

Mobile wallets in cash-based economies during COVID-19

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Abstract

Purpose – The coronavirus disease 2019 (COVID-19) pandemic altered business and personal activities globally especially stimulating contactless financial transactions. However, despite the similar national lockdowns in cash-based economies, the adoption of contactless transactions through the widely available mechanism, mobile wallets, remained low. This research aimed to identify the factors surrounding this peculiarity.

Design/methodology/approach – The study was investigated using a composite model based on the diffusion of innovation theory (DIT), technology acceptance model (TAM) and information systems success model (ISSM). Data were collected from 621 Cameroonian mobile wallet users and analyzed using partial least squares structural equation (PLS-SEM) modeling.

Findings – The key findings revealed that the usage of mobile wallets, in the current form, were not affected by the perceived ease of use and did not match the existing lifestyle of users in Cameroon (no compatibility). The branding of mobile wallets (image) which was based on global messaging did not appeal to Cameroonians; in fact, the branding gave mobile wallets a negative image.

Originality/value – These key findings reveal the dangers of assuming that global strategies which have been effective in dealing with the pandemic will be effective in low-income or cash-based economies. The findings suggest that considering essential contextual dispositions is critical.

Keywords Mobile wallets, Adoption, COVID-19, Cash-based economies

Paper type Research paper

1. Introduction

Before the COVID-19 pandemic, many countries, especially low-income countries, had traditional cash-based economies where cash was the preferred means of financial transactions for retail services. However, the introduction across the globe of COVID-19 counter measures such as lockdowns and movement restrictions disrupted many business activities (Guthrie *et al.*, 2021). As a result, many countries, including low-income countries with cash-based economies, were forced to adopt cashless and digital mechanisms such as mobile wallets to execute financial transactions (Yang *et al.*, 2015; Wu *et al.*, 2017; Alswaigh and Aloud, 2021).

A mobile wallet is an application that is downloaded to a mobile device or an existing built-in feature of a smartphone to make contactless payments (Mew and Millan, 2021). The built-in feature of a smartphone allows consumers to store debit cards, credit cards, or reward card information to facilitate the payment transaction. Typically, the installed software is set up

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by inputting the user's card payment information, which is connected to a personal identity format such as a number, quick response (QR) code, or the owner's image, and stored in the wallet.

Mobile wallets allow quick, convenient, and timesaving in-store payments as opposed to paying with cash or carrying physical credit cards (Mombeuil, 2020; Mew and Millan, 2021). The mobile wallet program employs a technology known as near-field communication (NFC) (Leong *et al.*, 2013, 2020), which enables communication between devices through radio waves. The NFC communicates payment data with the dealer's point-of-service (POS) terminal using the personal identity format developed for the user (Leong *et al.*, 2020). Information is transmitted when the user passes an NFC-activated smartphone over the store's NFC scanner.

Mobile wallets allow various transactions to be performed, including online purchases, utility payments, money transfers, automated and timely payments, and expenses management (Iman, 2018). Mobile wallets are growing in popularity among the general public, with 4 billion users and a market size of \$7,580.1 billion predicted by 2024 and 2027, respectively (Sneha *et al.*, 2020). Mobile wallets rank among the quickest developing areas regarding future mobile technology payment methods owing to their convenience, ease of use, security, and fast service delivery. The mobile wallet innovation is beneficial to businesses because it is used to make cashless payment transactions, thus providing financial institutions with another source of income (Mew and Millan, 2021). The adoption of mobile wallets by consumers varies significantly across markets. While China leads the way with 87% of mobile wallet usage, countries such as the United Kingdom (75%) and the United States (66%) are close behind (Statistica, 2021). The adoption and use of mobile wallet innovation in Africa is still in infancy (Matemba and Li, 2018).

The development of mobile wallets applications has increased in recent years, notably during the COVID-19 pandemic. Several studies have investigated user intentions and perspectives; however, few, if any, have been undertaken in cash-based economies. This paper sought to understand the factors that influenced cash-based economies to adopt mobile wallets during the COVID-19 pandemic. Before the pandemic, some studies suggested some critical inhibitors of mobile wallet adoption such as anxiety, awareness, risk, technology skills, and complexity (Sharma *et al.*, 2018; Zamani and Giaglis, 2018; Leong *et al.*, 2021). Similarly, key factors that influence the adoption of mobile were also highlighted, namely relative convenience, privacy, security, and relative advantage (Mombeuil, 2020). Al-Saedi *et al.* (2019) posited that more studies are needed to investigate other factors impacting mobile payment acceptance. Factors influencing mobile payment acceptance in different contexts have been reported in the literature. However, studies on enablers and inhibitors of mobile wallet adoption in the low-income and cash-based economies context are limited. To this end, this study aimed to answer the following research question: *What factors influenced mobile wallet adoption in cash-based economies during COVID-19?*

To answer the research question, we derived a composite model with eight components from three adoption theories, namely the diffusion of innovations theory (DIT): (compatibility, image, and relative advantage) (Rogers, 2003), technology acceptance model (TAM): perceived ease of use and perceived usefulness (Davis, 1989), and information system success model (ISSM): information quality, system quality, and service quality (Delone and Mclean, 1992). The composite model was applied to investigate the adoption of mobile wallets in the Republic of Cameroon, an African country with a cash-based economy. Cameroon is generalizable to many other similar cash-based economies.

Given the adoption of mobile wallets by countries with cash-based economies, this study will make the following contributions:

- (1) It will examine and identify the key aspects that may impact the adoption of mobile wallets in cash-based economies.
- (2) It will increase the inventiveness of mobile application developers when designing effective mobile wallets.
- (3) It will aid industries in analyzing the advantages and disadvantages of future decisions and approaches for adopting mobile wallets.

The remainder of this paper is structured as follows. The theoretical overview of the study is presented in [Section 2](#). [Section 3](#) describes the conceptual research model. [Section 4](#) discusses the research methodology. [Section 5](#) presents the analysis and results, while [Section 6](#) outlines the limitations of this research study and highlights future work prospects.

2. Theoretical overview of the study

This section discusses the background information relating to mobile wallet technology and the potential factors that may influence the adoption of mobile wallets.

2.1 Overview of mobile wallet

A mobile wallet is a payment system that allows companies and users to receive and transfer money using smartphones. It is a type of e-business model intended to be utilized with mobile devices due to their portability and ease of usage. The wallet can be an incorporated feature of a mobile device, or a mobile application installed on a smartphone. Mobile wallets may be viewed as an extension of mobile banking and mobile money because they allow users to retain personal and credit or debit card information for payments purposes. A mobile wallet may be considered a storehouse for all customer-related information necessary for mobile financial transactions. Similarly, e-wallet and instant money applications may be considered platforms in which money is held digitally and used for payments through smartphones and computers ([Chawla and Joshi, 2019](#)). Common mobile wallets include Apple Pay, Google Pay, and Samsung Pay.

The adoption rate of mobile wallets is increasing rapidly ([Chawla and Joshi, 2019](#); [Routray et al., 2019](#)). The world is beginning to embrace the digital payment market through mobile payment instead of credit or debit cards to perform various transactions. For this reason, the global adoption of mobile wallets is expected to increase from 50–55% in 2020 to 75% by 2025 ([Beroe, 2021](#)). Owing to a COVID-19-stimulated demand for digital payments, merchants now aim to expand their mobile payment options. In addition, large international banks are reducing cash transactions while improving mobile wallet use for various types of financial transactions. This is also because mobile wallets are simple to create and utilize, and they necessitate a configuration of built-in functionalities in mobile devices. To make a digital payment with a mobile wallet, the user can simply wave the mobile device near an NFC-activated terminal. Mobile wallets are categorized into three different types, namely open, closed, and semi-closed mobile wallets ([Chawla and Joshi, 2019](#)).

As new technology innovation, mobile wallets have been investigated from different perspectives, including adoption ([Johnson et al., 2018](#); [Al-Saedi et al., 2019](#); [Routray et al., 2019](#); [Alswaigh and Aloud, 2021](#)), impacting factors ([Azizah et al., 2018](#); [Liébana-Cabanillas et al., 2018](#); [Sharma et al., 2018](#); [Mombeuil, 2020](#); [Binti Azman et al., 2021](#); [Mew and Millan, 2021](#)), moderating effects ([Wu et al., 2017](#)), mobile market ([Sneha et al., 2020](#)), and user intention ([Chawla and Joshi, 2019](#); [Mew and Millan, 2021](#)).

2.2 Adoption of mobile wallet in cash-based economies

While the adoption of mobile wallets in developed countries such as the US, UK, and China is alarming, the acceptance is still low in low-income countries. The majority of the cash-based

economies are late and slow adopters of innovations (Rogers, 2003) because they practice a wait-and-see attitude towards adopting innovations (Okonkwo *et al.*, 2019). Nonetheless, mobile wallet technologies already exist and are used in many low-income countries like Kenya and Nigeria.

2.3 *The use of theories*

This study derived its measures from three well-known theories (i.e. DIT, ISSM, and TAM) to develop a composite model. The importance of these theories has previously been explained, and references to studies that have recently used these theories have also been cited. Gregor (2006) emphasized the importance of creating composite or integrated models to understand the phenomena better. The DIT describes the adoption of technological innovations by modeling the aspects of communication and human information relations. The ISSM defines, characterizes, and explains the links between the essential characteristics of success in information systems. TAM proposes that when consumers are offered a new technology, several factors influence their choice in terms of how and when they will use it. Although TAM has been criticized for being outdated, a bibliometric study revealed that the number of studies on TAM and its applications is increasing, implying that using, modifying, and expanding the model is still valid across a wide range of applications and areas (Al-Enran and Granić, 2021). According to (Venkatesh *et al.*, 2007), TAM's common criticisms are its primary strengths. Although other competing models have a broader range of features, empirical evidence has generally favored TAM and its derivatives. In addition, recent studies used TAM to determine the factors Influencing Wearable Device Adoption (Gopinath *et al.*, 2022) and to examine the factors that impact the use of Artificial Intelligence voice assistants (Balakrishnan *et al.*, 2021).

2.4 *Model development of influencing factors*

2.4.1 Compatibility. Compatibility refers to how well an invention is compatible with the existing values, prior practices, and wants of potential users (Rogers, 2003). Compatibility influences the acceptability and use of digital mechanisms for financial transactions (Nel and Boshoff, 2022). If a mobile technological breakthrough such as a mobile wallet is consistent with the context of the social system, it is more likely to be widely adopted. The efficient usage of mobile wallets necessitates an NFC-enabled environment, including NFC connection features on POS and smartphones (Leong *et al.*, 2020). Compatibility is, therefore, a significant factor determining the adoption of mobile wallets in cash-based economies (Lin *et al.*, 2020). This study, therefore, makes the following hypothesis:

H1. Compatibility positively influences the adoption of mobile wallets in cash-based economies

2.4.2 Image. Images are one example of “non-verbal stimuli” used in advertising to communicate information, improve recollection, and reinforce messaging arguments (Unnava and Burnkrant, 1991). They are frequently used with print because they give additional illustrations of what is being addressed in the text that customers can readily understand (Gerrig *et al.*, 2015). The inclusion of visuals improves trusting beliefs, possibly because images are richer media and are higher at promoting personal concentration, aiding the greater-level information processing required for trust development (Zinko *et al.*, 2020). Images have been shown to increase consumer confidence in e-commerce (Rahi *et al.*, 2020) and promote the adoption of e-wallet applications (Binti Azman *et al.*, 2021). Trust is essential for promoting innovation in mobile payments such as mobile wallets, especially in Africa. The following hypothesis was thus proposed:

H2. Image is likely to positively influence the adoption of mobile wallets in cash-based economies.

2.4.3 Relative advantage. According to (Rogers, 2003), the relative advantage is the degree to which an invention is perceived as superior to the concept it replaces. Relative advantage influences an individual's intention to adopt and use mobile payment services. A link between relative advantage and individual adoption capability was identified in Kenya and Nigeria on the adoption of mobile banking services (Kiura and Solomon, 2012). Mobile wallets have better features and services than similar concepts (Johnson *et al.*, 2018). Studies revealed that relative advantage positively impacts people's intentions to use mobile wallets (Lin *et al.*, 2020; Mombeuil, 2020). In line with previous studies, the following hypothesis was proposed:

H3. Relative advantage positively influences the adoption of mobile wallets in cash-based economies

2.4.4 Perceived ease of use. A key concept from TAM relates to people's opinion of how straightforward and easy it is to use a specific technological innovation (Davis, 1989). The perceived ease of use and usefulness are important factors that predict technology adoption (Chen and Aklirikou, 2020) and support mobile technology services (Al-Emran *et al.*, 2020). Concerning the adoption of mobile payments, studies have revealed that perceived ease of use has a significant impact on perceived usefulness (Li *et al.*, 2014; Liébana-Cabanillas *et al.*, 2020) and consumers' intention to use mobile payments (Shang and Wu, 2017; Leong *et al.*, 2020). Furthermore, it was proven that perceived simplicity of use significantly affects perceived usefulness in short message service (SMS) and NFC mobile payment systems (Liébana-Cabanillas *et al.*, 2018). Considering the impact of perceived ease of use on the adoption of technology and perceived usefulness, the following hypotheses were proposed:

H4. Perceived ease of use positively influences the adoption of mobile wallets in cash-based economies.

H5. Perceived ease of use positively affects the perceived usefulness of the adoption of mobile wallets in cash-based economies.

2.4.5 Perceived usefulness. This factor is derived from TAM, which was proposed by Davies *et al.* (Davis, 1989). Perceived usefulness is a potential consumer's subjective conviction that asserts that employing a particular technology will improve their productivity at work. Perceived usefulness, which is similar to relative advantage in DIT, is an essential driver of the adoption of mobile applications services (Tam *et al.*, 2020). Also, other than being an important factor that influences users' intention to use a technology innovation (Chen and Aklirikou, 2020), it reduces users' perception of risk to acquire a product (Wu *et al.*, 2017). Perceived usefulness significantly influences users' propensity to utilize online banking (Rahi *et al.*, 2020). In the context of m-payments, perceived usefulness indicates that using an m-payment method may benefit a user paying for a particular item. The following hypothesis was thus proposed:

H6. Perceived usefulness positively influences the adoption of mobile wallets in cash-based economies

2.4.6 Information quality. Information quality is one of the six key success dimensions used to measure information systems success, which was proposed by (Delone and Mclean, 2003). Information quality refers to the desirable properties of system outputs such as management reports and websites (Petter *et al.*, 2008). Several studies have been conducted on the relevance of information quality (Shim and Jo, 2020; Shahzad *et al.*, 2021). It was established that information quality influences users' intention to use mobile application services (Azizah *et al.*, 2018). The quality of mobile applications affects users' involvement and acceptance, and high-quality content improves the value of an application (Lee *et al.*, 2014). Routray *et al.* (2019) concluded that the information quality of mobile wallets has a substantial influence on perceived utility,

allowing users to maintain their intention to use mobile wallets. Regarding mobile payment services, high-quality content may increase mobile wallets' understandability, usability, and relevance, thereby influencing their adoption. The following hypothesis was thus proposed:

- H7. Information quality positively influences the adoption of mobile wallets in cash-based economies*

2.4.7 System quality. System quality refers to the desired properties of an information system, including ease of use, system dependability, system flexibility, ease of learning, sophistication, adaptability, and processing period (Petter *et al.*, 2008). These system attributes are thought to be exposed to users (Shim and Jo, 2020). Al-Marooof and Salloom (2021) have established that the system's quality substantially influenced satisfaction and intent to use mobile application services. The quality of the system impacts customer happiness (Sebetci, 2018). The following hypothesis was thus proposed:

- H8. System quality positively influences the adoption of mobile wallets in cash-based economies*

2.4.8 Service quality. Service quality refers to the level of assistance such as adequate responsiveness, correctness, dependability, and technical skill provided by the information technology (IT) support professionals to system users (Petter *et al.*, 2008; Raza *et al.*, 2020). The efficacy of an information system is heavily influenced by the quality of its services (Al-Dweeri *et al.*, 2019), which in turn affects users' satisfaction (Sebetci, 2018). As a result, the influence of service quality on users' satisfaction regarding the adoption of mobile wallets is projected to be positive and substantial, which serves as the foundation for the following hypothesis.

- H9. Service quality positively influences the adoption of mobile wallets in cash-based economies*

3. The composite conceptual model

This study is based on three well-known frameworks for measuring technology adoption and use: DIT, TAM, and ISSM. There are eight constructs in the model, namely: relative advantage, compatibility, image, perceived ease of use, perceived usefulness, information quality, system quality, and service quality. These theories were chosen because they are well recognized and have good characteristics for evaluating technological innovation. This study attempts to identify the factors influencing the adoption of innovative technology in the form of mobile wallets in cash-based economies, using Cameroon as the case study. Figure 1 shows the composite research model.

4. Research methodology

The target respondents were mobile wallet users in Cameroon. Cameroon is considered the driving force of Central Africa's economy and has cash-based similarities with many other African countries. As of 2019, the total number of mobile subscribers stood at 19.10 million, accounting for 76% of the Cameroonian population. Mobile broadband connections (3G & 4G) account for about 23%. About 99% of all mobile connections are pre-paid, and only 1% are post-paid (Fosso Wamba *et al.*, 2021). In terms of mobile connectivity, the overall index score of the country (on a scale of 1–100) stood at 42.76, 25.69 for the mobile network infrastructure, 58.64 for the affordability of devices and services, 54.90 for consumer readiness, and 40.42 for the availability of relevant content and services (Fosso Wamba *et al.*, 2021). Mobile money services have been, over the last decade, considered a vital tool in improving financial inclusion in Africa, and Cameroon in particular.

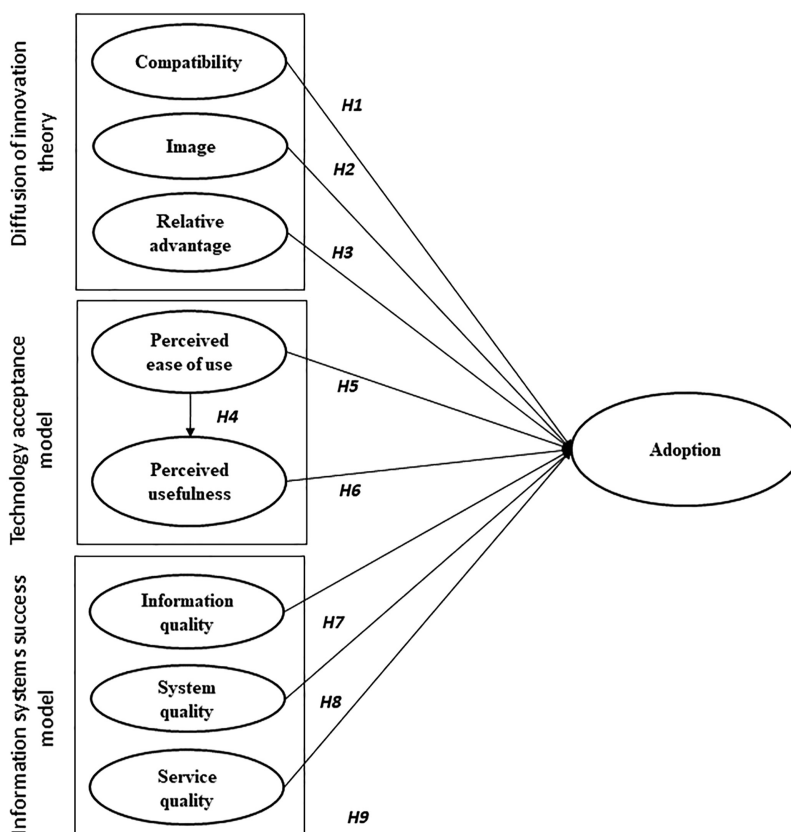


Figure 1.
Research
conceptual model

4.1 Sampling procedure and data collection

A cross-sectional survey design was created in two forms: web-based and paper-based, both in French and English. The survey was created using indicators derived from previous studies and tailored to the m-wallet context. The constructs were explicitly adapted from the following sources: compatibility, relative advantage, and image from Rogers (2003); perceived ease of use and perceived usefulness from Davis (1989); Information Quality, System Quality, and Service quality from Delone and Mclean (1992). A 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) was utilized for the measurements.

The target population was mobile wallet users from Cameroon. Since the sampling frame is unavailable, we opted for a non-probabilistic sampling strategy: convenience sampling. This is consequent upon ensuring that participants are active m-wallet users by filtering out non-active m-wallet users or participants who did not have an m-wallet account. A survey pre-testing involving eight active m-wallet users was conducted to check for content validity. Their comments and suggestions had little effect on the final surveys used for the pilot testing phase. The pilot study of the two types of surveys was conducted from 7 to 10 December 2019, with 61 useable observations from active m-wallet wallet users. The pilot study enabled us to test the robustness of our proposed model before executing the final data collection phase.

The final data collection was undertaken from 11 to 30 December 2019. For the online data collection, an invitation letter explaining the objectives of the study, as well as the link to each survey, was sent to all active m-wallet users via social networks (e.g. Facebook, WhatsApp) to

encourage them to participate in the study. An incentive worth € 1.52 (or CFA 1000) was offered to those who completed the survey as qualified participants. The reward was instantly sent to each participant's m-wallet account after the survey completion based on the information supplied. As a result, we checked for duplicate cases and eliminated the associated data from the dataset. To ensure data representativeness, participants were drawn from different age groups, genders, experience levels, locations, and educational levels. Initially, 741 active m-wallet users volunteered to take part in the survey. After a thorough review of the responses, 621 questionnaires were correctly completed and found to be suitable for further investigation, resulting in an 83.81 % response rate.

4.2 Common method bias

The study was cross-sectional and self-reported; hence, common method bias is possible. Our study is vulnerable to the inflation of correlations by common method variance. Accordingly, we ran the full collinearity assessment of [Kock \(2017\)](#). The variance inflation factor (VIF) values at the factor level were assessed after running the consistent PLS algorithm for each construct (one at a time) and with each of the constructs being assumed as the dependent variable.

4.3 Non-response bias

The non-response bias was tested by comparing the sample distributed to the web-based and paper-based respondent groups, using the independent samples *t*-test ([Leong et al., 2020](#)). Results of this test confirmed that the two respondent groups do not differ statistically ($p > 0.05$), indicating the absence of non-response bias.

5. Analysis and results

The sample comprised 621 respondents. As shown in [Table 1](#), males accounted for 65.5% of qualifying responders, while females accounted for 34.5%. Most participants (61.7%) were between the ages of 18 and 25. The sample was dominated by undergraduates (51.7%).

Variables	<i>n</i> (%)
<i>Gender</i>	
Male	407 (65.5%)
Female	214 (34.5%)
<i>Age</i>	
18–25	383 (61.7%)
26–33	154 (24.8%)
34–41	46 (7.4%)
42–49	21 (3.4%)
50+	17 (2.7%)
<i>Education level</i>	
No formal qualification	8 (1.3%)
Primary qualification	12 (1.9%)
Secondary qualification	33 (5.3%)
College qualification (diploma/certificate)	127 (20.5%)
Undergraduate degree	321 (51.7%)
Postgraduate degree (Master/Ph.D)	120 (19.3%)
<i>Geographic location</i>	
Rural	55 (9.0%)
Non-rural	566 (91.0%)

Table 1.
Demographic profile of
respondents (*n* = 621)

Partial least squares structural equation modeling (PLS-SEM) from the SmartPLS 3.3.5 software (Ringle *et al.*, 2015) was used to examine the theoretical framework. The PLS-SEM technique is a causal modeling approach that focuses on maximizing the variance of the dependent latent constructs explained by the independent variables. The rationale behind the employment of PLS-SEM (variance-based SEM) in this research stems from two distinct reasons. First, since this study explores the factors affecting mobile wallet adoption rather than its confirmation, PLS-SEM is considered a more attractive and appropriate technique in such situations (Hair *et al.*, 2022). Second, we are aware of the robustness of PLS-SEM to complex structural models involving many constructs, indicators, and model relationships (Hair *et al.*, 2022). Further, PLS-SEM is robust to non-normally distributed data (Hair *et al.*, 2022). Accordingly, using a web power online tool (Soper, 2020), we confirmed that the data collected were not multivariate normal, given the results of Mardia's multivariate skewness ($\beta = 398.89$, $p < 0.001$) and Mardia's multivariate kurtosis ($\beta = 2500.46$, $p < 0.001$).

The measurement model evaluated reliability and validity, while the structural model tested the hypothesized associations. We used the average estimates from bootstrapped 5,000 samples to assess the significance of the path coefficients (Hair *et al.*, 2022).

5.1 Measurement model

First, the measurement model assessed the convergent validity through the outer loadings of the indicators and average variance extracted (AVE). Convergent validity essentially reveals how an indicator correlates positively with another indicator of the same construct (Hair *et al.*, 2022). Table 2 shows that all the item loadings exceeded the recommended value of 0.6 (Chin *et al.*, 2008). The AVE ranged from 0.728 to 0.857, satisfying the >0.5 requirements for convergent validity (Hair *et al.*, 2022).

Construct reliability was evaluated using Cronbach's alpha and composite reliability (CR). Table 2 shows that the Cronbach's alpha and composite reliability values were greater than 0.70, the minimum being for the user adoption construct (Cronbach's alpha = 0.813; CR = 0.889), thus outperforming the literature cut off (Wamba *et al.*, 2020) and suggesting adequate reliability of the selected constructs.

We further assessed how well the construct measures discriminate empirically, termed discriminant validity. Table 3 shows the results of the Heterotrait-Monotrait ratio (HTMT) assessment for discriminant validity, which is superior to both the Fornell and Larcker criterion and the assessment of cross-loadings (Henseler *et al.*, 2015). All the HTMT values were lower than the conservative threshold of 0.85. Further, a bootstrapping procedure was conducted with 5,000 samples, and the bias-corrected and accelerated (BCa) bootstrap confidence interval (Aguirre-Urreta and Rönkkö, 2018; Cheah *et al.*, 2019) showed that all HTMT values were statistically different from 1. These results are in support of discriminant validity for all constructs.

5.2 Structural model

To assess the structural model, we followed the guidelines of Hair *et al.* (2022) by reporting the variance inflation factors (VIFs), coefficient of determination (R^2), path coefficients (beta), and corresponding *t*-values, including their significance tests. Due to the data collected being skewed towards specific groups, we controlled for the effect of the participants' demographic factors, thereby reducing confounding effects in the results.

The VIF values ranged from 1.000 to 3.922 (see Table 4), which are below the minimum of 5 thresholds (Hair *et al.*, 2022), thus suggesting the absence of multicollinearity. In terms of the R^2 values, our structural model provided good explanatory power. The model explained the variation in user adoption by 63.7% and the perceived usefulness by 60%. The R^2 values are higher than what would indicate a substantial model.

IMDS 123,2		662				
		Items	Loadings	Cronbach's alpha	CR	AVE
	COMP	comp1	0.854	0.941	0.941	0.798
		comp2	0.914			
		comp3	0.891			
		comp4	0.913			
	IMG	img1	0.917	0.947	0.947	0.857
		img2	0.936			
		img3	0.925			
	PRA	pra1	0.928	0.935	0.953	0.837
		pra2	0.926			
		pra3	0.910			
		pra4	0.894			
	PEOU	peou1	0.885	0.954	0.963	0.814
		euo2	0.913			
		peou3	0.891			
		peou4	0.902			
		peou5	0.918			
		peou6	0.903			
	PU	pu1	0.890	0.954	0.962	0.785
		pu2	0.891			
		pu3	0.856			
		pu4	0.891			
		pu5	0.905			
		pu6	0.900			
		pu7	0.869			
	IQ	iq1	0.889	0.925	0.946	0.816
		iq2	0.910			
		iq3	0.913			
		iq4	0.900			
	SQ	sq1	0.858	0.898	0.929	0.766
		sq2	0.896			
		sq3	0.914			
		sq4	0.830			
	SEQ	seq1	0.890	0.913	0.939	0.794
		seq2	0.913			
		seq3	0.892			
		seq4	0.868			
	USA	usa1	0.815	0.813	0.889	0.728
		usa2	0.865			
		usa3	0.880			

Table 2.
 Constructs reliability
 and convergent
 validity

Note(s): Abbreviations: CR = composite reliability; AVE = average variance extracted; COMP = compatibility; IMG = image; PRA = relative advantage; PEOU = perceived ease of use; PU = perceived usefulness; IQ = information quality; SQ = system quality; SEQ = service quality; USA = user adoption

Our path analytic results confirm support for all the hypotheses, except [H1](#) and 4 ([Table 4](#) and [Figure 2](#)). The results showed that user adoption was negatively influenced by image ($\beta = -0.083; p < 0.01$) and positively influenced by relative advantage ($\beta = 0.130, p < 0.05$), service quality ($\beta = 0.245; p < 0.001$), perceived usefulness ($\beta = 0.104, p < 0.05$), information quality ($\beta = 0.135; p < 0.05$), and system quality ($\beta = 0.263, p < 0.001$). The path from perceived ease of use to perceived usefulness ([H4](#)) suggests a significant positive relationship ($\beta = 0.774; p < 0.001$) and supports the hypothesis.

For the effect sizes, Cohen’s f^2 values ([Cohen, 2013](#)) were reported in [Table 4](#) to assess the magnitude of the relationship among the variables. The relationship between perceived ease of use and perceived usefulness had a large effect ($f^2 \geq 0.35$), whereas system quality and

service quality had small effects ($0.02 < f^2 < 0.15$) on user satisfaction. All other path relationships had no effects on each other.

Regarding the control variables, only the respondents' geographical location was significantly related to user adoption ($\beta = -0.063; p < 0.01$); other variables, including gender, age, and education, had no confounding effects (Table 4). The findings further imply a lack of influence on the model's explanatory power by the addition of control variables or substantial changes in the structural model estimates.

We assessed the out-of-sample predictive power using the PLSpredict procedure with ten folds and ten repetitions (Shmueli *et al.*, 2016, 2019). All the Q^2_{predict} values were well above zero, reflecting the model's superiority over a naive prediction. We further assessed the predictive power by focusing on user adoption, the model's key endogenous construct (Shmueli *et al.*, 2019). The root mean square error (RMSE) was used to compare the predictive power of PLS-SEM for each of the user adoption indicators with that of the linear model. Our fitted model has a medium predictive power (yielded more accurate out-of-sample predictions). The majority of the indicators had smaller RMSE values than the linear model benchmark (Table 5).

6. Discussion

6.1 Key findings

This research aimed to determine the factors that influenced the adoption of mobile wallets in Cameroon during COVID-19. Previous studies have explored the following constructs: compatibility, image, relative advantage, perceived ease of use, perceived usefulness, information quality, system quality, and service quality (Davis, 1989; Delone and Mclean, 2003; Rogers, 2003). The conceptual research model was developed to depict the relationship between these constructs and mobile wallet adoption in a highly representative developing economy. More specifically, the model was applied to answer the following research question: *What factors influenced mobile wallet adoption in cash-based economies during COVID-19?*

According to the findings, compatibility has no significant impact on mobile wallet adoption. This is possible because mobile wallets are created for universal usage by the public, irrespective of culture or lifestyle. This means that mobile wallet applications are not developed to be used by only Cameroonians but for global usage. Therefore, the designs are meant to serve everyone and not a particular set of people. The findings supported prior research in the African context, which found compatibility as unimportant in mobile application adoption (Elogie, 2015).

The study established that image negatively affected mobile wallet adoption in Cameroon. Prior research yielded similar results (Lian *et al.*, 2012). Product image is an essential indicator for users to evaluate the relevance of its services. An unfavorable representation of a product

	COMP	IMG	IQ	PEOU	PRA	PU	SEQ	SQ	USA
COMP									
IMG	0.553								
IQ	0.775	0.518							
PEOU	0.667	0.353	0.714						
PRA	0.768	0.549	0.764	0.729					
PU	0.724	0.491	0.707	0.807	0.774				
SEQ	0.774	0.567	0.872	0.712	0.77	0.74			
SQ	0.823	0.533	0.848	0.778	0.805	0.742	0.857		
USA	0.744	0.439	0.807	0.726	0.774	0.738	0.837	0.856	

Table 3.
Discriminant validity
assessment using the
Heterotrait-Monotrait
ratio (HTMT) criterion

	Path	Coefficients	T-values	95% CI	VIF	R ²	f ²	Decision
H1	COMP → USA	0.029	0.515	[−0.081, 0.142]	2.930	0.637	0.001	Not supported
H2	IMG → USA	−0.083**	2.604	[−0.147, −0.021]	1.543		0.012	Supported
H3	PRA → USA	0.130*	2.359	[0.026, 0.233]	3.162		0.015	Supported
H4	PEOU → USA	0.042	0.754	[−0.060, 0.156]	3.754		0.001	Not supported
H6	PU → USA	0.104*	1.901	[0.003, 0.214]	3.217		0.009	Supported
H7	IQ → USA	0.135*	2.403	[0.029, 0.252]	3.365		0.014	Supported
H8	SQ → USA	0.263***	4.257	[0.139, 0.381]	3.607		0.048	Supported
H9	SEQ → USA	0.245***	4.220	[0.134, 0.356]	3.922		0.043	Supported
H5	PEOU → PU	0.774***	28.475	[0.712, 0.822]	1.000	0.600	1.497	Supported
<i>Control variables</i>								
Gender	Gender → USA	−0.001	0.047	[−0.055, 0.051]	1.041		0.001	
Age	Age → USA	−0.047	1.835	[−0.099, 0.002]	1.046		0.006	
Education	Education → USA	−0.014	0.580	[−0.063, 0.032]	1.097		0.002	
Location	Location → USA	−0.063**	2.733	[−0.112, −0.021]	1.026		0.011	

Note(s): * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. CI = Bias-corrected confidence interval

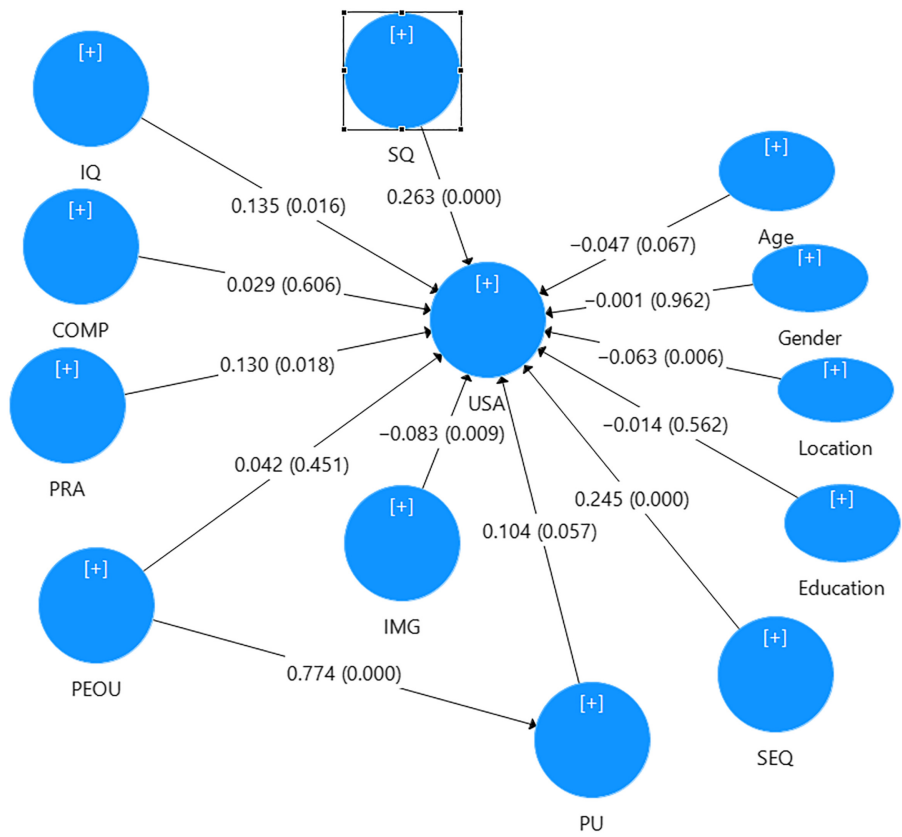


Figure 2. PLS results: Structural model

Key endogenous construct		PLS-SEM		LM		PLS-SEM-LM (difference)	
USA	Indicators	RMSE	Q^2_{predict}	RMSE	Q^2_{predict}	RMSE	Q^2_{predict}
	usa1	1.385	0.387	1.389	0.383	-0.004	0.004
	usa2	1.114	0.486	1.099	0.500	0.015	-0.014
	usa3	1.206	0.472	1.227	0.453	-0.021	0.019

Note(s): Abbreviations: USA – user adoption; RMSE – root mean squared error

Table 5. Predictive out-of-sample performance

causes a negative feeling to the potential adopters. When users have unpleasant impressions of mobile wallet brands, qualities, and the effect of technology innovations, their confidence in adopting such products decreases. This needs to be investigated further in terms of the influence of moderators to capture individual differences among users.

We also found support for the hypothesis, which posited that relative advantage positively influences the adoption of mobile wallets. This implies that any mobile wallets perceived by adopters or users as having more or better features than others will attract consumers to adopt them. As technology advances, the mode of various operations changes. It is expected that newly developed mobile wallet applications will have appealing features that are in line with the

current trend of financial transactions and that existing ones will be upgraded to maintain a competitive advantage. This result concurs with the findings of [Lin et al. \(2020\)](#).

The results indicated that perceived ease of use has no significant influence on both mobile wallet acceptance and perceived usefulness. Mobile wallets are designed more for financial transactions that require strong security to protect users' information rather than ease of usage; as a result, users do not expect these applications to be simple to use. This outcome aligns with a related study by [Chen and Aklikokou, \(2020\)](#).

The perceived usefulness of mobile wallets was found to be another key positive factor influencing mobile wallet adoption. The use of technology is expected to boost individual productivity and work experience. This means that users will adopt mobile wallets if they perceive them to contribute to their lives and work activities in a positive manner. The greater the utility of a technology product, the more willing users are to adopt it. This finding is consistent with previous research on mobile wallets and other mobile technology innovations ([Chen and Aklikokou, 2020](#); [Tam et al., 2020](#)).

In the dimensions of information success, information quality shows how well an information system can support or encourage appropriate decision-making in various business interactions ([Delone and Mclean, 2003](#); [Petter et al., 2008](#)). To draw the attention of the users, mobile wallets should include high-quality information to suit their needs, just like other existing payment applications. This implies that mobile wallets with rich information or content quality will increase adoption.

Regarding system quality as a significant positive factor, it is, therefore, imperative to consider the technical aspects of mobile wallets during the design and development processes. These features include ease of access, dependability, system functioning, adaptability, reaction speed, sophistication, and others ([Delone and Mclean, 2003](#); [Petter et al., 2008](#)). The user's views of system quality were found to be directly connected to the user's technical ability and self-confidence ([Petter et al., 2008](#)). This implies that if customers think that the system quality of a mobile wallet meets their expectations, they will not hesitate to utilize the application.

Moreover, service quality has a positive impact on the adoption of mobile wallets. A good support service encourages users to adopt a product. Mobile wallet services are still in their infancy, especially in a cash-based economy. The participants believed they would adopt and use mobile wallets if given the requisite service support. Therefore, the stakeholders involved in developing and distributing mobile wallet applications should endeavor to provide good user support features and facilities to assist the consumers, especially novice adopters. This finding supports previous research on these factors ([Sebetci, 2018](#); [Al-Dweeri et al., 2019](#); [Routray et al., 2019](#); [Al-Marouf and Salloum, 2021](#)).

6.2 Theoretical implications

This research is unique within the context of the study. It highlights important factors that influence mobile wallet adoption in low-income and cash-based economies during COVID-19 pandemic. The growing presence of mobile wallets services in an environment with recognized culture ([Yakomba and Twinomurinzi, 2021](#)) like Cameroon requires investigation. However, few related research has been conducted in this area ([Tsanga, 2018](#); [Fosso Wamba and Queiroz, 2020](#); [Fosso Wamba et al., 2021](#)). Still, none has investigated the factors that influence the adoption of mobile wallets in a cash-based economy like Cameroon. This study addresses the issue and contributes to theory. The findings could serve as a model for future studies on mobile wallet services.

6.3 Implications for practice

This study established that the relative advantage, perceived usefulness, and the three dimensions of information success play significant positive roles in mobile wallets

adoption in a cash-based economy. This highlights the importance of mobile wallet providers to incorporate features that provide a competitive advantage in the form of their products. Winder (2019) has suggested that incorporating passwords, personal identification numbers, and fingerprints will improve data privacy and security. In terms of usefulness, the findings indicate appropriate promotional strategies are required to highlight the benefits received from the usage of mobile wallets. Mobile wallets providers and other stakeholders, including the government and policymakers, should develop marketing campaigns emphasizing the relevance of mobile wallet use to social systems. Concerning information, system, and service qualities, society embraces innovation that can provide rich content, sophisticated design, and excellent end-user-support services. This requires mobile wallet providers ensure that their products meet the customers' demands and satisfaction.

6.4 Limitations and future works

Despite being generalizable to many other countries, especially African countries, this study is limited to one country with a cash-based economy, that is, Cameroon (Medina *et al.*, 2017). Secondly, using a cross-sectional design limits the study to a snapshot view. Future research could use longitudinal study designs and account for time differences. Finally, this study used a convenience sampling technique for data collection, which is not the most appropriate sampling technique. Future studies should, therefore, use a more appropriate sampling technique.

7. Conclusions

This study aimed to investigate and determine the factors that influence the adoption of mobile wallets in low-income and cash-based economies, using Cameroon, a Central African country as the case study. From previous research, eight hypotheses were developed. A research model was developed using DIT, TAM, and ISSM frameworks constructs. A survey was used to collect empirical data from 621 mobile wallet users in Cameroon and test the model. The findings of this study indicate that five factors, namely relative advantage, perceived usefulness, information quality, system quality, and service quality, positively impacted mobile wallet adoption. In contrast, the image indicated a negative impact. Compatibility and perceived ease of use were found not to significantly affect mobile wallet adoption in Cameroon. This study expands existing knowledge on m-wallet adoption and has substantial implications for technology-enabled financial inclusion, particularly in developing nations.

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