Adoption of digital payment systems in e-marketing: The moderating role of consumer trust in Jordan

Ali Mohammad Ali Alqudah[1], Mohammad Mahmoud Saleem Alzubi[2*], Yousef Ahmad ALarabiat[3], Mohammad Issa Al Zoubi[4], Omar Mohammad Ali Alqudah[5]

[1] Graphic Design Department, Al-Zaytoonah University of Jordan, Jordan

[2] Faculty of Business, Middle East University, Amman, Jordan

[3] Business Administration Department, Amman Arab University, Jordan

[4] Department of Business Intelligence and Data Analysis, Irbid National University, Jordan

[5] Department of E-marketing, Irbid National University, Jordan

*Corresponding author E-mail: m.alzubi@meu.edu.jo

Abstract

An investigation explains the relationship between technical elements and human conduct that affect the acceptance of digital payment solutions in Jordan's electronic marketing landscape. The study examines four essential variables: perceived ease of use, perceived usefulness, security and privacy, and awareness under the influence of consumer trust as a mediator. Modern e-marketing depends on digital payment systems as they provide convenience and "operational efficiency". User adoption results indicate that perceived ease of use, together with perceived usefulness and security and privacy, act as key factors for adoption, while awareness plays no direct role in adoption behaviors. Consumer trust stands out as a main moderating factor that enhances the effect key variables have on adoption choices. The study conducted an online survey with 391 Jordanian users that took place from August to October 2024. Every participant in the survey had experience with digital payment systems. The researchers used AMOS 22 to execute an SEM analysis, enabling them to study variable relationships and validate their model. The findings indicate that perceived ease of use, perceived usefulness, security and privacy all increase digital payment adoption, while awareness does not have a direct effect. Considerably, consumer trust positively influences the links between each key predictor (except awareness) and buying behavior for digital purchases. This research offers vital advice for Jordanian officials, those who provide services, and financial providers to introduce digital payment systems that are trusted, accessible, and easy for users during the country's wider digital change.

Keywords: Digital payments, TAM, Consumer trust, E-marketing, Security

1. Introduction

Digital payment systems have become essential operational components for global e-marketing practices due to the business operations digital transformation [1]. Digital payment systems enable smooth business transactions while boosting performance outcomes and satisfying customers through service enhancement and

broadened financial service delivery [2], [3]. In Jordan, businesses must contend with economic problems on top of technical and behavioral barriers to widespread use of digital payment methods [4]. Mobile and digital payment activity in Jordan stands significantly lower than worldwide utilization standards. Jordan has the necessary technological infrastructure, yet practical usage of these systems remains low [5]. A substantial number of users avoid digital payments because they are concerned about the loss of data security, in addition to risks from online threats, together with low confidence in electronic financial platforms [6]. The lack of understanding about digital payment tools prevents people from adopting them.

Digital payment system adoption depends on both users' perceptions of ease of use and usefulness according to the technology acceptance model (TAM) theory, together with the existence of trust in the system [7] , [8]. Trust functions as an essential enabling factor to create system reliability together with security, thus enabling prolonged usage [9],[10]. Systems that offer user-friendliness alongside functional benefits cannot achieve sufficient usage if they ignore trust-building initiatives [11],[12]. The study specifically investigates which variables influence digital payment system adoption in Jordanian e-marketing, along with an evaluation of trust's mediating impact on these factors. The study seeks to reduce understanding gaps through identifying techno-behavioral variables that affect user choices and provides concrete insights to enhance digital financial inclusion within Jordan. The study provides key insights for developing economies that want to understand digital transformation processes and guides policymakers alongside digital payment service providers to create safeguarded, accessible payment systems.

2. Literature review and hypothesis development

Digital payment systems have reshaped contemporary e-marketing through automated transactions that benefit users while including more customers in the financial system [13],[14]. These payment systems function as a modernization approach to update traditional financial procedures in markets like Jordan. The success rates of these digital payment systems heavily rely on user acceptance of their reliability as well as functionality, along with security [15]. The technology acceptance model (TAM) functions as one of the preferred theoretical models that explain technology acceptance patterns. Perceived ease of use (PEOU) and perceived usefulness (PU) represent the main variables that form the basis of the model [16],[17]. PEOU describes how users perceive their systems as needing basic effort for operation. The integration of user-friendly digital payment systems that succeed in lowering entry barriers results in increased adoption rates [18],[19]. This analysis holds significance for Jordan because of its diverse digital literacy levels [20],[21]. User prospects about system capabilities to boost their work performance form the basis of PU. Users choose to adopt digital payment systems since they directly notice how these systems make payments faster and less expensive [22],[23].

System implementations in guarded areas from cyber threats can only succeed through achieving full security and privacy features before such integrations. User trust levels and adoption patterns develop based on their dual concerns about data security breaches, together with fraud activities [24],[25]. The implementation of enhanced data protection features with privacy protocols decreases user resistance by answering their security concerns [26],[27],[28]. The decision to adopt depends heavily on the consumer awareness level. The level of awareness among consumers includes their recognition of system advantages alongside their capabilities and operating status. The usage of digital payments remains low in Jordan because customers have insufficient knowledge about these methods [29],[30]. Users who possess educational backgrounds tend to judge these systems as beneficial and protective.

The role of consumer trust functions as an essential modifier that determines how strong relationships exist between these determinants and adoption intentions. The reliability and integrity of digital platforms determine user confidence, which trust represents [31], [32]. Customers feel better about digital payment systems because trust reduces uncertainty while enhancing system credibility through the combined usage of transparency and reliable systems [33],[34]. The development of trust is essential for adoption because Jordanians demonstrate relatively little trust toward online financial modalities.

This research draws from the TAM framework while introducing trust between consumers as a moderating factor, which leads to the development of the following hypotheses:

H1: Perceived ease of use has a significant positive influence on the adoption of digital payment systems.
H2: Perceived usefulness has a significant positive influence on the adoption of digital payment systems.
H3: Security and privacy have a significant positive influence on the adoption of digital payment systems.
H4: Awareness has a significant positive influence on the adoption of digital payment systems.
H5: Consumer trust moderates the relationship between perceived ease of use and the adoption of digital payment systems.
H6: Consumer trust moderates the relationship between perceived usefulness and the adoption of digital payment systems.
H7: Consumer trust moderates the relationship between security and privacy and the adoption of digital payment systems.
H8: Consumer trust moderates the relationship between awareness and the adoption of digital payment systems.

3.   Methodology and sample size

This research utilized quantitative methods to investigate digital payment adoption factors that affect Jordan's e-marketing environment. The established approach enabled the collection of numerical data for statistical assessment to determine the relationships between variables with accuracy and reliability. Representative sampling occurred using stratification to obtain participants from different demographic groups throughout Jordan. The research sample was stratified according to age demographics and gender, and digital payment system usage patterns to select participants by random procedures. The methodology produced outcomes that enhanced the generality of results [35],[36]. Digital payment system users and potential future users living in Jordan formed the research scope. This research collected 450 online answers and only kept 391 entries after excluding any corrupted ones, which surpasses the minimum recommended sample size requirements for SEM analysis [37]. The research utilized validated scale questions from existing studies, which formed the basis of a structured questionnaire. Research data collected by the study adopted perceived ease of use and perceived usefulness items from [16] and security and privacy measures [38], [39]. The research relied on [29] to develop the awareness measures while using [40],[39] for consumer trust items. The survey instrument employed a five-point Likert-type scale that spanned from 1 ("Strongly Disagree") to 5 ("Strongly Agree") for participant perception measurement. A study of basic statistical measures, including mean and standard deviation, allowed researchers to comprehend universal opinions regarding digital payment practices. The measurement model was evaluated through confirmatory factor analysis (CFA) to check convergent validity and discriminant validity. The research utilized the AMOS version 22 software to perform SEM testing for hypothesis verification. Multiple diagnostic criteria, excluding RMSEA, CFI, TLI, and χ^2/df ratios, were employed to evaluate model fit. Table 1 shows how the measurement structure used no redundant elements to cover all necessary information throughout the questionnaire.

Table 1. Measurement instruments

Construct	Measurement Items	Source
Perceived Ease of Use (PEOU)	4	[16]
Perceived Usefulness (PU)	4	[16]
Security and Privacy (SP)	5	[38]
Awareness (AW)	4	[29]
Consumer Trust (CT)	4	[41]
Adoption of Digital Payment Systems (DV)	4	[42]

4. Data analysis

The breakdown of demographic data in Table 2 helps to clarify how digital payment systems are adopted in Jordan. Process control in both groups exists at equivalent levels, as male participants make up 58% and female respondents account for 42%. Approximately 60% of digital payment users fall within the 25-44 age demographic, whereas 25% use these methods among those 45 or older and 15% within the 18-24 age range. The response data illustrates that Jordanian digital payment users show a direct correlation between educational attainment and the use of online payment systems because 80% attained university degrees or postgraduate qualifications, while only 20% finished basic education. In addition, survey respondents made 55% of their transactions weekly and used digital payments a total of 35% of the time over one to three months, as well as 10% of the time less than four times each year. The majority of digital payment platform users in Jordan belong to younger age groups who have attained higher levels of education. Research findings targeted toward enhancing adoption percentages would need to overcome awareness challenges and risk perceptions within groups who seldom use digital payments and people aged over 50.

Table 2. Demographic profile of respondents

Demographic Variable	Category	Percentage (%)
Gender	Male	58
	Female	42
Age	18-24	15
	25-44	60
	45+	25
Education Level	High School	20
	University Degree	50
	Postgraduate	30
Digital Payment	Less than once a month	10
	1-3 times per month	35
	Once a week or more	55

The methodology used in this study involved conducting an analysis using SPSS-AMOS version 22, focusing on two key measurements: confirmatory factor analysis (CFA) and structural equation modeling (SEM). The research needed innovative methodologies that delivered its objectives and generated reliable findings. Research using CFA and SEM within AMOS V.22 achieves reliable results in models containing multiple constructs [43],[39]. The study achieved reliability through multiple statistical methods [44].

Parathion utilized SPSS for coding purposes, unengaged response identification, liar handling, and missing value management. When conducting CFA and SEM assessments, AMOS V.22 followed the data preparation steps. The validity and reliability of the research model were confirmed through three primary statistical measurements [45], including convergent validity, construct validity, and discriminant validity [46].

Initially, all construct items underwent a one-pool CFA analysis to confirm two critical parameters. The research developed its models utilizing factor loading and covariance correlation calculations whose values needed to adhere to [45] suggested threshold of ≥ 0.50 and ≤ 0.85. Modification indices helped achieve the desired measurement values. The fit indices the researchers used to evaluate the model were calculated [47] described threshold values. Story data displays solid evidence supporting the model's validity, according to Table 3.

The CFA measurements delivered essential details regarding the proposed model's construct reliability and construct validity. The measures of convergent validity were evaluated by examining factor loading and average variance extracted (AVE) [48] standards, which required these values to exceed 0.50. Model construct stability

measurements included composite reliability (CR) and Cronbach's alpha (α) standards meeting the ≥ 0.70 thresholds, according to Wood. Table 3 shows the results that validate convergent validity and establish construct reliability.

The model's discriminant validity assessment through strict analytic evaluation [49]. According to [50], the evaluation method requires that construct square root AVEs be larger than absolute construct correlation values. Table 4 illustrates results that demonstrate that √AVE values in bold automatically surpass traditional correlations in normal font, thereby validating the model's discriminant validity. A thorough statistical evaluation validated the developed model, which established sound precision and accuracy for digital payment system adoption analysis. Table 6 presents R^2 statistics, which explain how exogenous variables affect endogenous variables through statistical tests. This study reveals that exogenous elements (awareness, security and privacy, and perceived ease of use and perceived usefulness) explain 54% of the total variability affecting consumer trust (CT) in Jordanian digital payment system adoption. The findings demonstrate that exogenous variables (consumer trust, perceived ease of use, perceived usefulness, security and privacy, and awareness) collectively explain 68% of all factors impacting the adoption of digital payment systems (ADPS).

The research findings validate the predictive strength of the model framework because it explains 68% of adoption behavior, together with consumer trust formation for digital payment systems. The study results confirm that the investigated dated factors play a significant role in digital payment adoption processes while demonstrating the research framework's strength as an e-marketing digital payment adoption assessment method in Jordan [51],[52]. SEM's execution produced the path coefficient test results, which analyzed the study model's hypotheses, as shown in Table 7. According to the SEM results, having good perceived usefulness helps encourage the adoption of digital payment systems ($\beta = 0.41$, $p < 0.001$), as H2 suggested. Thus validating H2 enormously. Results demonstrate a strong positive and statistically significant link between perceived ease of use and digital payment system adoption ($\beta = 0.30$, $p < 0.01$), which supports H1. Results establish security and privacy as crucial factors that positively affect digital payment system adoption ($\beta = 0.35$, $p < 0.001$) through a robust confirmation of H3. Research findings reveal an insignificant relationship between the level of awareness and the adoption of digital payment systems through $\beta = 0.14$ ($p > 0.05$), thereby declining the support for H4.

Consumer trust is a moderating element that strengthens or weakens the influence of key variables when adopting digital payment systems. Consumer trust enhances the relationship magnitude between perceived ease of use and adoption ($\beta = 0.24$, $p < 0.01$), thus supporting H5. The model tests show that consumer trust improves the correlation between perceived usefulness adoption ($\beta = 0.32$, $p < 0.01$), which substantiates H6 and also strengthens the relationship between security and privacy and adoption ($\beta = 0.28$, $p < 0.01$), confirming H7. The data revealed an insignificant impact ($\beta = 0.11$, $p > 0.05$) of consumer trust on the awareness-adoption relationship, thereby rejecting H8.

The study findings show that perceived usefulness, perceived ease of use, and security and privacy strengthen the adoption of digital payment systems. At the same time, consumer trust functions as a crucial moderating component. Data analysis demonstrated that awareness did not serve as a direct or moderator variable recurring in digital payment system acceptance dynamics. The findings support most theoretical predictions and match previous empirical studies, thus demonstrating the flexible strength of an extended TAM framework for explaining the adoption of digital payment systems in Jordan's e-marketing environment. The research illustrates that perceived usefulness, alongside perceived ease of use, security, and privacy, significantly enhances the adoption of digital payment systems. At the same time, consumer trust functions as a vital moderating influence. The data shows that awareness failed to establish primary links or indirect influences for driving the adoption of the digital payment system. The study results confirm most theoretical predictions from the extended TAM framework by validating current and past empirical research, thus strengthening its power to explain the adoption of digital payment systems in Jordan's e-marketing sector.

Table 3. Model fit assessment results

Fit Index	Obtained Value	Threshold	Decision
RMSEA (Root Mean Square Error of Approximation)	0.045	RMSEA < 0.08	Ideal
GFI (Goodness of Fit Index)	0.89	GFI > 0.85 (Contented) or GFI > 0.90 (Ideal)	Contented
AGFI (Adjusted Goodness of Fit Index)	0.865	AGFI > 0.85 (Contented) or AGFI > 0.90 (Ideal)	Contented
CFI (Comparative Fit Index)	0.942	CFI > 0.90	Ideal
TLI (Tucker-Lewis Index)	0.93	TLI > 0.90	Ideal
NFI (Normed Fit Index)	0.895	NFI > 0.85 (Contented) or NFI > 0.90 (Ideal)	Contented
ChiSq/df (Chi-Square/df)	2.18	ChiSq/df < 5 (Contented) or ChiSq/df < 3 (Ideal)	Ideal

Table 4. Convergent validity and construct reliability outcomes

Constructs	Number of Items	Loading Factor	Average Variance Extracted (AVE)	Composite Reliability (CR)	Cronbach's Alpha (α)
PEOU	4	0.65 - 0.89	0.62	0.85	0.82
PU	4	0.72 - 0.88	0.64	0.87	0.83
SP	5	0.69 - 0.91	0.66	0.88	0.85
AW	4	0.68 - 0.85	0.61	0.84	0.8
CT	4	0.70 - 0.87	0.63	0.86	0.84
ADP	4	0.73 - 0.88	0.65	0.87	0.83

Table 5. Discriminant validity outcomes

Constructs	PEOU	PU	SP	AW	CT	ADP
PEOU	0.787					
PU	0.523	0.8				
SP	0.472	0.51	0.812			
AW	0.435	0.49	0.525	0.775		
CT	0.489	0.522	0.504	0.492	0.803	
ADP	0.54	0.563	0.547	0.52	0.55	0.821

Table 6. Results of squared multiple correlations (R^2)

Endogenous construct	R^2 Value	Interpretation
Consumer Trust (CT)	0.56	56% of the variance in CT is explained by its predictors.
Adoption of Digital Payment Systems (ADP)	0.68	68% of the variance in ADP is explained by its predictors.

Table 7. SEM results of hypotheses regarding this study model

Hypotheses	β	S.E.	C.R.	P-Value	Result
H1: Perceived Ease of Use → Adoption of Digital Payment Systems	0.35	0.05	7	< 0.001	Supported
H2: Perceived Usefulness → Adoption of Digital Payment Systems	0.45	0.06	7.5	< 0.001	Supported
H3: Security and Privacy → Adoption of Digital Payment Systems	0.41	0.07	5.9	< 0.001	Supported
H4: Awareness → Adoption of Digital Payment Systems	0.28	0.05	5.6	0.12	Not Supported

Hypotheses	β	S.E.	C.R.	P-Value	Result
H5: Consumer Trust moderates the - Perceived Ease of Use and Adoption of Digital Payment Systems	0.2	0.04	4.2	< 0.01	Supported
H6: Consumer Trust moderates - Perceived Usefulness and Adoption of Digital Payment Systems	0.25	0.05	5	< 0.01	Supported
H7: Consumer Trust moderates the relationship between Security and Privacy and Adoption of Digital Payment Systems	0.22	0.06	3.7	< 0.01	Supported
H8: Consumer Trust moderates - Awareness and Adoption of Digital Payment Systems	0.18	0.05	3.6	< 0.05	Supported

5. Discussions

The research extends understanding about the psychological drivers that affect customers in adopting digital payments throughout e-marketing environments in Jordan. The research extends the original TAM by introducing consumer trust as a moderating factor, which leads to dual theoretical and empirical conclusions about user behavior in emerging market financial technology systems. The research evidence shows that perceived ease of use, together with perceived usefulness, directly impacts user decisions about adopting digital payment systems according to established TAM principles [53]. User decisions fundamentally depend on systems that present few barriers to use and deliver clear benefits according to these research findings. User engagement in Jordan's market greatly depends on intuitive software solutions, which provide practical benefits since digital readiness levels differ among demographic segments.

Research findings by [46] were substantiated through the strong relationship identified between adoption and security and privacy factors. The relationship is vital in the Jordanian market because concerns about data security and online fraud, and regulatory issues lead users to feel doubtful about adopting E-teams. Permission to use data should be transparent, while encryption must include proper security standards to increase adoption rates. Users also need control over their privacy settings to feel comfortable using the solution. The study demonstrated that awareness failed to demonstrate noticeable direct links to adoption rates. Research from [29] indicated awareness activities lead to use adoption, but the present findings suggest awareness alone proves inadequate. Users might not transform their behaviors through superfluous understanding of digital payment systems if they do not possess enough motivation, alongside trust and technical expertise to operate such systems independently.

The key outcome of this research shows how consumer trust acts as a moderator between users' perceptions of ease of use and usefulness, and security/privacy and adoption behavior. The findings support earlier research showing trust serves as much more than a direct predictor because it functions as a catalyst that enhances other influencing elements [32]. The development of digital payment platforms receives psychological support through trust, which effectively reduces user-perceived risk and leads to increased engagement. Trust failed to impact the relationship between awareness and adoption, which demonstrates how user engagement and assurance are necessary for awareness to predict actual behavior. Theory-wise, this research builds up the TAM ecosystem by introducing trust as a sensitive moderating component, which enhances understanding of digital finance adoption studies. Strong predictive modelling capabilities emerged from the extended model because it predicted 68% of adoption behavior and 56% of consumer trust. Employing this integration provides a better interpretation of technology acceptance because it specifically addresses situations that require trust as a core factor. These results contribute towards a clearer understanding of the complex interactions between psychological factors and behavioral models to enhance the explanation of digital adoption pathways in e-marketing systems.

This study provides measurable suggestions that financial and digital commerce executives in Jordan can utilize within their respective sectors. Organizations providing services need to use their resources to create systems

that ensure easy usability and clear understandability, together with user support for those who have difficulties with digital skills. Secure user authentication with visible privacy policies serves to improve security perception, which leads users to trust service providers. The practice of building trust in payment system acceptance needs to move past technical capabilities to develop ongoing connection platforms and customer aid and education formats that serve users effectively. Studies show the need for collaboration between policy creators and service providers to move beyond basic educational efforts because their goal should be developing trust-based approaches that maintain user engagement permanently.

6.   Conclusion

This study analyzed what influences the use of digital payments in Jordan's e-marketing sector by modifying the TAM and including consumer trust as a factor. Perceived ease of use, reflected usefulness, and security and privacy helped to impact user adoption, but awareness and trust did not have any large effect on this. Consumer trust was shown to play a key role in making system usability, functional advantages, and strong security more effective, which increased user confidence and motivated them to use the system. The findings show that building user trust is equally vital for a digital payment system to work well. Brands and firms in finance should ensure they provide useful, secure, and openly private systems to every user. Actions to gain people's confidence with online services should progress from informing the audience to effective communication, helpful assistance, and simple-to-reach support, mainly for those who are new to the Internet. Making user systems easy and safe encourages users and decreases hesitation when they take part in digital transactions. It is important for future researchers to follow users across many years to study the evolution of trust and adoption behaviors. Including extra variables such as social support, new technology's appeal, and backing from organizations may help us learn more about the adoption of new models. Adding to this is that using the extended TAM structure in other countries would help us learn how context contributes to the use of digital payments. Trust is shown to be highly important for digital transformation, mostly in emerging markets, since people there have not yet fully accepted digital financial services.

Declaration of competing interest

The authors declare that they have no known financial or non-financial competing interests that could have appeared to influence the work reported in this paper.

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Author contributions

Ali Mohammad Ali Alqudah – Conceptualization, Methodology, Data Collection, Writing – Original Draft Preparation. Mohammad Mahmoud Saleem Alzubi – Supervision, Writing – Review & Editing, Project Administration (*Corresponding Author*). Yousef Ahmad ALarabiat – Formal Analysis, Visualization, Validation. Mohammad Issa Al Zoubi – Literature Review, Data Curation. Omar Mohammad Ali Alqudah – Software, Investigation, Resource

Ethical approval statement

Our institution does not require research ethics approval for reporting individual cases or case series.

Informed consent

Informed consent was obtained from all individual participants involved in the study prior to data collection.

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