Exploring Consumer Intentions to Use Mobile Wallet Applications in Tunisia: A Financial Characteristics Approach

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***Abstract*— Driven by the rapid evolution of mobile payment technology, this study examines the factors influencing Tunisian consumers' adoption of bank-offered mobile wallet applications. Specifically, we investigate the impact of financial factors, prior digital financial service experience, perceived cost, perceived financial vulnerability, and subjective financial knowledge. Through a survey of 321 participants and analysis using Partial Least Squares Structural Equation Modeling, we found that digital financial service experience and perceived financial vulnerability positively drive mobile wallet adoption, while perceived cost acts as a significant deterrent.**

***Keywords*— Mobile Wallet Applications, Intention to use, Consumer financial characteristics, Digital financial services experience, Perceived cost, Subjective financial knowledge, Perceived financial vulnerability, Tunisia.**

I. INTRODUCTION

In today's digital era, financial technology, particularly mobile banking applications (MWA), is reshaping the banking sector and consumer behavior ([1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [14], [15]). The increasing preference for digital transactions, such as internet banking, mobile banking, and digital payments, highlights a fundamental shift in consumer financial habits ([1], [2], [7], [13], [17], [18]). MWA serve as digital platforms that enable users to manage financial assets and conduct transactions via smartphones. Their growing popularity stems from their security, efficiency, and convenience ([1], [20]). These applications align with the modern consumer's preference for seamless financial services, eliminating the need for physical wallets and simplifying financial management ([1], [3], [9], [20], [21], [22], [23]).

Despite the global rise in MWA adoption, Tunisia lags behind, underscoring the need for an in-depth analysis of adoption factors. Previous studies have examined MWA acceptance using models such as the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) ([7], [13], [14], [19], [20], [24], [25]). However, research often neglects the role of consumer financial characteristics, despite their potential influence on adoption behavior.

This study addresses this gap by exploring how four financial characteristics—digital financial services experience, perceived cost, subjective financial knowledge, and perceived financial vulnerability—affect the intention to use MWA in Tunisia. By analyzing these variables and their interrelationships, the research aims to provide valuable insights for the expansion of MWA in the Tunisian market.

By focusing on Tunisia's unique socio-economic dynamics, this study offers theoretical and practical contributions. It provides policymakers, financial institutions, and marketers with targeted strategies to enhance MWA adoption and promote digital financial inclusion. The findings will help bridge the knowledge gap, guiding future research and practical applications in this evolving financial landscape.

II. BACKGROUND AND DEVELOPMENT OF THE FRAMEWORK

Research explores MWA adoption in digital finance, building on mobile payment studies. Factors like barriers, facilitators, and theoretical drivers shape user intention. This analysis aims to clarify these influences, highlighting the technology, behavior, and financial ecosystem's interaction. Understanding this drives digital financial inclusion's future.

A. Mobile wallet applications as technological and financial innovation

Mobile payment, utilizing technologies like QR codes and NFC, facilitates financial transactions via mobile devices ([1], [3], [6], [14], [18], [20], [21], [22], [23], [24], [25], [27]). Mobile wallet applications (MWA) represent a sophisticated form of this, linking bank accounts and cards for diverse transactions ([1], [9], [13], [14],

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[18], [23]). Driven by increased digitization and smartphone adoption, MWA offer convenient, anytime-anywhere financial management ([3], [20], [24]). They enhance convenience through streamlined payments, security with biometric authentication, and potential cost savings via loyalty programs ([1], [8], [13], [22], [23], [24]). MWA also simplify peer-to-peer transfers, making them a popular choice for efficient financial handling [1].

B. Consumer financial characteristics as a predictor of intention to use MWA

Given the limited research on consumer financial characteristics influencing MWA adoption, this section explores their role. Factors like digital financial services experience, perceived cost, financial knowledge, and vulnerability are examined as predictors of MWA use. By analyzing these dimensions, we aim to clarify how financial characteristics shape user intention, highlighting the motivations behind leveraging MWA convenience and security.

1) Digital financial services experience:

Digital financial services experience, akin to online brand experience [28], reflects an individual's subjective response to digital financial management tools. Customer experience, a key competitive advantage [2, 29], is crucial in retail finance [30]. In e-banking, touchpoints like websites, apps, and mobile payments contribute to this experience [2]. A positive experience, marked by user-friendly interfaces and secure transactions, fosters trust and familiarity, encouraging MWA adoption [31, 32].

Positive experiences, arising from interactions with digital financial providers [41], drive satisfaction, loyalty, and revisit intentions [28, 33, 34, 35, 36, 37, 38, 39, 40]. They include seamless transactions, robust security, and personalized features, alongside effective customer support. Conversely, negative experiences deter adoption.

A satisfying digital financial experience acts as a catalyst for MWA intention. This is supported by the theory that positive customer experiences lead to repeat usage [32]. Thus, a positive experience, characterized by ease of use and perceived value, shapes user perceptions and behaviors, promoting innovative financial technology adoption. Therefore:

H1. Digital financial service experience positively impacts the intention to use MWA.

2) Perceived cost:

Perceived cost, encompassing monetary and non-monetary expenses, influences decision-making, including the adoption of technology-enabled services ([7], [42]). In the context of MWA, it represents a user's subjective evaluation of financial and time-related charges associated with these digital platforms ([42], [43], [44]). This includes transaction fees, currency conversion charges, subscription fees, and opportunity costs like learning time and security risks ([7], [16], [17], [20], [45], [46]).

Customers weigh these costs against perceived benefits. If the financial outlay is deemed minimal compared to the convenience and efficiency offered, adoption intention is high. Conversely, excessive costs or security concerns inhibit adoption. This mirrors findings in cashless transaction methods, where cost impacts usage ([20], [42], [43], [44]).

Perceived cost significantly shapes behavioral intention across various digital financial services, including mobile banking and MWA ([7], [13], [15], [16], [17], [20], [42], [44], [45], [46], [47], [48], [49]). Since cash transactions are typically fee-free, users expect minimal costs with MWA [27]. Therefore, managing perceived costs is crucial for promoting widespread adoption, as concerns about financial burdens or security risks can significantly deter users. Thus:

H2: Perceived cost has a negative effect on the intention to use MWA.

3) Subjective financial knowledge:

Financial knowledge, encompassing personal finance understanding, is assessed subjectively or objectively ([1], [50], [51], [52], [53]). Subjective financial knowledge, focusing on perceived understanding, reflects confidence in financial matters ([55]). Influenced by education and experiences, it shapes financial behaviors and decisions.

Subjective financial knowledge predicts positive financial behavior and well-being ([1], [51], [54], [57]). Individuals with higher perceived knowledge make informed financial decisions, demonstrating proactive planning and risk management ([1], [26], [50], [58]). In cashless transactions, financial knowledge affects payment choices, increasing contactless payment frequency [59].

For MWA, high financial knowledge fosters confidence in navigating complexities and managing risks, driving adoption. However, some studies suggest lower financial knowledge among mobile payment users [11]. Financially literate users demonstrate healthier financial actions compared to their less knowledgeable counterparts [11]. Conversely, low subjective financial knowledge can lead to MWA hesitancy. Therefore, subjective financial

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knowledge significantly influences MWA attitudes and intentions. Targeted financial education is crucial for enhancing digital literacy and promoting adoption. Thus:

H3: Perceived financial knowledge positively impacts the intention to use MWA.

4) Perceived financial vulnerability:

Financial vulnerability refers to an individual's capacity to manage financial setbacks, encompassing both objective and subjective assessments ([12], [60], [61]). Perceived financial vulnerability, shaped by factors like job insecurity and debt, influences financial behaviors and decision-making ([60], [62]).

In the MWA context, the impact of financial vulnerability on adoption is complex. Some financially vulnerable individuals may avoid MWA due to concerns over security, complexity, or potential financial risks, preferring traditional methods. Conversely, financially secure individuals may see MWA as efficient tools for managing finances, drawn by convenience and cost savings.

However, financially vulnerable individuals may also heavily rely on mobile payment tools, including MWA, to manage financial distress ([12], [63], [64]). This reliance can lead to impulsive spending, exacerbating financial vulnerability, as digital payments are linked to increased financial risk ([12]). Therefore:

H4. Financial vulnerability will be positively associated with customers' intentions to use MWA.

III. RESEARCH METHODOLOGY

A. State of mobile wallet applications in Tunisia

In June 2022, Tunisia's Central Bank launched its first mobile wallet, adopted by nine banks. This platform enables fund transfers, business payments, and cash transactions via MWA and QR codes, streamlining consumer and merchant interactions.

B. Research instrument design and measures

This study employs a quantitative approach to investigate MWA usage in Tunisia. A pre-tested questionnaire, focusing on intention to use, digital financial services experience, perceived cost, subjective financial knowledge, and perceived financial vulnerability, was distributed to MWA users and non-users. Items, adapted from prior financial studies, were tailored for the Tunisian context.

A pilot study with 26 participants validated the questionnaire, with scholar review ensuring validity and reliability. Revisions, informed by pilot feedback, enhanced clarity. Intention to use items were from [67], digital financial services experience from [2], perceived cost from [13], and perceived financial vulnerability from [74]. Subjective financial knowledge was measured using a single item, deemed adequate despite limitations, as per [68], and supported by prior research ([55], [68], [69], [70], [71], [72], [73]).

The questionnaire, featuring twenty Likert-scale questions (1-5) and demographic inquiries, excluded pilot data from the final analysis.

C. Sampling and data collection procedure

Based on the convenience sampling technique, data was gathered through a structured questionnaire distributed to participants via an online web format (Google Forms) from October to November 2023. A sample of a total of 321 respondents was collected to attain the objectives of the research.

D. Research technique

PLS-SEM, using *SmartPLS 4*, assessed the influence of variables on MWA intention. The analysis included an outer model linking latent variables to indicators, and an inner model examining relationships between intention and financial factors.

E. Common method bias

To assess common method bias, Harman's single factor was examined as suggested by [75]. The overall covariance for the single element was 29.685 %, which is below 50 %, suggesting that there is no notable concern about overall structural bias [75]. Consequently, there is no significant traditional process bias detected in the data collection.

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IV. Data Analysis and Results

A. Measurement model assessment

1) Indicators' multicollinearity assessment:

The first step involves evaluating multicollinearity using the Variance Inflation Factor (VIF) [76]. The VIF values were found to be below the recommended threshold of 5, as indicated by [77], indicating the absence of multicollinearity concerns.

2) Reliability:

We assessed reliability using both Cronbach's alpha and composite reliability (CR) ([78], [79]). All CR values exceeded the recommended threshold of 0.7 ([79], [80]). Similarly, Cronbach's alpha values are above 0.7 ([78], [80]). These results indicate strong internal consistency within the measures used in this study.

Table I.

Composite reliability and Cronbach's alpha

	Rho_c	**Cronbach's alpha**
Intention to use	0.945	0.927
Digital financial services experience	0.917	0.893
Perceived cost	0.919	0.893
Perceived financial vulnerability	0.904	0.868

3) Convergent validity:

Convergent validity was established as factor loadings all exceed 0.7 and the Average Variance Extracted (AVE) is greater than 0.5. These values indicate the measures adequately capture their intended constructs.

Table II.

Factor loadings and average variance extracted

	Items	**Item loadings**	**AVE**
Intention to use	IU1	0.875	0.774
	IU2	0.889	
	IU3	0.896	
	IU4	0.891	
	IU5	0.845	
Digital financial services experience	DFSE1	0.738	0.649
	DFSE 2	0.832	
	DFSE 3	0.865	
	DFSE 4	0.810	
	DFSE 5	0.766	
	DFSE 6	0.815	
Perceived cost	PC1	0.764	0.742
	PC2	0.843	
	PC3	0.916	
	PC4	0.912	
Subjective financial knowledge	SFK1	1.000	-
Perceived financial vulnerability	PFV1	0.849	0.703
	PFV2	0.825	
	PFV3	0.914	
	PFV4	0.760	

4) Discriminant validity:

There are two types of validity assessed: item-level and construct-level.

Item-level validity ensures each question aligns best with its intended construct. This is achieved when an item's loading (Table 3) with its corresponding construct is higher than its loadings with other constructs [78].

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TABLE III.

ITEMS CROSS-LOADINGS

	Intention to use	Digital financial services experience	Perceived financial cost	Subjective financial knowledge	Perceived financial vulnerability
Intention to use					
IU1	**0.875**	0.284	-0.137	0.189	0.115
IU2	**0.889**	0.301	-0.184	0.155	0.076
IU3	**0.896**	0.335	-0.229	0.168	0.098
IU4	**0.891**	0.393	-0.122	0.147	0.204
IU5	**0.845**	0.300	-0.122	0.153	0.109
Digital financial services experience					
DFSE1	0.345	**0.738**	-0.171	0.284	-0.051
DFSE 2	0.270	**0.832**	-0.270	0.320	-0.103
DFSE 3	0.267	**0.865**	-0.301	0.275	-0.124
DFSE 4	0.231	**0.810**	-0.300	0.313	-0.114
DFSE 5	0.215	**0.766**	-0.276	0.334	-0.176
DFSE 6	0.387	**0.815**	-0.225	0.297	-0.019
Perceived cost					
PC1	-0.044	-0.177	**0.764**	-0.080	0.277
PC2	-0.121	-0.245	**0.843**	-0.112	0.244
PC3	-0.181	-0.311	**0.916**	-0.092	0.179
PC4	-0.191	-0.282	**0.912**	-0.140	0.260
Subjective financial knowledge					
SFK1	0.183	0.375	-0.127	**1.000**	-0.089
Perceived financial vulnerability					
PFV1	0.141	-0.076	0.205	-0.024	**0.849**
PFV2	0.055	-0.060	0.213	-0.069	**0.825**
PFV3	0.152	-0.111	0.221	-0.113	**0.914**
PFV4	0.056	-0.123	0.288	-0.118	**0.760**

Discriminant validity, confirming distinct constructs, was assessed using AVE and HTMT. AVE square roots exceeded inter-construct correlations, and HTMT values were below 0.85, indicating adequate discriminant validity.

TABLE IV.

LATENT VARIABLE CORRELATIONS BASED ON THE FORNELL-LARCKER CRITERION

	Intention to use	Digital financial services experience	Perceived cost	Perceived financial vulnerability	Subjective financial knowledge
Intention to use	**0.880**				
Digital financial services experience	0.372	**0.805**			
Perceived cost	-0.311	-0.180	**0.861**		
Perceived financial vulnerability	-0.109	0.142	0.260	**0.839**	
Subjective financial knowledge	0.375	0.183	-0.127	-0.089	**1.000**

TABLE V.

HTMT MATRIX

	Digital financial services experience	Intention to use	Perceived cost	Perceived financial vulnerability	Subjective financial knowledge
Intention to use	0.384				
Perceived cost	0.337	0.173			
Perceived financial vulnerability	0.145	0.129	0.330		
Subjective financial knowledge	0.398	0.191	0.129	0.103	

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B. Structural model assessment

1) Multicollinearity assessment:

According to [82], assessing collinearity involves examining VIF values, which ideally should not exceed 5. Values exceeding 5 may indicate potential collinearity issues. The outer VIF values are presented in Table 7.

TABLE VI.

COLLINEARITY STATISTICS (VIF) – INNER MODEL

	Intention to use
Digital financial services experience	1.268
Perceived cost	1.174
Perceived financial vulnerability	1.077
Subjective financial knowledge	1.167

2) Hypotheses testing:

Path coefficients are presented in Table 10. T-statistics should be higher than 1.96 and a P value less than 0.05. Three hypotheses were supported: H1, H2, and H4. However, one hypothesis was rejected: H3.

TABLE VII.

PATH COEFFICIENTS OF THE HYPOTHESES

Hypotheses	**T statistics**	**P values**	**Path coefficients**	**Test results**
H1	5.587	0.000	0.333	Supported
H2	2.349	0.000	-0.125	Supported
H3	1.053	0.292	0.062	Not supported
H4	3.456	0.000	0.216	Supported

3) Model's predictive relevance:

The model's predictive relevance was evaluated using R^2, Cohen's f^2, and Q^2. R^2, at 18.8%, indicates limited variance explanation for MWA usage intention, though it meets the minimum threshold ([83]). This variance is attributed to digital financial services experience, perceived cost, and financial vulnerability.

Cohen's f^2 showed digital financial services experience and financial vulnerability had small effects, while perceived cost and financial knowledge had negligible effects.

The Stone-Geisser Q^2 test, with a value of 0.152, confirmed acceptable predictive relevance for the model ([84], [85], [86]). This indicates the model's ability to predict MWA usage intention.

TABLE VIII.

EXPLANATORY POWER

Outcome	**Predictors**	**f^2**	**Result**	**R^2**	**Result**	**Q^2**
Intention to use	Digital financial services experience	0.108	Small	0.188	Weak	0.152
	Perceived cost	0.016	No			
	Subjective financial knowledge	0.004	No			
	Perceived financial vulnerability	0.054	Small			

4) Model's predictive power:

The out-of-sample predictive power, assessed through the PLS predict procedure, is employed to evaluate the model's predictive power. Among the indicators in the PLS-SEM analysis (3 out of 5), most exhibit lower prediction errors compared to the LM, indicating a medium predictive power [87].

V. DISCUSSION

This study investigated Tunisian consumers' MWA adoption, expanding traditional models with digital financial services experience, perceived cost, and financial vulnerability. Results indicated these factors significantly influence MWA intention, highlighting their predictive power and the importance of user-friendly designs and security. Subjective financial knowledge was insignificant.

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Digital financial services experience strongly influences MWA adoption. Prior positive experiences with digital finance increase MWA usage intention, emphasizing the need for banks to enhance digital interfaces and support. Targeted education can broaden adoption.

Perceived cost negatively affects MWA adoption. High costs, like transaction fees, deter usage, especially in developing countries ([13], [45], [4]). Transparent pricing and cost-free trials can enhance adoption.

Perceived financial vulnerability positively influences MWA intention. Individuals may see MWA as tools for better financial management ([10], [12]). Marketing should emphasize these benefits.

Contrary to expectations, subjective financial knowledge did not significantly influence MWA intention. This contradicts prior research ([1]), suggesting self-assessed financial knowledge doesn't automatically lead to MWA adoption. Users may not see added value over traditional methods. Understanding users' financial knowledge is crucial for assessing usage consequences ([12]).

VI. Conclusion

Digital technologies have transformed financial services, with MWA revolutionizing transactions globally ([7], [19]). Tunisian banks have adopted these apps, but their success hinges on consumer intention. This study examines how consumer financial characteristics—digital financial services experience, perceived cost, subjective financial knowledge, and perceived financial vulnerability—influence MWA usage in Tunisia.

Using PLS-SEM, the research, based on data collected via non-probabilistic sampling from October to November 2023, assesses relationships and validity. Results highlight the significant impact of digital financial services experience, perceived cost, and financial vulnerability on MWA adoption.

A. Theoretical implications

This study significantly contributes to IT/IS acceptance research by providing a theoretical framework for MWA literature, applying consumer financial characteristics in a novel context—Tunisia. It demonstrates the relevance of this perspective in the banking sector, using four financial characteristics to predict MWA usage.

Consistent with prior research, digital financial services experience, perceived cost, and financial vulnerability significantly influence MWA adoption intention. This research addresses the emerging trend of MWA in banking, offering insights for researchers to maximize advantages and minimize disadvantages. It enhances banking literature by elucidating the impact of these financial characteristics on MWA usage intention.

B. Practical implications

This study offers practical implications for banking merchants and managers. Merchants benefit from MWA through reduced fraud and transaction costs ([14]). Policymakers and businesses gain insights into customer cost perceptions, aiding cashless transaction adoption ([42]).

Understanding MWA acceptance is crucial for service development and communication strategies. This research illuminates the value and potential of MWA for Tunisian banks, which are increasingly adopting these technologies.

To boost MWA usage, banks must highlight perceived customer benefits. This study, the first to examine four financial characteristics—digital financial services experience, perceived cost, and financial vulnerability—in the Tunisian context, informs bank decision-making.

A positive digital financial services experience drives adoption, emphasizing the need for user-friendly, reliable MWA ([22]). Banks should improve content, visuals, and interfaces. This study helps MWA authorities develop user-accepted systems.

Transparent fee structures and cost-benefit communication address perceived cost concerns. Building trust and ensuring robust security measures alleviate financial vulnerability concerns. Addressing these factors increases MWA adoption, customer satisfaction, and loyalty.

C. Limitations and future research directions

This study acknowledges several limitations, suggesting avenues for future research. Firstly, the use of a non-probabilistic sample and a relatively small sample size (252 respondents, with a predominance of non-users) limits generalizability. Future studies should employ diverse sampling methods, larger samples, and include more MWA users from various regions and banks. Incorporating demographic moderators like age, gender, education, and income could also enhance understanding.

Secondly, the study's narrow scope, focusing on nine Tunisian banks, may not fully represent the diverse MWA landscape. Expanding research to include more banks and transaction types is crucial for a comprehensive analysis.

Thirdly, while consumer financial characteristics were examined, other influencing factors like service quality, perceived value, privacy, security, trust, usefulness, self-efficacy, and social influence were not included. Future research should explore these variables to provide a more nuanced understanding of MWA adoption. Additionally,

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including a wider range of vulnerability variables and conducting comparative studies across different countries could yield valuable insights into the cost-adoption relationship.

Fourthly, this study focused on intentions, not actual behavior. Future research should bridge this gap by investigating real MWA usage and comparing it with stated intentions. Longitudinal studies could also illuminate temporal effects and the impact of prior knowledge on actual usage.

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