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Research Article

Barriers and opportunities to the adoption of innovative technologies: An empirical study on the relationship between contactless payment and consumers with an extended Technology Acceptance Model

Yenilikçi teknolojilerin benimsenmesinin önündeki engeller ve fırsatlar: Genişletilmiş Teknoloji Kabul Modeli ile temassız ödeme ve tüketici ilişkisi üzerine ampirik bir araştırma

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Abstract

With the rapid increase in digitalisation today, the adoption of innovative technologies, such as contactless payment systems, holds critical importance for both consumers and businesses. This study examines, through an extended Technology Acceptance Model (TAM), the factors influencing the adoption of contactless payment technologies from the perspective of consumer behaviour using an extended TAM. In the model tested using structural equation modelling (PLS-SEM), the relationships between perceived ease of use, perceived usefulness, perceived risk, service quality, perceived trust, social value, brand experience, brand preference, satisfaction, and intention to reuse were empirically analysed. Additionally, this study investigated the mediating role of satisfaction in the relationship between brand experience, brand preference, and intention to reuse. The findings revealed that perceived ease of use, perceived trust, and service quality have a significant and positive effect on brand experience. Brand experience and brand preference have a substantial and positive impact on user satisfaction. Furthermore, satisfaction plays a crucial mediating role in the relationship between brand experience, brand preference, and the intention to reuse. These results demonstrate that user satisfaction is a crucial factor in influencing consumers' intentions to reuse contactless payment technologies. The lack of expected significant effects of perceived risk and usefulness highlights the importance of contextual factors in technology adoption. While this study offers critical theoretical contributions to the technology acceptance literature, it also provides practical recommendations for enhancing user experience and satisfaction in the financial technologies (fintech).

Keywords: Innovative Technologies, Contactless Payment, Technology Adoption, Consumer Behaviour, Intention to Reuse

Jel Kodları: M3, M31, M310

Öz

Günümüzde dijitalleşmenin hızla artmasıyla birlikte, temassız ödeme sistemleri gibi yenilikçi teknolojilerin benimsenmesi hem tüketiciler hem de işletmeler için kritik bir öneme sahiptir. Bu çalışma genişletilmiş teknoloji kabul modeli (TKM) ile, temassız ödeme teknolojilerinin benimsenmesinde etkili olan faktörleri tüketici davranışları üzerinden incelemeyi amaçlamaktadır. Yapısal eşitlik modeli (PLS-SEM) kullanılarak test edilen modelde, algılanan kullanım kolaylığı, algılanan fayda, algılanan risk, hizmet kalitesi, algılanan güven, sosyal değer, marka deneyimi, marka tercihi, memnuniyet ve yeniden kullanım niyeti arasındaki ilişkiler ampirik olarak analiz edilmiştir. Ayrıca çalışma, memnuniyetin, marka deneyimi ve marka tercihi ile yeniden kullanım niyeti arasındaki ilişkide aracılık rolünü de araştırmaktadır. Bulgular, algılanan kullanım kolaylığı, algılanan güven ve hizmet kalitesinin marka deneyimi üzerinde anlamlı ve pozitif etkisi olduğunu ortaya koymuştur. Marka deneyimi ve marka tercihi kullanıcı memnuniyeti üzerinde anlamlı ve olumlu etkiye sahiptir. Ayrıca, memnuniyetin, marka deneyimi ve marka tercihi ile yeniden kullanım niyeti arasındaki ilişkide önemli bir aracılık rolü oynadığı tespit edilmiştir. Bu sonuçlar, kullanıcı memnuniyetinin tüketicilerin temassız ödeme teknolojilerini tekrar kullanma niyetlerinde kritik bir köprü olduğunu göstermektedir. Algılanan risk ve faydanın beklenen anlamlı etkilerinin bulunmaması ise teknolojinin benimsenmesinde bağlamsal faktörlerin önemine işaret etmektedir. Çalışma, teknoloji kabulü literatürüne önemli teorik katkılar sunarken, finansal teknoloji (fintech) sektöründe kullanıcı deneyimini ve memnuniyetini artırmaya yönelik pratik öneriler de sunmaktadır.

Anahtar Kelimeler: Yenilikçi Teknolojiler, Temassız Ödeme, Teknoloji Benimseme, Tüketici Davranışı, Yeniden Kullanım Niyeti

Jel Codes: M3, M31, M310

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Introduction

The rise of contactless payment technologies marks a significant shift in consumer behaviour and technological adoption, reflecting both an opportunity and a challenge in the transition to cashless societies (Abdulrazzaq & Aljawder, 2018). The development and widespread implementation of these technologies have accelerated, particularly in response to the need for hygiene and convenience during the COVID-19 pandemic (Bayir, 2021). Applications such as contactless payment methods, mobile payments, and facial recognition systems not only provide faster transactions but also enable safer operations by minimising direct contact (Puriwat & Tripopsakul, 2021).

A critical factor encouraging the adoption of contactless payments is the perceived usefulness and ease of use of these technologies, which positively influences consumers' attitudes toward them. In particular, factors such as performance expectancy and facilitating conditions significantly influence adoption rates, highlighting the importance of perceived technological security (Rahman, Ismail & Bahri, 2020). However, in developing countries, the widespread challenges related to digital infrastructure and acceptance of innovative technologies require tailored approaches for effective adoption (Mogaji & Nguyen, 2024).

Concerns regarding security, trust, and digital anxiety may hinder consumers' willingness to embrace contactless technologies (Liébana-Cabanillas, Molinillo, & Montañez, 2019). A lack of awareness resulting from unfamiliarity with technology can also present significant obstacles, particularly in regions where digital literacy is low (Balakrishnan & Eesan, 2023). Moreover, the sustainability of these technologies remains a question, given the necessity of maintaining user trust and satisfaction, as consumer behaviours and expectations evolve alongside broader digital financial ecosystems (Al-Sharafi, Al-Emran, Al-Qaysi, & Iahad, 2021).

In this regard, the Turkish market holds unique potential for fintech development, as evidenced by its robust banking system and increasing adoption of technology (Armutcu, Tan, Ho, Chow, & Gleason, 2024b; Kurt, 2021). These conditions create a favourable environment for promoting sustainable financial practices through contactless and other fintech payment systems (Bayram, Talay & Feridun, 2022). From this perspective, this study aims to provide a comprehensive understanding of the factors influencing consumer adoption and continued usage intentions, offering valuable insights for service providers, policymakers, and technology developers seeking to enhance the accessibility and acceptance of digital payment systems.

This study aims to examine, specifically in the Turkish context, the factors influencing the adoption of innovative technologies, such as contactless payment systems, in today's world, where digital transformation is gaining momentum. Focusing on consumer behaviours, this study seeks to identify the main antecedents that play a role in the widespread adoption of contactless payment technologies. To the best of our knowledge, this study is the first to investigate the relationship between contactless payments and consumers in Asian, European, and Middle Eastern consumption cultures using the extended Technology Acceptance Model (TAM). TAM is an essential framework for understanding users' technology acceptance and usage behaviours. Developed by Davis (1986), this model is based on two main components: perceived usefulness and perceived ease of use (Armutcu & Tan, 2024c; Cimperman, Brencıc & Trkman, 2016). A combination of these two components shapes users' intentions to adopt technology.

The current study offers significant contributions and innovations from various perspectives by (i) revealing the relationship between the contactless payment method and consumer behaviour; (ii) investigating the effects of perceived ease of use, perceived risk, perceived usefulness, service quality, perceived trust, and social value on the relationship between brand experience and brand preference; (iii) demonstrating the impact of brand experience and brand preference on contactless payment satisfaction; (iv) identifying the relationships between consumer satisfaction and intention to reuse; (v) examining the crucial mediating role of satisfaction in the relationship between brand experience and brand preference and intention to reuse; (vi) focusing on consumers in a developing economy, namely Turkey; and (vii) providing robust empirical evidence (partial least squares structural equation modeling (PLS-SEM) test with 10,000 subsamples). The findings of this study will offer significant and valuable insights for the banking sector, marketers, policymakers, and relevant public institutions. This study aims to address the following research questions, contributing to further research by addressing gaps in the literature, guiding future studies, and enhancing existing knowledge.

Research questions;

Q1. What are the main barriers to and opportunities for adopting innovative technologies?

Q2. How do factors such as perceived ease of use, trust, risk, usefulness, service quality, and social value affect consumers' brand experience and preferences?

Q3. How do brand experience and brand preference affect users' overall satisfaction?

Q4. What role does usage satisfaction play in consumers' intention to reuse a product or service?

Background theory and hypothesis development

Background theory

Contactless payment methods have become a significant part of consumer behaviour, particularly in recent years. The period that began with the COVID-19 pandemic has led to notable increases in the adoption and user acceptance of contactless payment systems. Studies have examined the reasons behind this trend from various perspectives. For example, in a study by Li, Park, Li & Choi (2024), it was emphasised that consumers' search for a hygienic payment alternative has increased interest in contactless payments. Social distancing measures and fear of infection have played a significant role in shaping consumer payment behaviours, prompting individuals to prefer cashless transactions in retail environments to minimise physical contact (Huterska, Szalacha-Jarmuzek & Piotrowska, 2021). However, technological readiness and acceptance have also played an essential role in ensuring adoption. The Technology Acceptance Model (TAM) suggests that perceived usefulness and ease of use significantly influence users' attitudes and intentions regarding the adoption of digital payment technologies. These variables were found to mediate the relationship between technological readiness and the intention to use mobile payments, particularly during the pandemic (Rafdinal & Senalasari, 2021). Furthermore, dissatisfaction with traditional payment methods, combined with the perceived ease of use and benefits of mobile payments, has encouraged the transition to contactless payment methods (Mu & Lee, 2022). Furthermore, the emotional and social values derived from contactless transactions have further increased the adoption of mobile payments, especially among different consumer groups (Thoumrungroje & Suprawan, 2024). These factors influence not only the adoption of digital payments but also their sustainable use after the pandemic. Reliability and perceived security in payment systems have been found to have significant effects on the adoption of contactless payments (Al-Sharafi et al., 2021). Technological advancements also play a role in changing consumption habits, as contactless payment systems offer essential advantages by increasing transaction speed and eliminating the need for physical contact (Puriwat & Tripopsakul, 2021).

Hypothesis development

Perceived ease of use

Perceived ease of use significantly influences brand experience and brand preference, particularly in the financial sector. The Technology Acceptance Model (TAM) suggests that ease of use is a crucial factor influencing user perceptions and interactions with digital services, such as online banking platforms. For example, Martinez-Navalon, Fernández-Fernández & Alberto (2023) confirm in their study that the higher the perceived ease of use in the digital banking sector, the higher the consumer confidence. Similarly, Garzaro, Varotto & Pedro (2020) state in their study focusing on internet and mobile banking that factors such as interaction and social presence, which increase perceived ease of use, indirectly affect the brand experience by encouraging customer interaction. This interaction is emphasised as being very important for creating positive brand experiences and, consequently, increasing customer satisfaction and loyalty. Perceived ease of use also results from a combination of time and place utility, which directly affects user satisfaction (Pal, Vanijja & Papasratorn, 2015; Lim & Kim, 2011). Based on this, it is suggested that ease of use has a positive effect on users' effort expectancy. Based on these discussions, we propose the following hypotheses:

H1a: Perceived ease of use (PEU) positively affects brand experience (BE)

H1b: Perceived ease of use (PEU) positively affects brand preference (BP)

Perceived risk

Users may perceive risks owing to the uncertainties and potential adverse outcomes associated with new technologies. Perceived risk is a key factor that negatively affects users' intention to continue (Yuan, Liu,

Rui-hong, & Liu, 2016). In another study by Al-Sharafi et al. (2021), it was noted that increasing users' trust in contactless payment systems could further improve the usage rate of these payment methods. Notably, perceived security constitutes a significant barrier to consumers adopting contactless payments (Hampshire, 2017). Based on these discussions, we propose the following hypotheses:

H2a: Perceived risk (PR) negatively affects brand experience (BE)

H2b: Perceived risk (PR) negatively affects brand preference (BP)

Perceived trust

Perceived trust significantly impacts brand experience and brand preference in the financial sector, as demonstrated by several studies. Trust is a cornerstone of customer relationships, particularly in financial services, where customers rely on institutions to manage their financial assets (Rohit, Kumari, Singh & Alofaysan, 2025). Trust refers to users' beliefs about the service provider and is strongly linked to satisfaction. Trust is a significant determinant of satisfaction with mobile payment systems (Liébana-Cabanillas, Molinillo & Montañez, 2016). Liu and Wang (2023) state that brand trust also plays a vital role in shaping customers' behaviour towards a brand by significantly influencing attitudes and behavioural intentions. Based on these discussions, we propose the following hypotheses:

H3a: Perceived trust (PT) positively affects brand experience (BE)

H3b: Perceived trust (PT) positively affects brand preference (BP)

Service quality

Perceived service quality is a user's evaluation of the overall functionality and performance of the system. Therefore, the relationship between service quality, brand experience, and brand preference is multifaceted, particularly in the financial sector, and plays a significant role in shaping customer loyalty and overall brand satisfaction. Service quality encompasses various dimensions, including tangible attributes, reliability, responsiveness, assurance, and empathy, which directly influence customers' perceptions and evaluations of the brand. Effective service management and high-quality interactions encourage positive brand experiences, which customers associate with higher loyalty and preference toward the brand (Bose & Gupta, 2013; Divanoglu & Bagci, 2022). High service quality increases user trust (Zhou, 2013), increases satisfaction levels (Deng, Lu, Wei and Zhang, 2010), and strengthens the intention to continue using the system (Wang, 2015). Based on these discussions, we propose the following hypotheses:

H4a: Service quality (SQ) positively affects brand experience (BE)

H4b: Service quality (SQ) positively affects brand preference (BP)

Perceived usefulness

Overall satisfaction (perceived usefulness, perceived ease of use, and perceived trust) has been found to play a critical role in consumers' adoption of contactless payment technologies in their travel experiences. Additionally, Wang & Lin (2019) examined consumer intentions toward contactless credit card payments and found that factors such as perceived usefulness and convenience are effective in the adoption of these payments. Consumers' intentions to use contactless payment systems are directly related to trust and satisfaction arising from their overall user experience (Nguyen, Nguyen & Nguyen, 2024). Studies examining the sustainability of contactless payment systems in the post-pandemic period predict that user behaviours are likely to become permanent. Based on these discussions, we propose the following hypotheses:

H5a: Perceived usefulness (PU) positively affects brand experience (BE)

H5b: Perceived usefulness (PU) positively affects brand preference (BP)

Social value

Social value is increasingly recognised as a critical determinant in shaping brand experience and brand preference, particularly in the financial sector, where customer relationships and perceptions significantly impact business outcomes. The literature suggests that social value can enhance relationships between customers and brands, leading to improved experiences and stronger brand preferences. Social value refers to the usefulness and acceptability of a service in terms of an individual's relationship with their social environment (Roing, Sánchez, Tena & Monzonis, 2006). Mobile technologies increase satisfaction by

supporting individuals' social lives (Chang, 2015). Therefore, it has been argued that social value has a positive effect on user satisfaction. Social value, often examined under the umbrella of Corporate Social Responsibility (CSR), plays a significant role in shaping brand experience and brand preference in the financial sector. Moreover, brand experience can mediate the relationship between social marketing activities and brand equity, further indicating that efforts towards social value creation naturally translate into enhanced brand equity (Koay, Ong, Yeoh & Khoo, 2021). Hence, CSR actions not only improve consumer attitudes toward local banking brands but also enhance customer-based brand equity during crises (Tosun & Köylüoğlu, 2023). These findings collectively suggest that social values and CSR initiatives are critical to building robust brand experiences and preferences in the financial sector. Based on these discussions, we propose the following hypotheses:

H6a: Social value (SV) positively affects brand experience (BE)

H6b: Social value (SV) positively affects brand preference (BP)

Brand experience, preference, satisfaction and intention

Consumer satisfaction develops during the process of evaluating experiences with a product or service, and is an essential determinant of continued usage intention (Zhou, 2011). In this context, satisfaction has a direct impact on users' intentions to continue using contactless payment systems. Cabanillas et al. (2019) found in their research that satisfaction, service quality, effort expectancy, and perceived risk were significant factors in the use and adoption of NFC. Park, Manalili, Magtoto, Martinez, Solis & Chua (2022) demonstrated the positive impact of contactless payment methods on user satisfaction and behavioural intentions, especially in the tourism sector. Furthermore, it is widely accepted that brand experience significantly impacts user satisfaction. In the context of service branding, satisfaction plays a facilitating role that increases the perceived value for the customer and strengthens brand loyalty. Sotheara, Zhang & Yen (2015) explain this by emphasising the mediating role of customer satisfaction in enhancing the link between brand experience and loyalty in service industries, demonstrating that positive experiences increase satisfaction and loyalty. Mandagi, Rampen, Soewignyo & Walean (2023) highlight that customer satisfaction plays a critical mediating role between brands and the intention to reuse services, emphasising the importance of direct consumer experience in shaping outcomes such as the intention to reuse. Based on these discussions, we propose the following hypotheses:

H7: Brand experience (BE) positively affects satisfaction with use (SU)

H8: Brand preference (BP) positively affects satisfaction with use (SU)

H9: Satisfaction with use (SU) positively affects reuse intention (RUI)

H10: Satisfaction with use (SU) has a mediating role between brand experience (BE) and reuse intention (RUI)

H11: Satisfaction with use (SU) has a mediating role between brand preference (BP) and reuse intention (RUI)

In conclusion, contactless payment systems have a significant impact on consumer behaviour. Factors such as security, perceived risk, ease of use, user satisfaction, and brand elements play decisive roles in the adoption and use of these systems. For businesses, developing strategies that consider these factors is critically important for promoting the widespread adoption of contactless payment methods (Puriwat & Tripopsakul, 2021; Cabanillas et al., 2019). Based on the limited empirical discussion above, we propose the following hypotheses and develop the model shown in Figure 1.

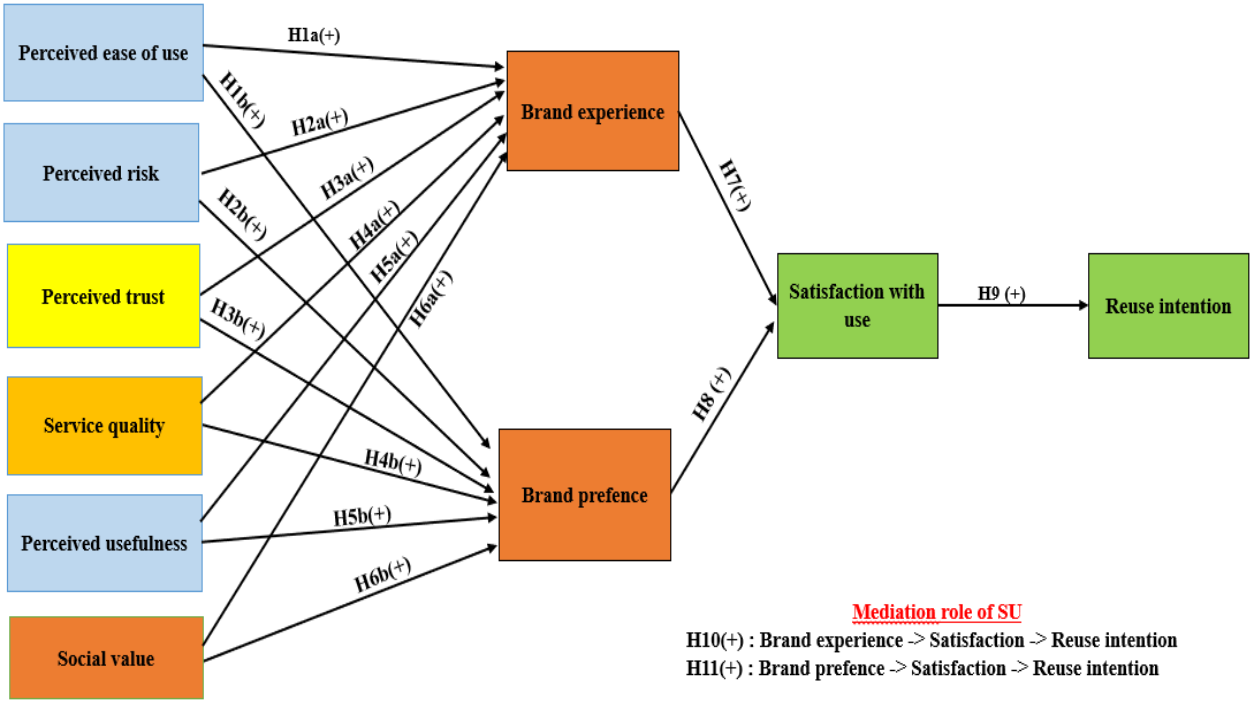

Figure 1: Proposed Theoretical Framework Model

Source: Author's own work

Research methodological background

Method, participants, data analysis and measurements

This study examines the attitudes and behaviours of individuals using contactless payment systems across Turkey to adopt innovative technologies. Data collection was conducted using an online survey method. During the preparation of the survey form, the back-translation method was applied three times to adapt the scales used in Turkish. A team of six experts, including professors specialising in business, linguistics academics, and business professionals, participated in this process. The original scales were translated into Turkish by these experts and then translated back into English by a different group for comparison, ensuring that the integrity of the meaning was preserved. In the pretest phase, a pilot study was conducted with 30 participants to evaluate the clarity and practicality of the survey. Based on the feedback obtained from the pilot test, the necessary adjustments were made to the survey questions. The final survey was designed to measure participants' opinions using a five-point Likert scale (1= strongly disagree, 5= strongly agree). The survey questions measured various constructs, including perceived ease of use, perceived risk, perceived usefulness, service quality, perceived trust, social value, brand experience, brand preference, satisfaction, and intention to reuse. During the data collection phase, the survey was sent to 800 individuals; those who did not use the contactless payment method were excluded from the study. In the final stage, 200 valid surveys from users of contactless payments were accepted for analysis. In the technique developed by Soper (2025), 190 samples were determined to be sufficient for a priori structural equation modelling (SEM) with a 95% confidence interval. The calculation method developed by Soper (2025) has been widely accepted and utilised in the relevant literature (Cohen, 1988; Westland, 2010; Armutcu et al., 2023). The representativeness of the population was evaluated using G*Power analysis (linear multiple regression, two tails, effect size: 0.07, power 0.95), and it was determined that there were more than 188 participants (n = 200; see Figure 2). This result shows that a 95% confidence interval represents the population. The collected data were analysed using the structural equation modelling (PLS-SEM) approach with SmartPLS 4.0. PLS-SEM was preferred, as it allowed for the simultaneous testing of both measurement models and structural relationships. The validity and reliability of the scales were assessed using cross-loadings, the Fornell-Larcker criterion, and internal consistency analyses. In the structural model, the hypotheses were tested using path coefficients, t-statistics, and p-values. The scales used in this study were adapted from Ramadani et al. (2025), Davis (1986), Cabanillas et al. (2019), Pal et al. (2015), Hsiao et al. (2016), Chang et al. (2015), Kurt (2021), Bayır (2021), Armutcu et al. (2024), and Ahn et al. (2007).

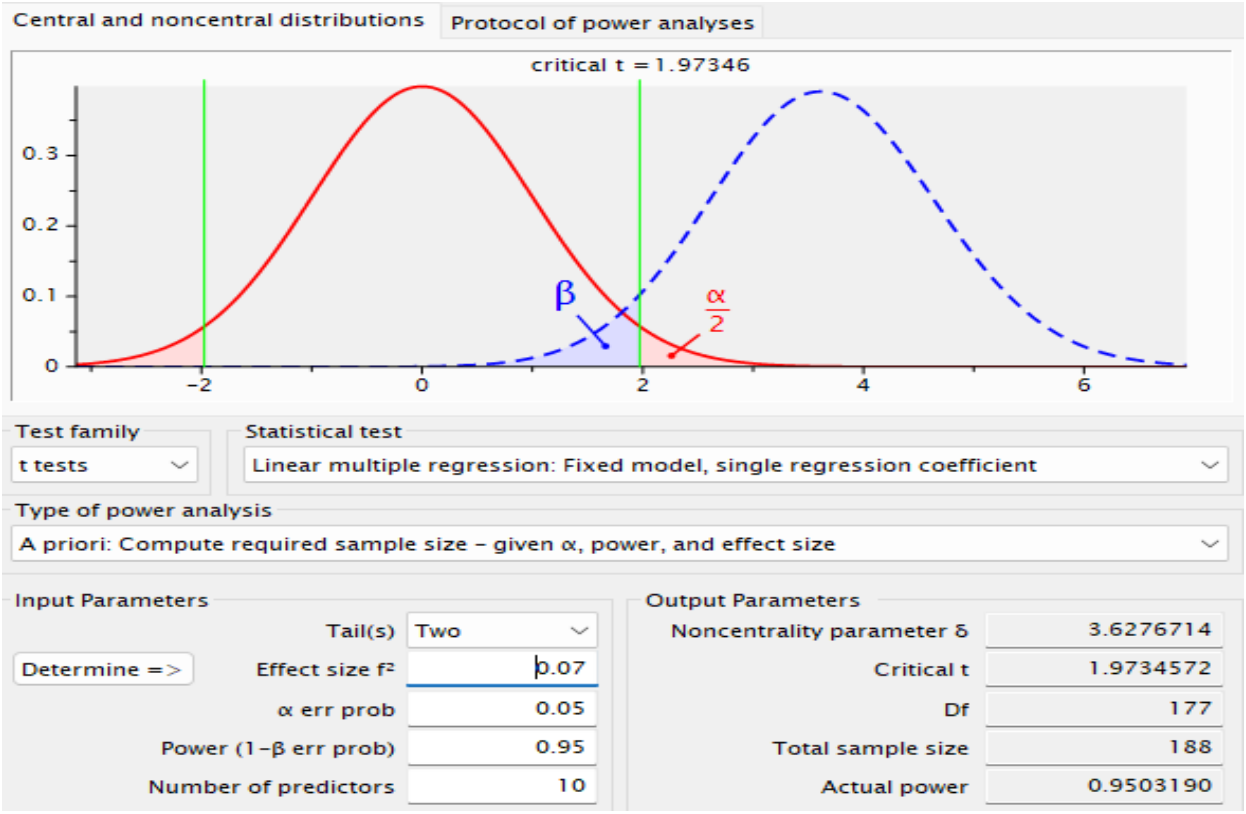

Figure 2: G*Power Test Results

Source: Author's own work

Model analysis and results

Descriptive statistical analysis results

Two hundred individuals from Turkey who used contactless payment technologies participated in this study. As shown in Table 1, 71% of the participants were male (n=142) and 29% were female (n=58). Regarding educational level, the largest group consisted of high school graduates (62.5%), followed by individuals with a master's degree or higher (14.5%), bachelor's degree holders (13%), associate degree graduates (5.5%), and middle school graduates (4.5%). When examining age distribution, it was observed that the majority of participants were concentrated in the 25-34 age group (46.5%), followed by those aged 18-24 years (24%), and those aged 35-44 years (23.5%). In terms of income level, 32% of the participants reported a monthly income between 60,001-80,000 TL, followed by 23.5% with an income of 22,000 TL or less, and 22.5% earning between 40,001-60,000 TL. Additionally, 13.5% reported a revenue of 80,001 TL or higher. In terms of occupational groups, the majority of participants were public employees (59.5%), followed by the unemployed (20.5%), and self-employed individuals (11.5%). When examining the frequency of contactless payment usage, 70% of participants reported using contactless payment every day, 20% several times a week, 5% rarely, and 2.5% several times a month. The most commonly used contactless payment instruments are bank cards (48%) and credit cards (45%), while the proportion of those using mobile phones for payment is 5% and those who indicated "other" is 2%.

Table 1: Demographic Profile

		F	%
Gender	Male	142	71
	Female	58	29
	Total	**200**	**100.0**
Education	Middle school	9	4.5
	High school	125	62.5
	Associate's degree	11	5.5
	Bachelor's degree	26	13.0
	Master's and above	29	14.5
	Total	**200**	**100.0**
Age	18 to 24	48	24.0
	25 to 34	93	46.5
	35 to 44	47	23.5
	45 to 55	10	5.0
	55 and above	2	1.0
	Total	**200**	**100.0**
Income	22.000TL and less	47	23.5
	22.001-40.000TL	17	8.5
	40.001-60.000TL	45	22.5
	60.001-80.000TL	64	32.0
	80.001TL and more	27	13.5
	Total	**200**	**100.0**
Job	Retired	3	1,5
	Housewife	8	4,0
	Laborer	6	3,0
	Unemployed	41	20,5
	Civil Servant	119	59,5
	Self-Employed	23	11,5
	Total	**200**	**100,0**
Frequency of contactless payment usage	A few times a month	5	2,5
	A few times a week	40	20,0
	Every day	140	70,0
	Never used	5	2,5
	Rarely	10	5,0
	Total	**200**	**100,0**
Contactless payment type	Debit Card	96	48,0
	Other	4	2,0
	Credit Card	90	45,0
	Phone	10	5,0
	Total	**200**	**100,0**

Validity and reliability analysis results

Table 2 presents the reliability and validity of the constructs. According to Table 2, Cronbach's alpha (CA) values are above 0.7 for all constructs. This result indicates a high internal consistency. In addition, Composite Reliability (CR) and rho_A values exceed 0.7 for all constructs. This is another indication that the constructs were highly reliable. Furthermore, Average Variance Extracted (AVE) values are above 0.5 for all constructs. This finding demonstrates that convergent validity has been established (Hair et al., 2019; Fornell & Larcker, 1981; Armutcu et al., 2023). As shown in Table 2, the reliability and validity criteria for all constructs were met. This demonstrates that the measurement model is robust and suitable for use in research.

Table 2: Construct Reliability, Validity and Discriminant Validity

	Reliability and Validity			
	CA	**CR**	**rho_A**	**AVE**
PEU	0,921	0,924	0,950	0,863
PR	0,866	0,955	0,915	0,784
PT	0,915	0,920	0,940	0,797
SQ	0,922	0,924	0,941	0,763
PU	0,926	0,943	0,953	0,870
SU	0,918	0,918	0,948	0,858
RUI	0,866	0,909	0,917	0,788
BE	0,770	0,769	0,867	0,686
BP	0,797	0,800	0,883	0,718
SV	0,939	0,940	0,961	0,891

Note: CA = Cronbach's alpha; CR = Composite reliability (rho_c); rho_A = Composite reliability (rho_a); AVE = Average variance extracted. PEU: Perceived ease of use, PR: Perceived risk, PU: Perceived usefulness, SU: Satisfaction with use, RUI: Reuse intention, BE: Brand experience, BP: Brand preference, SV: Social value, PT: Perceived trust and SQ: Service quality

Discriminant validity was assessed using two commonly accepted approaches: cross-loadings and the Fornell-Larcker criterion (Fornell & Larcker, 1981; see Table 3-4). First, discriminant validity was evaluated by examining the cross-loadings of each indicator. The principle is that each measurement item should load more strongly on its associated latent construct than on any other construct. As shown in Table 3, all items exhibited their highest factor loadings on their respective constructs, with significantly lower loadings on other constructs. For instance, the indicators of Perceived Ease of Use (PEU1, PEU2, and PEU3) loaded highest on the PEU construct, while indicators for Perceived Risk (PR1–PR3) loaded highest on the PE construct. Similar patterns were observed for other constructs, such as Perceived Trust (PT), Service Quality (SQ), Perceived Usefulness (PU), Satisfaction with Use (SU), Reuse Intention (RUI), Brand Equity (BE), Behavioural Performance (BP), and Social Value (SV). These results provide initial evidence supporting the discriminant validity of the constructs. In addition to cross-loading analysis, the Fornell-Larcker criterion was applied. According to this method, the square root of the average variance extracted (AVE) for each construct should be greater than the correlation values between the construct and other constructs in the model. As presented in Table 4, all the constructs met this criterion. For example, the square root of AVE for PEU (0.929) was greater than its correlation with all other constructs, including PB (0.758) and SU (0.534). Similarly, other constructs, such as PU (0.886), PT (0.893), SQ (0.873), and SV (0.944), demonstrated square roots of AVE exceeding their inter-construct correlations. Based on both the cross-loading results and the Fornell-Larcker criterion, it can be concluded that all latent constructs in the model exhibit satisfactory discriminant validity. This suggests that the constructs are conceptually distinct and that the indicators do not capture multiple latent variables simultaneously (Hair et al., 2019; Fornell & Larcker, 1981; Armutcu et al., 2023).

Table 3: Discriminant Validity Results (Cross Loadings)

	PEU	PR	PT	SQ	PU	SU	RUI	BE	BP	SV
PEU1	**0,930**	-0,042	0,334	0,386	0,759	0,523	0,434	0,508	0,404	0,194
PEU2	**0,934**	-0,024	0,277	0,374	0,709	0,501	0,386	0,473	0,335	0,230
PEU3	**0,924**	-0,042	0,308	0,390	0,638	0,463	0,364	0,478	0,342	0,231
PR1	0,058	**0,760**	-0,024	-0,004	-0,014	-0,075	0,012	0,066	0,135	0,119
PR2	-0,086	**0,951**	0,244	0,218	-0,068	0,062	0,227	0,094	0,305	0,413
PR3	-0,028	**0,934**	0,291	0,251	-0,009	0,123	0,258	0,125	0,255	0,387
PT1	0,319	0,205	**0,906**	0,706	0,460	0,542	0,620	0,480	0,580	0,570
PT2	0,299	0,212	**0,935**	0,711	0,453	0,545	0,605	0,474	0,559	0,568
PT3	0,335	0,203	**0,875**	0,727	0,447	0,543	0,580	0,467	0,559	0,553
PT4	0,217	0,200	**0,852**	0,691	0,350	0,483	0,479	0,410	0,467	0,550
SQ1	0,324	0,170	0,739	**0,882**	0,444	0,570	0,600	0,472	0,577	0,640
SQ2	0,464	0,059	0,658	**0,822**	0,610	0,706	0,675	0,530	0,617	0,485
SQ3	0,245	0,231	0,713	**0,876**	0,368	0,512	0,579	0,445	0,556	0,699
SQ4	0,373	0,254	0,676	**0,908**	0,508	0,607	0,653	0,511	0,651	0,691
SQ5	0,381	0,188	0,685	**0,876**	0,531	0,619	0,659	0,461	0,571	0,632
PU1	0,719	-0,026	0,495	0,590	**0,957**	0,662	0,592	0,434	0,518	0,306
PU2	0,760	-0,099	0,374	0,429	**0,914**	0,570	0,469	0,359	0,375	0,231
PU3	0,649	0,009	0,468	0,552	**0,927**	0,596	0,516	0,387	0,439	0,290
SU1	0,504	0,053	0,511	0,579	0,636	**0,921**	0,797	0,683	0,639	0,402
SU2	0,469	0,072	0,558	0,681	0,547	**0,930**	0,745	0,647	0,626	0,475
SU3	0,510	0,053	0,580	0,669	0,639	**0,929**	0,813	0,600	0,711	0,474
RUI1	0,265	0,357	0,534	0,572	0,357	0,542	**0,791**	0,460	0,846	0,769
RUI2	0,443	0,121	0,614	0,711	0,586	0,840	**0,943**	0,644	0,763	0,577
RUI3	0,398	0,162	0,568	0,647	0,532	0,825	**0,921**	0,623	0,723	0,517
BE1	0,512	0,029	0,363	0,386	0,334	0,538	0,460	**0,829**	0,367	0,239
BE2	0,492	0,015	0,368	0,414	0,357	0,555	0,496	**0,876**	0,424	0,252
BE3	0,304	0,222	0,538	0,573	0,360	0,624	0,669	**0,777**	0,665	0,527
BP1	0,474	0,002	0,457	0,551	0,542	0,728	0,656	0,609	**0,720**	0,355
BP2	0,269	0,360	0,519	0,595	0,344	0,537	0,724	0,416	**0,905**	0,761
BP3	0,250	0,332	0,566	0,585	0,341	0,545	0,788	0,480	**0,903**	0,722
SV1	0,234	0,320	0,631	0,730	0,347	0,504	0,674	0,439	0,696	**0,939**
SV2	0,213	0,348	0,581	0,641	0,243	0,434	0,604	0,370	0,685	**0,950**
SV3	0,215	0,411	0,562	0,662	0,252	0,435	0,618	0,363	0,684	**0,943**

Table 4: Discriminant Validity Results (Fornell-Larcker)

	PEU	PE	PT	SQ	PU	SU	RUI	BE	BP	SV
PEU	**0,929**									
PE	-0,039	**0,886**								
PT	0,331	0,230	**0,893**							
SQ	0,413	0,206	0,794	**0,873**						
PU	0,758	-0,038	0,482	0,568	**0,933**					
SU	0,534	0,064	0,593	0,694	0,657	**0,926**				
RUI	0,426	0,216	0,643	0,727	0,568	0,848	**0,887**			
BE	0,524	0,110	0,514	0,556	0,425	0,694	0,658	**0,828**		
BP	0,389	0,278	0,609	0,683	0,482	0,712	0,856	0,591	**0,848**	
SV	0,234	0,380	0,628	0,719	0,298	0,486	0,671	0,415	0,730	**0,944**

Factor loadings, VIF and model fit results

Table 5 presents the results regarding the suitability of the structural model used in the study, including the factor loadings, variance inflation factors (VIF), and overall model fit indices. All the observed variables demonstrated significant and strong relationships with their respective latent variables. The factor loadings for all items ranged from 0.720 to 0.957. These values exceed the minimum threshold of 0.70 indicated by Hair et al. (2019), indicating that all variables represent their constructs well. Furthermore, all t-values were significant ($p < 0.001$), indicating that the inclusion of items in the measurement model was statistically valid. To determine whether there was a multicollinearity problem among the variables, the Variance Inflation Factor (VIF) was analysed. All VIF values remained below 5 (for example, the highest VIF value was 4.844 for the PT2 item), indicating that multicollinearity is not a concern in the model (Diamantopoulos & Siguaw, 2006). Low VIF values increase the reliability of the regression coefficients. Questions that did not provide valid factor loading and VIF values were excluded from the analysis. The overall model fit was evaluated using key fit indices, such as SRMR, NFI, d_ULS, and d_G. The Standardised Root Mean Square Residual (SRMR) value was 0.080, which is at the threshold of the recommended 0.08, indicating that the model demonstrates an acceptable level of fit. The Normed Fit Index (NFI) value was determined to be 0.801, which is below the ideal threshold of 0.90 for NFI values; however, it is considered acceptable in cases of convergence (Çokluk, Şekercioğlu & Büyüköztürk, 2018). In addition, other goodness-of-fit values were d_ULS: 4.217 and d_G: 1.725. These values support the adequacy of the model fit. Based on the findings obtained, all observed variables in the model represent their respective factors strongly and do not present multicollinearity issues. Moreover, the overall model fit values indicated that the model was structurally acceptable. These findings indicate that the measurement model was reliable and valid.

Table 5: Factor Loadings, VIF and Model Fit

Item	Loadings	STDEV	T-values	VIF	SRMR	NFI	d_ULS	d_G
PEU1	0,930	0,020	45,772	3,205				
PEU2	0,934	0,027	34,289	3,730				
PEU3	0,924	0,028	32,853	3,324				
PR1	0,760	0,093	8,213	1,697				
PR2	0,951	0,043	22,007	3,529				
PR3	0,934	0,042	22,069	3,294				
PT1	0,906	0,015	60,360	3,794				
PT2	0,935	0,010	91,644	4,844				
PT3	0,875	0,025	34,456	2,656				
PT4	0,852	0,039	21,651	2,349				
SQ1	0,882	0,022	39,266	3,004				
SQ2	0,822	0,034	24,334	2,051				
SQ3	0,876	0,024	35,958	3,119				
SQ4	0,908	0,015	58,665	3,790				
SQ5	0,876	0,025	34,500	2,993				
PU1	0,957	0,011	83,591	4,619				
PU2	0,914	0,030	30,222	3,312	0.080	0.801	4.217	1.725
PU3	0,927	0,017	55,173	3,450				
SU1	0,921	0,020	45,443	3,031				
SU2	0,930	0,031	29,520	3,517				
SU3	0,929	0,018	51,073	3,350				
RUI1	0,791	0,036	22,213	1,763				
RUI2	0,943	0,009	103,005	3,549				
RUI3	0,921	0,014	66,269	3,035				
BE1	0,829	0,038	21,572	1,860				
BE2	0,876	0,024	36,265	2,106				
BE3	0,777	0,042	18,684	1,355				
BP1	0,720	0,044	16,287	1,238				
BP2	0,905	0,014	67,024	3,791				
BP3	0,903	0,014	64,407	3,777				
SV1	0,939	0,015	62,086	3,776				
SV2	0,950	0,014	68,796	4,736				
SV3	0,943	0,011	85,130	4,355				

Note: PEU: Perceived ease of use, PR: Perceived risk, PU: Perceived usefulness, SU: Satisfaction with use, RUI: Reuse intention, BE: Brand experience, BP: Brand preference, SV: Social value, PT: Perceived trust and SQ: Service quality

Results of regression and hypothesis testing

According to the results of structural equation modelling (see Table 6), a total of 17 path relationships were evaluated to test the hypotheses. The findings indicate that the relationships between some variables in the model are statistically significant.

According to the results presented in Table 7, the effect of perceived ease of use on brand experience was found to be significant and positive ($\beta = 0.505$, $p < 0.001$). This finding demonstrates that when contactless

payment systems are user-friendly, consumers have more positive experiences with the brand. Therefore, the H1a hypothesis was accepted. The effect of perceived ease of use on brand preference was not found to be statistically significant ($\beta = 0.060$, $p = 0.455$). This result indicates that ease of use is insufficient to influence brand preferences directly. Therefore, the H1b hypothesis was rejected.

Perceived risk does not have a significant effect on brand experience ($\beta = 0.004$, $p = 0.950$). This shows that users' risk perceptions do not directly affect their brand experiences. The H2a hypothesis was rejected. In addition, the effect of perceived risk on brand preference is not statistically significant ($\beta = 0.052$, $p = 0.294$). This finding indicates that perceived risk in contactless payment systems does not directly influence users' decision to prefer a particular brand. Therefore, H2b is rejected.

Perceived trust has a positive and significant effect on brand experience ($\beta = 0.209$, $p = 0.042$). This shows that, when users trust the payment system, they have more positive experiences with the brand. Accordingly, the H3a hypothesis was accepted. However, perceived trust does not have a significant effect on brand preference ($\beta = 0.077$, $p = 0.377$). This finding indicates that a direct relationship between trust factors and brand preferences cannot be established. Therefore, the H3b hypothesis was rejected.

Service quality has a significant and positive effect on brand experience ($\beta = 0.302$, $p = 0.033$). This result suggests that high-quality services have a positive impact on consumers' brand experiences. Accordingly, the H4a hypothesis is accepted. Additionally, service quality does not have a statistically significant effect on brand preference ($\beta = 0.117$, $p = 0.281$). This suggests that the perceived quality of service does not directly impact users' brand preferences. The H4b hypothesis was therefore rejected.

Although the effect of perceived usefulness on brand experience was adverse, it did not reach significance ($\beta = -0.235$, $p = 0.096$). This finding shows that the perceived usefulness alone is insufficient to explain brand experience. Thus, the H5a hypothesis was rejected. Moreover, the effect of perceived usefulness on brand preference is not statistically significant ($\beta = 0.183$, $p = 0.139$). This result indicates that the usefulness perceived by consumers is not directly reflected in their brand preference decisions. Therefore, the H5b hypothesis is rejected.

The effect of social value on brand experience was insignificant ($\beta = 0.017$, $p = 0.863$). This finding suggests that perception of social value does not play a significant role in an individual's experience with the brand. The H6a hypothesis was rejected. However, social value has a significant effect on brand preference ($\beta = 0.509$, $p < 0.001$). This result suggests that the impressions individuals form in their social environment play an important role in shaping their brand preferences. In this context, the H6b hypothesis is accepted.

The effect of brand experience on usage satisfaction was positive and significant ($\beta = 0.420$, $p < 0.001$). This finding shows that individuals with a positive experience with a brand derive greater satisfaction from using that brand. Thus, H7 was accepted. Furthermore, a significant positive relationship was found between brand preference and usage satisfaction ($\beta = 0.463$, $p < 0.001$). This finding indicates that individuals with a positive perception of brand preference also have high levels of satisfaction during use. Therefore, the H8 hypothesis was accepted.

Usage satisfaction had a powerful and significant effect on intention to reuse ($\beta = 0.848$, $p < 0.001$). This result clearly demonstrates that users who are satisfied with contactless payment systems tend to reuse this technology. Therefore, the H9 hypothesis was accepted.

Overall, when evaluated in general terms, only nine of the 17 hypotheses proposed in the model were accepted. It has been found that ease of use, perceived trust, and service quality affect the brand experience, while social value influences brand preference. Additionally, satisfaction and brand preferences have significant effects on the intention to reuse. These results reveal that user evaluations based on experience, satisfaction, and social factors are decisive in loyalty and repeat usage behaviours.

Table 6: Regression Results

	Path Coefficients (PC)	STDEV	T Statistics	*p* values	Hypotheses
PEU -> BE	0,505	0,120	4,214	0,000*	H1a Accepted
PEU -> BP	0,060	0,081	0,746	0,455	H1b Rejected
PR -> BE	0,004	0,069	0,063	0,950	H2a Rejected
PR -> BP	0,052	0,050	1,050	0,294	H2b Rejected
PT -> BE	0,209	0,103	2,033	0,042*	H3a Accepted
PT -> BP	0,077	0,087	0,884	0,377	H3b Rejected
SQ -> BE	0,302	0,141	2,138	0,033*	H4a Accepted
SQ -> BP	0,117	0,108	1,079	0,281	H4b Rejected
PU -> BE	-0,235	0,142	1,664	0,096	H5a Rejected
PB -> BP	0,183	0,124	1,478	0,139	H5b Rejected
SV -> BE	0,017	0,096	0,172	0,863	H6a Rejected
SV -> BP	0,509	0,076	6,674	0,000*	H6b Accepted
BE -> SU	0,420	0,099	4,239	0,000*	H7 Accepted
BP -> SU	0,463	0,093	4,999	0,000*	H8 Accepted
SU -> RUI	0,848	0,023	37,060	0,000*	H9 Accepted

Note: * denotes significance at the 5% level. PEU: Perceived ease of use, PR: Perceived risk, PU: Perceived usefulness, SU: Satisfaction with use, RUI: Reuse intention, BE: Brand experience, BP: Brand preference, SV: Social value, PT: Perceived trust and SQ: Service quality

This study examined the mediating role of user satisfaction between brand experience and brand preference and intention to reuse (RUI) (see Table 7). In this context, the indirect effects of brand experience (BE) and brand preference (BP) on intention to reuse were evaluated. According to the results presented in Table 7, the indirect effect of brand experience on intention to reuse through user satisfaction was found to be significant and positive ($\beta = 0.356$, $p < 0.001$). This result indicates that individuals who have a positive experience with a brand become more satisfied as a result of this experience; consequently, their intention to reuse the brand is strengthened. Therefore, user satisfaction is a significant mediator of the relationship between brand experience and intention to reuse. Based on these findings, H10 was accepted in this context. Similarly, the indirect effect between brand preference and intention to reuse was significant through user satisfaction ($\beta = 0.393$, $p < 0.001$). This finding shows that individuals who are satisfied with their preferred brands are more likely to reuse them. Therefore, the H11 hypothesis was also accepted for the second pathway.

Table 7: Mediating Role of SU

	Path Coefficients (PC)	**STDEV**	**T Statistics**	***p* values**	**Hypotheses**
BE -> SU -> RUI	0.356	0.082	4.364	0.000	H10 Accepted*
BP -> SU -> RUI	0.393	0.084	4.702	0.000	H11 Accepted*

Note: * denotes significance at the 5% level. PEU: Perceived ease of use, PR: Perceived risk, PB: Perceived usefulness, SU: Satisfaction with use, RUI: Reuse intention, BE: Brand experience, BP: Brand preference, SV: Social value, PT: Perceived trust and SQ: Service quality

Discussion and implications

Discussion

This study aims to reveal the barriers and opportunities encountered in the transition to innovative technologies by examining the factors influencing the adoption of contactless payment technologies, and the relationships between users' attitudes and their intention to reuse during this process. The research findings indicate that perceived ease of use (PEU), service quality (SQ), and perceived trust (PT) have significant and positive effects on brand experience (BE). In particular, the substantial impact of PEU on BE ($\beta = 0.505$, $p < 0.001$) demonstrates that users' ability to use contactless payment systems comfortably and effortlessly enhances their positive experience with technology. This supports the critical importance of user-friendly designs and intuitive interfaces in the adoption of technological products. Additionally, while social value (SV) did not affect brand experience, it influenced brand preference. Çalışma kapsamında tespit edilen bu bulgular önceki çalışmaların bulgularını doğrulamaktadır (Garzaro et al., 2020; Liu & Wang, 2023; Bose & Gupta, 2013; Tosun & Köylüoğlu, 2023). However, the lack of significant effects of perceived usefulness (PU) and perceived risk (PR) on both brand experience and brand preference (BP) suggests that consumers do not rely solely on these abstract factors when evaluating innovative payment systems. The particular ineffectiveness of PR indicates that security concerns related to contactless payments have decreased compared to previous years, or that awareness of the technology has increased. These results suggest that consumers' risk perception has evolved, indicating that it no longer poses a barrier to technological innovation.

Another notable finding of the study is that brand experience and brand preference significantly influence the intention to reuse (RUI) through user satisfaction (SU). The fact that both paths BE → SU → RUI ($\beta = 0.356$, $p < 0.001$) and BP → SU → RUI ($\beta = 0.393$, $p < 0.001$) are statistically significant indicates that users with positive experiences with the brand increase their level of satisfaction, thereby triggering repeat usage behaviour. This mediating effect presents strategic opportunities, particularly for brands seeking to cultivate user loyalty. Furthermore, the direct impact of SU on RUI was relatively high ($\beta = 0.848$, $p < 0.001$), clearly revealing that satisfaction is fundamental to sustainable user behaviour in contactless payment technologies. This finding demonstrates that user experience and service design, when focused on continuous improvement, are crucial factors in the long-term adoption of technological innovations. Çalışma kapsamında tespit edilen bulgular önceki çalışmaların bulguları ile örtüşmektedir (Armutcu et al., 2024b; Sotheara et al., 2015; Park et al., 2022).

Theoretical and practical contributions of the study

This study makes significant theoretical contributions to the literature on the adoption of contactless payment technology. First, by proposing a comprehensive structural model that integrates multidimensional variables such as perceived ease of use, service quality, perceived trust, social value, perceived risk, and usefulness, it presents an original framework for technology acceptance models. In this way, the technology adoption process is addressed not only in terms of technical and functional aspects, but also in terms of its emotional and experiential components. Additionally, this study empirically tests the mediating role of satisfaction in the relationship between brand experience, brand preference, and intention to reuse. These findings contribute to the integration of models developed in the context of consumer behaviour with the technology acceptance literature and shed light on gaps in the field. Moreover, the observation that variables traditionally considered necessary in technology acceptance models, such as perceived risk, usefulness, and social value, do not show statistically significant effects in this context suggests that such factors may vary contextually. This calls into question the universality of the existing models and offers new areas for inquiry in future research. Finally, the integration of concepts related to consumer behaviour into technology usage models encourages an interdisciplinary approach and forms a theoretical bridge between marketing and information systems literature.

Additionally, the findings offer important practical implications for practitioners regarding the development and dissemination of contactless payment technologies. This research demonstrates that perceived ease of use is the strongest determinant of users' adoption of these technologies. This indicates that technology developers should design simple, user-friendly, and accessible interfaces. Simultaneously, the substantial impact of satisfaction on intention to reuse suggests that strategies to improve user experience and prioritise user feedback play a critical role in increasing customer loyalty. The findings also show that service quality and perceived trust have a positive effect on brand experience, highlighting the

need for technology providers to offer not only technical competence but also a reliable service infrastructure. Furthermore, the lower-than-expected impact of perceived risk and usefulness suggests that firms should adopt a holistic experience approach rather than base their marketing strategies solely on security- and usefulness-oriented messages. Finally, the direct and indirect effects of brand experience and brand preference on satisfaction and intention to reuse emphasise the necessity for firms to build deeper, emotional, and lasting relationships with users. In this context, this study provides strategic roadmaps for all sectors investing in digital payment systems, particularly the financial technologies (fintech).

Limitations of the study and recommendations for future researchers

Although this study reveals significant findings regarding the adoption of contactless payment technologies, it has certain limitations. First, since the research sample is limited to specific demographic and geographic areas in Turkey, the generalizability of the findings may be restricted. Conducting similar studies in countries with different cultural and economic conditions would contribute to stronger inferences about the universality of the results. Additionally, due to the data collection method and cross-sectional nature of the surveys used in the study, the study is limited in its ability to determine cause-and-effect relationships definitively. Future longitudinal (panel) studies could better reveal changes in user behaviour and dynamics within adoption processes. The impact of certain factors, such as perceived risk and usefulness, did not reach the expected level in this study, indicating that these variables need to be reexamined in different contexts or with alternative measurement methods. Our recommendation for future research is to conduct comprehensive comparisons across other areas of technology use and various sectors. Furthermore, conducting studies that employ qualitative research methods to gain an in-depth understanding of consumers' perceptions and attitudes towards technology will enrich the findings from quantitative studies.

General results

This research evaluated the effects of both individual and environmental factors on the adoption process of contactless payment technologies and provided significant findings regarding user behaviour. According to the results obtained, ease of use, service quality, and perceived trust have a direct and positive impact on users' experiences with the brand, which in turn leads to user satisfaction and strengthens the intention to reuse. This suggests that users' satisfaction with technology is not merely a matter of viewing it as an innovation; it is also essential for sustainable use. For companies seeking to encourage technology adoption, this finding suggests that investing solely in technological infrastructure is insufficient; it is also crucial to provide services that enhance the user experience. Furthermore, social value has a significant impact on brand preference. In addition, the ineffectiveness of traditional variables, such as perceived risk and usefulness, suggests that consumers place more importance on tangible and experiential factors in their relationships with technology. This situation necessitates reshaping marketing and user-relationship strategies. In conclusion, the successful adoption of innovative technologies, such as contactless payments, is only possible through the development of systems that are user-friendly, trustworthy, and customer-focused. This research offers valuable insights for both technology developers and marketing professionals aiming to understand user behaviours, and it provides guidance on how to turn barriers to innovative technologies into opportunities.

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