effort expectancy, value barrier, risk barrier, tradition barrier, image barrier	China, Italy	Intention to adopt mobile payment

compatible with their lifestyle standards, it influences their behavior positively, thereby enhancing their intention to adopt and use the technology [45, 69]. This effect is supported by the findings of previous studies on cashless payments [45], mobile and e-wallets [14, 69].

Accordingly, lifestyle compatibility is expected to affect the intention to use of embedded payment systems, one of the DP methods, and the following hypothesis is proposed:

H5: Lifestyle compatibility has a positive effect on consumers' intention to use embedded payment systems.

Facilitating conditions (FC)

Facilitating conditions are defined as "consumers' perceptions of the resources and support available to perform a behavior" [65]. Users' intentions to use and adopt technology are positively influenced by the availability of support and resources [36, 56]. Studies conducted on mobile payments [8, 33, 43], cashless payments [51], digital

payments [54], mobile wallets [14], and e-payments [3, 4] have confirmed this effect.

Based on these studies, facilitating conditions are expected to affect the intention to use of embedded payment systems, one of the DP methods, and the following hypothesis is proposed:

H6: Facilitating conditions have a positive effect on consumers' intention to use embedded payment systems.

Perceived trust (PT)

Trust refers to the belief that one party will fulfill its responsibilities [37]. Users' belief in the reliability and alignment of a technology with its promises leads to its better evaluation and demonstration of improved usage behavior. Therefore, users' positive perceptions of trust will positively affect their intention to use and adoption of this technology [28]. Previous literature on mobile payments [5, 33], e-wallets [14, 69], P2P mobile payments

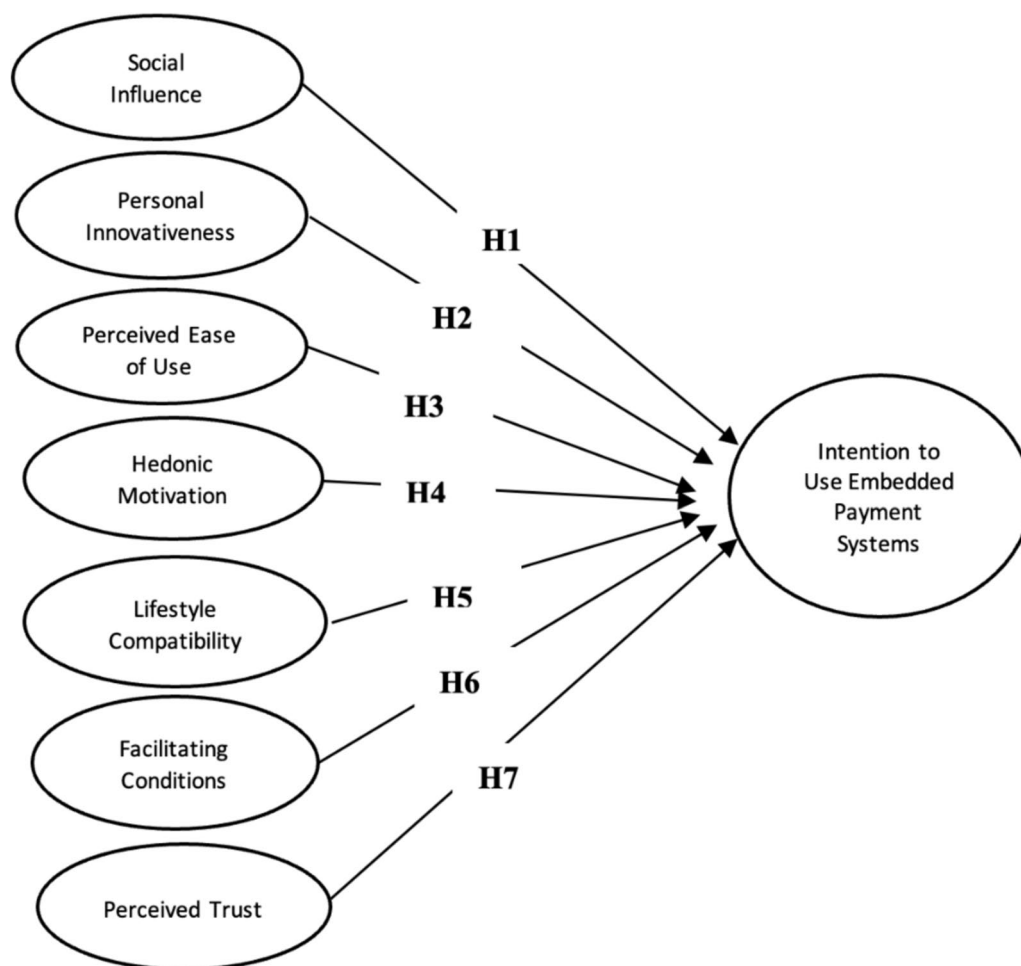


Fig. 1 Research model

[28, 29, 35], QR code mobile payments [63] and e-payments [3] have corroborated this effect.

According to the related studies in the literature, perceived trust is expected to affect the intention to use of embedded payment systems, one of the DP methods, and the following hypothesis is proposed:

H7: Perceived trust has a positive effect on consumers' intention to use embedded payment systems.

Method

Measurement of constructs

The variables in the research model were assessed using statements derived from prior research. The development and adaptation of the scales considered the study's theoretical background, including TAM and UTAUT2 models.

The variables were measured using a 5-point Likert scale, where 1 represents "Strongly Disagree" and 5 represents "Strongly Agree". The 4 items used to measure social influence were adapted from the studies of

Sivathanu [54] and Liébana-Cabanillas et al. [35], the 4 items used to measure personal innovativeness, and the 3 items used to measure hedonic motivation were adapted from the research of Liébana-Cabanillas et al. [35]. The 4 items used to measure perceived ease of use were adapted from the research of Chawla and Joshi [14] and Liébana-Cabanillas et al. [35]. The 4 expressions used to measure lifestyle compatibility were adapted from the studies of Yang et al. [69] and Chawla & Joshi [14], while the 4 expressions used to measure facilitating conditions were adapted from the studies of Yang et al. [69] and Gupta et al. [20]. The 4 expressions used to measure trust, and the 4 expressions used to measure usage intention as a dependent variable were derived from the studies of Liébana-Cabanillas et al. [35] and Yang et al. [69].

To ensure face validity, experts reviewed the scales before finalizing them. This involved consulting with 3 academics and 2 specialists. After that, 90 people participated in a pilot study to test item clarity. The data

collection instrument was amended and finalized based on participant responses.

Sample

The participants in the research are young consumers between the ages of 19–27 who shop from a coffee company that provides embedded payment in Turkey. Young consumers represent a critical demographic for this study, as they are the most frequent users of DP technologies globally and in Türkiye, driving adoption trends in the post-COVID-19 era [42, 61]. Given the large and geographically dispersed nature of this population, identifying the exact number of individuals is impractical and costly in terms of time, money, and effort [40]. Consequently, the research used convenience sampling, a non-probabilistic approach, due to its advantages in terms of speed, cost-effectiveness, accessibility, and ease of data collection, making it a suitable choice for reaching consumers relevant to the research objectives [16, 49, 71].

Data were collected from 807 participants using a questionnaire over a period of approximately two months in 2022. The sample size was determined to be sufficient based on criteria outlined in the existing literature, ensuring reliability and robustness for this type of research [11, 66].

Analysis and results

This study used descriptive analyses to describe participant demographics. A measurement model and structural models (Structural Equation Modeling, SEM) were used to evaluate data quality and test hypotheses using Anderson and Gerbing's [6] two-stage technique. Thus, the study's measurement model, with 31 items and 8 components, was first tested for construct validity and reliability using Confirmatory Factor Analysis (CFA) and then hypothesis tested using Structural Equation Modeling. Data was analyzed using SPSS and AMOS 24.

We use SEM in hypothesis testing because it can account for measurement errors in predictions by combining multiple regression and factor analysis [55]. From this perspective, SEM may more robustly test the theoretical model as a comprehensive framework.

Descriptive statistic

The demographic characteristics of the sample participating in the study show that the gender distribution is 55.5% female and 44.5% male. When the educational status of the participants is examined, it is determined that 41.4% of the participants are high school graduates, 10.8% are associate degree graduates, 45.1% are bachelor's degree graduates, and 2.7% are master's degree graduates. Regarding occupational distribution, it is understood that 80% of the participants are students,

12.4% work in the private sector, 2.6% are self-employed, 2.5% are public employees, and 2.2% work in other occupations. As for income distribution, most of the sample consisted of individuals earning below the minimum wage (78.9%) during the data collection period.

Common method bias

Common method bias occurs when systematic error variation in data from the same measuring instrument or procedure misrepresents the connection between measured variables [31]. Harman's single factor test on 8 constructs tested the research model for CMB. Factor analysis was performed without rotation on 8 constructs loading onto one factor. The results show no CMB issues because the variance accounted for by a single factor was 48.343%, below the 50% threshold [50].

Nonresponse bias

Study data were checked for nonresponse bias before the presentation. Early and late responses (first 100 and last 100) were compared to assess nonresponse bias. Early and late responders had similar replies, supporting the hypothesis that nonresponse bias has little effect on the dataset [7].

Assessment of measurement model: validity and reliability

Researchers translated the study scales into Turkish using the translation-back translation method, overseen by academics proficient in both languages. After specialists reviewed the translations, the expressions were back-translated into English. Comparison between the original and translated expressions revealed similarity. Subsequently, the construct validity of the scales was assessed. Table 3 displays factor loadings all exceeding 0.50 [22], confirming that the scales maintain construct validity comparable to the originals.

The measurement model variables' construct validity and reliability were tested, evaluating them based on convergent and discriminant validity criteria. Convergent validity is usually assessed by considering factor loadings, composite reliability (CR) and average variance explained (AVE) [21]. The factor loadings of all constructs were calculated above 0.50 [19, 21]. Convergent validity was examined through average variance extracted (AVE). AVE values of all constructs in Table 2 are greater than 0.50 [18]. CR values are also higher than 0.70 [46]. In addition, AVE values were greater than 0.50 ($AVE > 0.50$), and CR values were greater than AVE ($CR > AVE$) [22]. In this context, the results in Table 2 show that convergent validity is provided for the constructs.

Fit indices, regression weights, and modification indices (MI) were implemented to assess the measurement model. The fit indices of the measurement model

Table 2 Measurement model

Constructs	Items	Standardized Loadings*	AVE	CR	Cronbach's α
SI	SI1	0.901	0.697	0.901	0.904
	SI2	0.899			
	SI3	0.818			
	SI4	0.707			
PI	PI1	0.816	0.629	0.871	0.900
	PI2	0.850			
	PI3	0.724			
	PI4	0.776			
PE	PE1	0.811	0.641	0.877	0.873
	PE2	0.783			
	PE3	0.749			
	PE4	0.855			
HM	HM1	0.898	0.879	0.956	0.955
	HM2	0.957			
	HM3	0.956			
LC	LC1	0.860	0.778	0.934	0.933
	LC2	0.888			
	LC3	0.883			
	LC4	0.897			
FC	FC1	0.833	0.627	0.869	0.861
	FC2	0.851			
	FC3	0.836			
	FC4	0.627			
PT	PT1	0.863	0.680	0.894	0.900
	PT2	0.790			
	PT3	0.734			
	PT4	0.903			
IU	IU1	0.886	0.762	0.927	0.931
	IU2	0.930			
	IU3	0.842			
	IU4	0.830			

χ^2/df : 1480.635/403 = 3.674, CFI: 0.950, GFI: 0.888, AGFI: 0.862, IFI: 0.950, TLI: 0.943, RMSEA: 0.058.

CR, composite reliability; AVE, average variance extracted; Cronbach's α , Cronbach alpha; SI, Social influence; PI, Personal innovativeness; PE, perceived ease of use; HM, hedonic motivation; LC, lifestyle compatibility; FC, facilitating conditions; PT, perceived trust; IU, intention to use.

* $p < 0.001$,

obtained as a result of CFA (Confirmatory Factor Analysis) χ^2/df : 1480.635 /403 = 3.674 CFI: 0.950 GFI: 0.888 AGFI: 0.862 IFI: 0.950 TLI: 0.943 RMSEA: 0.058. These findings indicate that the measurement model is at an acceptable fit level [44, 53]. Table 3 presents the measurement model fit indices and standardized regression loadings of model variables.

The results of the analyses in Table 2 show that the AVE values for each construct in the model vary between 0.627 and 0.879, and the CR values vary between 0.869 and 0.956. Therefore, these values were found above the recommended values [22]. The results obtained

support the reliability and construct validity of the research model.

The type of validity that shows that each latent variable used in the research is measured differently from the other construct is discriminant validity [32]. The discriminant validity of the measurements was determined using the Fornell-Lacker Criterion method. The results in Table 3 show that discriminant validity is provided since the square root of the AVE calculated for each of the constructs and included in the diagonal is higher than the correlation between any two latent constructs in the model [18].

Table 3 Discriminant validity of constructs—correlations and square roots of AVEs

Constructs	SI	PI	PE	HM	LC	FC	PT	IU
SI	0.835							
PI	0.463***	0.793						
PE	0.435***	0.656***	0.800					
HM	0.567***	0.530***	0.570***	0.937				
LC	0.569***	0.578***	0.719***	0.744***	0.882			
FC	0.425***	0.583***	0.719***	0.448***	0.623***	0.792		
PT	0.499***	0.512***	0.613***	0.608***	0.680***	0.453***	0.825	
IU	0.577***	0.579***	0.659***	0.700***	0.828***	0.559***	0.655***	0.873

The values on the diagonal show the square root of the AVE values ($\sqrt{\text{AVE}}$). **Correlation coefficient (r) ($p < 0.001$).

Table 4 HTMT (Heterotrait–monotrait ratio) analysis

Constructs	SI	PI	PE	HM	LC	FC	PT	IU
SI	–							
PI	0.482	–						
PE	0.480	0.663	–					
HM	0.588	0.535	0.592	–				
LC	0.601	0.578	0.726	0.754	–			
FC	0.502	0.619	0.746	0.490	0.662	–		
PT	0.540	0.516	0.612	0.618	0.671	0.503	–	
IU	0.608	0.589	0.666	0.712	0.825	0.600	0.651	–

In the study, HTMT (Heterotrait–Monotrait Ratio) was also used to ensure discriminant validity between constructs [24]. An HTMT ratio of less than 0.90 is acceptable for this purpose [24, 25]. The results in Table 4 confirm discriminant validity.

Cronbach's alpha (α) and composite reliability (CR) were used to evaluate the internal consistency of latent variables [22]. Since the values in Table 3 are above 0.70, the reliability of the scales is supported by the results obtained [46].

Assessment of structural model: hypothesis tests

Maximum Likelihood Estimation (MLE) method was used to analyze the structural equation model. The goodness of fit values (χ^2/df : 1480.635/403 = 3.673; CFI: 0.956; GFI: 0.888 AGFI: 0.862; IFI: 0.950; TLI: 0.943; RMSEA: 0.058) shows that the research model is compatible with the data set. The SEM model is shown in Fig. 2, and the regression coefficients of the hypothesis tests are shown in Table 5.

The results in Fig. 2 show that social influence ($\beta = 0.099$, $p < 0.05$) and personal innovativeness ($\beta = 0.075$; $p < 0.05$) have a statistically significant effect on the intention to use of embedded payment. Accordingly, hypotheses H1 and H2 were supported. Perceived ease of use ($\beta = 0.051$; $p > 0.05$) could not

be found to have a statistical effect on the intention to use of embedded payment. Therefore, hypothesis H3 was rejected. Since the effect of hedonic motivation ($\beta = 0.113$, $p < 0.05$) and lifestyle compatibility ($\beta = 0.535$, $p < 0.05$) on embedded payment was statistically significant, hypotheses H4 and H5 were accepted. The effect of facilitating conditions ($\beta = -0.008$; $p > 0.05$) on the intention to use of embedded payment is statistically insignificant. Therefore, hypothesis H6 was rejected. The effect of perceived trust ($\beta = 0.099$; $p < 0.05$) on the intention to use of embedded payment was found to be significant. Accordingly, hypothesis H7 was supported.

The R^2 values in Table 5 represent the percentage of variance in the dependent variable explained by the independent variables. As per Hair et al. [21], since R^2 values range between 0 and 1, a higher value indicates greater predictive accuracy. The findings indicate that 72.6% of the variation in embedded payment intention can be accounted for by social influence, personal innovativeness, hedonic motivation, lifestyle compatibility, and perceived trust variables.

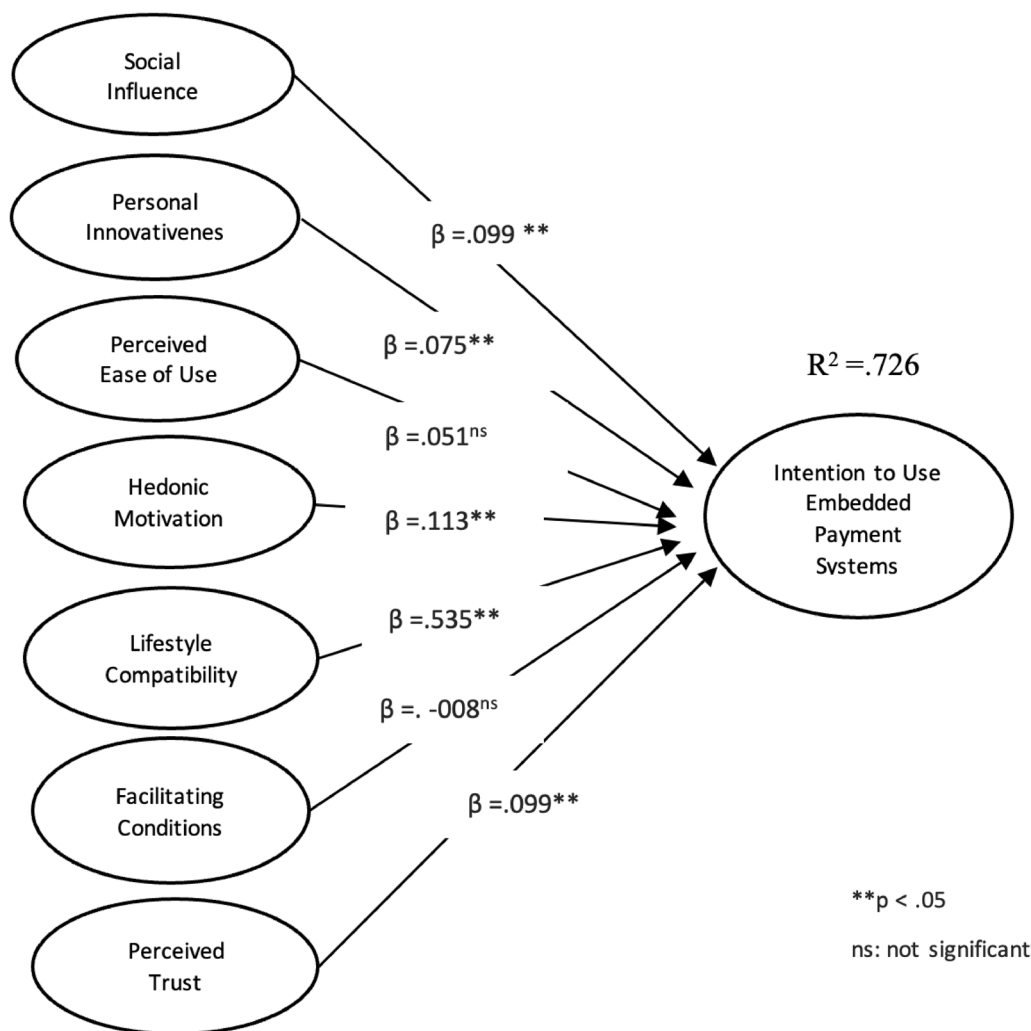


Fig. 2 Structural model

Discussion

This study examines young Turkish customers' intentions to use embedded payment systems, a DP mechanism. SEM results, path coefficients, and hypothesis evaluation results, along with their predictive power for the research model, are presented in Fig. 2 and Table 5. The empirical

findings indicate that most of the hypotheses in the suggested model are verified. According to the results, social influence (H1), personal innovativeness (H2), hedonic motivation (H4), lifestyle compatibility (H5), and perceived trust (H7) variables are statistically significant and have a positive effect on the intention to use embedded

Table 5 Path coefficient

Hypothesis	Path	β	T value	P value	Results	R^2
H1	SI \rightarrow IU	0.099	30.268	0.001	Supported	$R^2: 0.726$
H2	PI \rightarrow IU	0.075	20.136	0.033	Supported	
H3	PE \rightarrow IU	0.051	10.062	0.288	Not supported	
H4	HM \rightarrow IU	0.113	30.029	0.002	Supported	
H5	LC \rightarrow IU	0.535	100.755	0.000	Supported	
H6	FC \rightarrow IU	0.008	0.219	0.826	Not supported	
H7	PT \rightarrow IU	0.099	20.814	0.005	Supported	

payment systems, while perceived ease of use (H3) and facilitating conditions (H6) variables are statistically insignificant.

Among the proposed constructs, lifestyle compatibility emerged as the most influential variable. When individuals perceive a technological innovation to align with their lifestyle standards, it positively impacts their behaviors and intention to adopt the technology. Yang et al. [69] suggested that when e-wallets are compatible with consumers' lifestyles, there is a greater willingness to try such services, underscoring the significant positive effect of lifestyle compatibility on the intention of Indonesian consumers to use e-wallets. Similarly, Chawla and Joshi [14] found that lifestyle compatibility directly influences consumers' intention to adopt mobile wallets in India. Munikrishnan et al. [45] demonstrated that Malaysian consumers are more receptive to cashless payment technologies that integrate seamlessly into their lifestyles, leading to heightened usage intentions. This finding is particularly significant for young users, as their digital habits and dynamic lifestyles make compatibility a critical factor in adopting new technologies, aligning closely with the results of our study.

Factors such as hedonic motivation, perceived trust, and personal innovativeness have been identified as other significant variables influencing the intention to use embedded payment systems. Firstly, hedonic motivation may positively affect the intention to continue using embedded payment systems by providing a sense of enjoyment and pleasure to technology users. Sivathanu [54] and Rahman et al. [51] showed that hedonic motivation significantly affects the intention to use DP systems. Similarly, Lian and Li [33] and Hameed et al. [23] supported that hedonic motivation determines the intention to use mobile payments. Young individuals, who often seek enjoyment and novelty in digital interactions, are particularly influenced by hedonic motivations, making this a key driver for this demographic. Perceived trust is another influential factor because users' trust in technology leads to their adoption and usage behavior. In their studies, Lian and Li [33], Ali et al. [5], and Chawla and Joshi [14] reported that trust positively affects mobile payment usage intention. In addition, Yang et al. [69] and Al-Sabaawi et al. [3] also stated that perceived trust increases the intention to use DP. Personal innovativeness is also a factor that positively affects the intention to use embedded payment systems. Liébana-Cabanillas et al. [35], Rahman et al. [51], and Balakrishnan and Shuib [9] concluded that personal innovativeness increases the intention to adopt DP systems. These findings align with the results of our study, further confirming the

positive effects of these variables on the intention to use embedded payment systems.

Another notable result in the study is related to social influence. The close environment of the respondents in Türkiye has a positive effect on the intention to use of embedded payment systems. This finding contradicts with Türker et al.'s [63] findings on the social influence of QR payment method usage intention. This difference may stem from the distinct contexts of use and user experiences associated with different payment methods. For young individuals, the social environment plays a crucial role in technology adoption. Observing peers using embedded payment systems likely strengthens their intention to adopt, as young users are often influenced by trends and collective behaviors within their social circles. Since embedded payment systems are integrated into specific applications, seeing their social environment frequently use these methods can further enhance their willingness to adopt them. On the other hand, QR payment methods primarily focus on speed and convenience in physical store settings. In studies conducted in different geographical regions such as Malaysia [51], India [54], Indonesia [69], Yemen, Iraq, Italy, and Latin America, the finding that social influence positively affects the intention to use payment systems ranging from cashless payments to e-wallets is consistent with our results.

Surprisingly, the results indicate that there is no statistically significant relationship between perceived ease of use and intention, as shown in Fig. 2. The results in the literature on this relationship are contradictory. While Yang et al. [69] and Tian et al. [62] found that ease of use positively influences the intention to use mobile payments, Chawla and Joshi [14], Liébana-Cabanillas et al. [35], and Kalinic et al. [29] did not find any effect. Even Türker et al. [63] did not find any effect of this variable in their study investigating the factors influencing the intention to use the QR code mobile payment method in Türkiye. The insignificance of perceived ease of use in this study may also reflect the technological proficiency and adaptability of the young demographic, who are often early adopters and more comfortable navigating new technologies without requiring extensive support. Even if the embedded payment method is not perceived as easy to use, it may be preferred for reasons such as lifestyle compatibility, social influence, and hedonic motivation.

In this study, contrary to our expectations, a positive effect of the facilitator conditions variable, representing individuals' beliefs in the existence of the infrastructure required to support system usage, on the intention to use of embedded payment systems could not be found. Although this variable has been identified as an important determinant of DP technologies in the literature, the results of our study were insufficient to confirm this

relationship. Existing studies indicate a lack of consensus on the relationship between facilitator conditions and various DP systems' usage or adoption intention. While most studies confirm a positive relationship, there are also studies across different country contexts that fail to demonstrate a statistically significant impact of facilitator conditions. For instance, Lian and Li [33] confirmed the positive effect of facilitator conditions on the adoption of mobile payment systems in Taiwan; Chawla and Joshi [14] found a positive relationship between facilitator conditions and the intention to use mobile wallets in India; Alduais & Al-Smadi [4] demonstrated the positive impact of facilitator conditions on the intention to use e-wallets in Yemen; and Al Sabaawi et al. [3] verified the positive effect of facilitator conditions on the adoption of e-payment systems in Iraq. On the other hand, studies such as Wu & Liu [67] have concluded that facilitator conditions were ineffective in adopting mobile payment systems in China, the United States, and Belgium. Migliore et al. [43], while confirming the positive impact of facilitator conditions in China, did not reach a significant result for Italy. Similarly, Yang et al. [69] could not find a significant effect of facilitator conditions on consumers' intention to use e-wallets in Indonesia. Therefore, in line with Wu & Liu [67] and Migliore et al. [43], our insignificant results suggest that facilitating conditions are not a determinant of the intention to use of embedded payment systems, given the regional and cultural differences of the participants in Türkiye. The insignificance of facilitating conditions for young users may stem from their tendency to view infrastructure availability as a standard expectation. This suggests that young users focus more on experiential factors such as social influence, lifestyle compatibility, and hedonic motivation when adopting embedded payment systems. This finding also aligns with the technological adaptability and competence commonly observed in the younger demographic.

Conclusion, recommendations and limitations

The scholarly literature has not adequately examined embedded payment technologies compared to other DP systems. This study aims to address the lack of knowledge in this area despite the increasing use and rapid diffusion of embedded payment technology. Data collected from young consumers who shop at coffee companies that provide embedded payment in Türkiye were analyzed using Structural Equation Modeling. The findings indicate that factors such as social influence, personal innovativeness, hedonic motivation, lifestyle compatibility, and trust are significant determinants of embedded payment adoption. Additionally, the insignificance of perceived ease of use and facilitating conditions suggests that other factors

may play a more influential role in the adoption of payment systems.

The findings could serve as a significant source of information for private sector professionals in Türkiye who aim to implement embedded payment systems in their companies. In this regard, it can be inferred that strategies aimed at promoting the use and adoption of embedded payment systems should be supported by initiatives to enhance consumers' trust, offer solutions tailored to their lifestyles, and improve payment experiences. Given the significant role of young users in driving adoption, these strategies should particularly focus on addressing the preferences and behaviors of this demographic. By doing so, it may be possible to develop more effective approaches for the proliferation and increased usage of embedded payment technologies.

The study also highlights the complexity and diversity in the adoption process of DP technologies. In this context, there is an emphasized need to integrate new variables into traditional adoption models such as TAM, UTAUT, and UTAUT2 to comprehensively understand the intention to use embedded payments. Future research could explore how young users' adoption patterns evolve over time or compare their behaviors with those of older demographic groups. Such comparative studies could provide deeper insights into how age and digital proficiency shape the adoption of embedded payment systems across different contexts. By overcoming the limitations of existing models and adapting to emerging DP trends, significant contributions can be made to the literature. Additionally, future researchers can employ qualitative methods, such as observation and interviews, to develop more effective strategies for promoting the adoption of DP technologies.

This study has certain limitations. Since the research focuses solely on the behavior of the young population towards embedded payment systems, the findings cannot be generalized to the broader population. While this focus provides a detailed understanding of the most active user group, it limits the applicability of the results to older demographics or those less engaged with digital technologies. Moreover, the use of cross-sectional data reflects trends at a specific point in time and does not allow for the analysis of longitudinal changes. Future studies could overcome these limitations by using a more balanced sample or collecting data across different time periods. It should also be noted that the adoption process for DP technologies may vary across countries and regions. Comparative studies examining the adoption of embedded payment systems among different demographic groups and cultural contexts could make valuable contributions to the literature.

Despite all these limitations, the study makes a significant and original contribution to the literature as the first known empirical research on the intention to use embedded payment methods. It also provides a comprehensive perspective on understanding the tendencies of young users toward these systems. By shedding light on the preferences and behaviors of this demographic, the study provides a foundational perspective for future research aimed at understanding and enhancing digital payment systems.

Appendix 1: Survey questions

Perceived ease of use (PE)

1. I think the use of this application is clear and understandable
2. It is easy for me to learn how to use this app
3. I think this application's payment process requires minimum effort
4. Overall, I believe that the application is easy to use

Perceived trust (PT)

1. I trust this payment method
2. I believe that my personal information in this app will be kept confidential
3. I believe that the providers of this application keep customers' best interests in mind
4. In general, I think an embedded payment system is reliable

Personal innovativeness (PI)

1. If I find out about new information technology, I want to try them
2. I want to look for new ways to try new technologies
3. I am usually one of the first among my close circle to explore new information technologies
4. In general, I would not hesitate to test new information technologies

Social influence (SI)

1. The people around trigger me to use an embedded payment system
2. The people around me think that I should use an embedded payment system
3. The people around me are positive about me using this payment system
4. The people around me use this payment system

Hedonic motivation (HM)

1. Using an embedded payment system is fun
2. Using an embedded payment system is entertaining
3. Using an embedded payment system is enjoyable

Lifestyle compatibility (LC)

1. I think embedded payment system is compatible with my lifestyle
2. I think the embedded payment system is compatible with how I like to buy
3. I think this payment system fits well with how I purchase products and services
4. Overall, I think this payment method fits me well

Facilitating conditions (FC)

1. I have the required resources to use this payment system

2. I have the required knowledge to use this payment system
3. This payment system is compatible with other technologies I use
4. I believe that if I have any problems using this payment system, I will be provided with the required help and support

Intention to use embedded payment systems (IU)

1. As long as I have the opportunity, I will use an embedded payment system
2. I will continue to use an embedded payment system in the near future
3. I expect to continue using an embedded payment system more frequently in the future
4. I intend to increase the use of the embedded payment system in the future

Abbreviations

API	Application programming interface
BaaS	Banking as a service
BNPL	Buy now pay later
CFA	Confirmatory factor analysis
CMB	Common method bias
CR	Composite reliability
DP	Digital payment
DOI	Diffusion of innovation theory
ECM	Expectation confirmation model
FC	Facilitating conditions
GFI	Goodness of fit index
HM	Hedonic motivation
HTMT	Heterotrait–monotrait ratio
IRT	Innovation resistance theory
IU	Intention to use
LC	Lifestyle compatibility
MLE	Maximum likelihood estimation
P2P	Peer to peer
PE	Perceived ease of use
PI	Personal innovativeness
PT	Perceived trust
RMSEA	Root mean square error of approximation
SEM	Structural equation modeling
SI	Social influence
TAM	Technology acceptance model
TRA	Theory of reasoned action
TRI	Technology readiness index
TLI	Tucker-Lewis index
UTAUT	Unified theory of acceptance and use of technology
UTAUT2	Extended unified theory of acceptance and use of technology

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Author contributions

All authors contributed equally to the study.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Ethics approval for this study is currently under review by the Sakarya University Ethics Committee. The approval reference number will be provided

upon receipt. The manuscript will be updated with this information once the approval is granted.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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