JYX

JYVÄSKYLÄN YLIOPISTO
UNIVERSITY OF JYVÄSKYLÄ

Author(s): Shaikh, Aijaz A.; Alamoudi, Hawazen; Alharthi, Majed; Glavee-Geo, Richard

Title: Advances in mobile financial services : a review of the literature and future research directions

Year: 2023

Version: Published version

Please cite the original version:

Shaikh, A. A., Alamoudi, H., Alharthi, M., & Glavee-Geo, R. (2023). Advances in mobile financial
services : a review of the literature and future research directions. International Journal of Bank
Marketing, 41(1), 1-33. https://doi.org/10.1108/IJBM-06-2021-0230

Advances in mobile financial services: a review of the literature and future research directions

Aijaz A. Shaikh

*Department of Marketing, Jyväskylä University School of Business and Economics,
University of Jyväskylä, Jyväskylä, Finland*

Hawazen Alamoudi

Department of Marketing, King Abdulaziz University, Rabigh, Saudi Arabia

Majed Alharthi

Department of Finance, King Abdulaziz University, Rabigh, Saudi Arabia, and

Richard Glavee-Geo

*Department of International Business,
Norwegian University of Science and Technology, Aalesund, Norway*

Abstract

Purpose – Using the theory, construct, method, moderator (TCMM) format, this framework-based review critically analyses the mobile financial services (MFSs) field through a detailed synthesis and analysis of a sample of mainstream empirical research published in various scientific journals within the period 2009–2020.

Design/methodology/approach – The authors followed a three-step structured approach suggested by Webster and Watson (2002) to search for the literature to synthesise the global perspectives on MFSs and their associated applications and systems. The literature research resulted in the identification of 115 most relevant articles.

Findings – The authors identified three major categories or domains within the MFSs comprising the entire spectrum of digital financial services. To facilitate the literature analysis, TCMM is developed and proposed as an organising framework. Moreover, the authors also developed and presented the comprehensive framework of MFS domains and explicitly identified 14 different research themes for future research in MFSs.

Originality/value – Prior attempts to synthesise and analyse mainstream academic research in MFSs have been scant and limited to a specific MFS domain: mobile banking or mobile payment. The authors synthesised a more extensive body of knowledge and provided a global perspective on the MFS field. Unlike the past literature reviews which followed traditional frameworks such as antecedents, decisions and outcome (ADO); TCCM; and 6 W Framework (who, when, where, how, what and why), the authors developed and proposed TCMM as organising framework.

Keywords Mobile banking, Mobile payments, Mobile money, Mobile financial services, Theory-construct-method-moderator framework

Paper type Research paper

1. Introduction

An exciting transition has been taking place within the banking and payment fields in the last four decades. Branch banking has been taken over by branchless banking with anytime – anywhere services. Net (short for Internet) banking has been transformed mainly into mobile

banking. The automated teller machines (ATMs), point-of-sale (POS) terminals and payment cards have been replaced with near-field communication (NFC)-enabled and contactless mobile payment applications, including mobile wallets and wearables. The chat-bots and robo-advisors have created an intelligent mobile banking and payment culture in many developed countries. Nonetheless, the consumers of branchless banking in Western countries have shown greater reliance on Internet- and mobile-based access to their banking accounts and to other value-added services, such as investments, advisory services, loans and mortgages. Consumers in non-Western or developing countries, on the other hand, have started adopting and using the mobile phone to execute traditional retail transactions such as fund transfers and paying utility bills. Mobile money has in fact played a significant role in transforming the socioeconomic conditions of many underprivileged and unbanked population segments in non-Western countries (Glavee-Geo *et al.*, 2019; Karjaluoto *et al.*, 2021).

Given the increasing use of and demand for smartphones and mobile banking and payment services, research examining the consumer, management, policy and theoretical perspectives in the mobile financial service (MFS) area is underway (Chawla and Joshi, 2017). However, efforts have been made to synthesise a more extensive body of knowledge in the MFS field, albeit with a limited scope and purpose. For example, Shaikh and Karjaluoto (2015) conducted a domain-specific structured review in the mobile banking adoption field from 2005 to 2014. In the context of the Gulf Cooperative Council countries and based on 46 articles, Alkhowaiter (2020) produced a comprehensive literature review and performed a meta-analysis of the factors affecting the use and adoption of digital banking and payment methods. Dahlberg *et al.* (2008) published a framework-based review in the mobile payment services field based on 73 articles published within the period from 1999 to 2006. Kim *et al.* (2018) conducted a systematic literature review based on 54 academic research papers in the areas of MFS, financial inclusion and developments. Unlike the previous research efforts, where the synthesis of the literature was limited to a specific MFS domain (mobile payments, mobile banking) or region (Gulf Cooperative Council countries), the purpose of our research endeavour was to conduct a framework-based review of the literature on the global MFSs.

In addition, Paul and Benito (2018) used the antecedents, decisions and outcome (ADO) format in their review article; Paul and Rosado-Serrano (2019) developed and used the theory, construct, characteristics and methodology (TCCM) model and Xie *et al.* (2017) used the 6 W Framework (who, when, where, how, what and why). We, on the other hand, used the Theory, Construct, Method, Moderator (TCMM) model after considering the nature of the MFS field and the articles selected and included in this framework-based review (quantitative/survey and mix-method approach). Survey articles provide objective information concerning the theory, constructs, method and moderators used in such articles (Shaikh and Karjaluoto, 2015). Nonetheless, the purpose of introducing the TCMM model was to offer a new or better model while relying on the existing models, such as TCCM. Our suggested TCMM is somehow a close variant of TCCM model developed by Paul and Rosado-Serrano (2019). Another purpose of developing the TCMM framework is to evaluate the extent to which previous research within the MFS field had used moderators in their studies. Similarly, the TCMM framework considered the use of "moderators" as a special type of constructs that can help researchers to develop novel and interesting relationships between constructs in MFS research.

The synthesis of these moderating variables as envisaged in the TCMM model could identify the gaps such as which variable (including the control variables) has been used extensively and rarely. In addition, moderators provide new insights and contingency relationships amongst constructs without which new perspectives of a phenomenon could be hidden. Moderator effects occur in situations where the moderator (an independent variable or construct) changes the strength or even the direction of a relationship between two constructs in the model (Hair *et al.*, 2017, p. 41). This framework-based review was meant to contribute to the understanding and distinction of various domains identified as falling

within the wide ambit of MFSs. We offered new definitions of mobile banking, mobile payments and mobile money and proposed the TCMM model. We also developed and proposed a framework presenting the MFS ecosystem and explicitly identified the future research areas left unidentified by the research on MFSs to date.

While drafting the plan for the future research directions, we considered emerging themes such as pandemic (e.g. the COVID-19 pandemic), new regulatory frameworks (General Data Protection Regulations, Revised Payment Services Directive [PSD2]), technologies (wearables), methods (experimental), intelligent mobile banking and payment systems using chat-bots and the emergence of new demographic groups. The primary literature search resulted in 115 relevant articles published within the period from 2009 to 2020. The reason for the selection of a 12-year period for the review, from the beginning of 2009 to the end of 2020, is that MFSs received a significant boost only after the advent of the smartphone, which was introduced by Apple Corporation in 2007.

The major contribution of this literature review is the identification of three major MFS domains, which are defined as a wide range of traditional and value-added services, retail transactions, banking activities and information accessible through portable devices and wearables (Dorfleitner *et al.*, 2019). These three domains comprising the entire spectrum of digital financial services are as follows: mobile banking services (including downloadable mobile applications), mobile payment services (including both proximate and contactless/remote mobile wallets and smart watches) and mobile money services (including branchless, short-message service [SMS], agency and money transfers). Moreover, we highlight herein several implications beneficial for banking and payment industry professionals (e.g. bank managers, digital marketing managers), regulators and policymakers. For example, the use of the TCMM model has identified several critical variables and consequences that affect consumer choices, behaviours, and attitudes towards the adoption of various MFS applications and systems. Therefore, bank marketing managers are better informed about the key factors that influence MFS adoption. This can help in the formulation and implementation of effective marketing strategies. In addition, MFSs have grown into a new subsector of the economy, supporting the financial inclusion programs started by government agencies in various countries. Our review has provided further insight into the different MFS domains, which would, for example, help regulatory authorities promote a cashless culture, document transactions, promote transparency, reduce the volume of the informal economy and reach out to the unbanked consumer segment.

For the organisation of the rest of this article, we present the research method that we used in our review in section 2 and define the frameworks and models widely accepted amongst the researchers within the MFS field and the choices of outcome constructs, moderators and determinants of adoption and use of MFSs in section 3. We then present a comprehensive framework of the MFS ecosystem in section 4, discuss the findings of the review and highlight their implications in section 5. We allude to the study's limitations and explicitly identify the future research areas in section 6.

2. Research method
To help identify the articles to include in our literature review, we relied on interdisciplinary journals and the journals in the business, marketing, retail, consumer behaviour and information system fields. Further, we employed the structured approach suggested by Webster and Watson (2002) to search for the most relevant literature within the MFS field, as presented and discussed below.

All the authors were made responsible for searching and including in the article the empirical studies that analysed the user behaviour, intention and beliefs in the pre-adoption, continuous use, sustained use or post-adoption of MFSs in different regions and markets, including developed, emerging and developing ones. This was done by scanning the abstract,

introduction and method sections of the articles that were found. Articles on the most recognised multidisciplinary databases for peer-reviewed contents (Elsevier/ScienceDirect, ProQuest, Web of Science, EBSCOhost and Emerald) were accessed using different but relevant keywords, such as *mobile financial services*, *mobile banking*, *mobile payments*, *mobile wallets*, *mobile money*, *agent banking*, *SMS banking*, *portable banking*, *branchless banking*, *banking for the poor*, *micro-banking* and *intelligent mobile banking*.

We limited our literature search to the period 2009–2020. In total, the 115 most relevant journal articles (excluding conference proceedings and book chapters) were shortlisted and included in the review. The 115 articles thus provide a holistic overview of the MFS field and are considered valuable. The lead author summarised the articles in an MS Excel sheet with multiple columns for easy synthesis and retrieval of information. Some of these columns created in the Excel sheet featured the year of publication, context (location or research site), moderators analysed, theory/model/framework, construct/factors/antecedents and research methods that were used. The Excel sheet was subsequently examined by each of the remaining authors to ensure that the obtained articles were placed under the right categories. Finally, all the authors examined each article together to build a consensus before further analysis. Our analysis of the 115 articles included in our review revealed that the volume of published articles in the MFS field has increased since 2017. To be specific, we divided the 2009–2020 time period into three periods, each consisting of four years: 2009–2012, 2013–2016 and 2017–2020. In the first period, 31 peer-reviewed journal articles were published; in the second, 38, and in the third, 46.

During the data analysis process, each author performed a detailed analysis and interpretation of one domain from the proposed TCMM framework, and then wrote about the results of the analysis and interpretation in the findings section. The results of each author's analysis and interpretation were subsequently examined by all the authors for validation, synergy and consistency.

3. Findings
3.1 Mobile financial services
The term MFSs is used to represent an all-inclusive service portfolio for consumer segments accessing and using retail- and business-related banking and payment services on mobile devices. Considering the usefulness, ubiquity, convenience, outreach and low-cost benefits of MFSs, some authors (e.g. Dorfleitner *et al.*, 2019) have used the term MFSs to refer to microfinance or transformational banking; the term has also been used for the consumers living in remote areas and popularly recognised as unbanked or underbanked.

Before the advent of smartphones in 2007, low-cost and feature phones were primarily used to communicate through voice calls or SMS messages. The emergence of smartphones with Internet connectivity marked the turning point in the banking and payment industry, expanded cell phone use for value-added services, revolutionised the financial industry and paved the way for the creation of various smart and disruptive business models. Consequently, in less than a decade since smart devices first made their way into consumers' everyday lives, mobile commerce and mobile payments have become mainstream, outpacing the traditional banking and payment models, including branch, ATM, net, POS and SMS banking, referred to collectively by Shaikh and Karjaluoto (2015) as an *alternative or alternate delivery channels*.

The three domains identified in the MFS field (i.e. mobile banking, mobile payments and mobile money), although sometimes cross paths and overlap their scope and usage with regard to the nature of the transactions (micro and macro), consumer–bank relationship (with and without a formal bank account), consumer segmentation or types (banked, under-banked and un-banked), access methods (remote and proximity) and mobile devices (smart and traditional or feature devices) used to access such services, they differentiate from each other (See Table 1). For example, mobile devices used for conducting mobile banking include cell phones and tablets. Therefore, accessing banking services from a laptop or a personal

Service type	Device category and type	Service provider	Service access methods	Service type and scope	Payment method	Primary consumer segment
Mobile banking	Handheld smartphones and tablets with the Internet connection	Banks, Credit Unions and Micro-finance Institutions	Internet, web browsing, downloadable mobile banking applications	Traditional, value-added financial, non-financial, micro and macro payments	Remote and proximity or NFC	Banked
Mobile Payments	Handheld smartphones and tablets with the Internet connection	Banks, Credit Unions and Micro-finance Institutions, FinTech and other Designated 3rd party service providers with a licence	Mostly with downloadable mobile payment applications	Mainly the value-added and financial services	Remote and proximity or NFC	Banked and de-banked
Mobile money	Feature phones with or without the Internet/connectivity	Banks, Credit Unions, and Micro-finance Institutions, FinTech, Telecoms and other designated 3rd party service providers with a licence	GSM connectivity and SMS messaging	Traditional and mostly micro-payments in nature	Remote using SMS and over the counter	Primarily for un-banked and under-banked

Source(s): Karjaluoto *et al.* (2019, 2020), Shaikh and Karjaluoto (2015), Glavee-Geo *et al.* (2019)

Table 1.
Difference between mobile banking, mobile payment, and mobile money

computer is not considered mobile banking, rather, laptops are largely aligned with the online/Internet banking category (Shaikh and Karjaluoto, 2015). Also, unlike mobile banking, a formal relationship between a person and a bank is not required in mobile payments. Third-party applications developed and provided by, for example, FinTech and telecom companies can be used to receive and send funds using mobile payment applications. Mobile money, on the other hand, is considered appropriate for that consumer segment which is popularly known as under-banked or un-banked (Glavee-Geo *et al.*, 2019).

3.1.1 Mobile banking. In one of their highly cited articles, Shaikh and Karjaluoto (2015) offered a comprehensive definition of mobile banking: an innovative service for conducting financial and non-financial transactions using a mobile device, namely a mobile phone, smartphone or tablet. Earlier, the segregation between the financial and non-financial services in mobile banking was not evident, which enlarged the scope and purpose of mobile banking. Nonetheless, a summary of the mobile banking definitions appearing in the historical and contemporary literature is given in Table 2.

Citation	Definition of mobile banking	Contribution
Chung and Kwon (2009)	The convergence of mobile technology and financial services, which emerged after the advent of wireless Internet- and smart-chip-embedded handsets, for people on the move who want to access their bank accounts and transfer funds anytime, anywhere through their smartphones, without having to visit banks in person	A convergence of mobile technology and financial services
Mehrad and Mohammadi (2016)	An application of mobile commerce that enables customers to bank virtually at any time and place convenient to them	An application of mobile commerce
Chaouali et al. (2017)	An emerging application of mobile commerce that can become an additional revenue source to both banks and telecom service providers and a form of service convergence enabled by innovative technologies	An application of mobile commerce
Al-Ajam and MdNor (2015)	A cost-effective service that allows users to break free from the constraints of time, place and queues	Cost-effective service available anytime, anywhere
Mohammadi (2015)	Has added the element of pure mobility to service consumption and has enabled consumers to gain convenient access to value-added and banking services even in countries with low incomes	Convenient access to value-added services
Van der Boor et al. (2014)	A natural evolution of electronic banking that empowers consumers to complete financial transactions via mobile or handheld devices	A natural evolution of electronic banking
Munoz-Leiva et al. (2017)	A remote service (via mobile phone, personal digital assistants [PDAs], tablets, etc.) offered by financial entities to meet the needs of their customers	A remote service on portable devices
Veríssimo (2016)	A banking product or service involving the conduct of financial and non-financial transactions using a mobile device such as a mobile phone or tablet	Conduct of financial and non-financial services
Shaikh and Karjaluoto (2015)	Also referred to as cell phone banking, the use of mobile devices such as PDA, mobile telephones, smartphones and tablet computers to access banking networks via WAP for financial services	Also considered cell phone banking
Tam and Oliveira (2016)	The subset of applications of mobile e-commerce offered by the financial industry (mobile commerce is also known as a subset of e-commerce that uses radio-based wireless devices to conduct business transactions over the web); enables users to access their account balances, pay bills, transfer funds and perform other financial activities anytime and anywhere	A subset of e-commerce
Lee et al. (2015)	An extension of banking and financial services onto mobile networks and devices, with characteristics such as time and location independence and secured transactions through the use of a personal mobile phone to identify the account owner and to confirm the transaction, which led to its rapid growth	An extension of banking and financial services

Table 2.
Studies on mobile banking

(continued)

Citation	Definition of mobile banking	Contribution
Gu *et al.* (2009)	With the improvement of mobile technologies and devices, it has been considered a salient system because of mobile technology attributes such as ubiquity, convenience and interactivity	A salient system
Oliveira *et al.* (2014), Glavee-Geo *et al.* (2017)	Includes mobile accounting (e.g. chequebook requests, blocking lost cards, money transfers or insurance policy subscription), mobile brokerage (selling and purchasing financial instruments) and mobile financial information services (balance enquiries, statement requests, obtaining credit card information and information regarding branch and ATM locations, foreign exchange rates and commodity prices)	Convenient access to value-added services
Baptista and Oliveira (2015)	A type of execution of financial services in the course of which, within an electronic procedure, the customer uses mobile communication techniques in conjunction with mobile devices; a service whereby customers use a mobile phone or a mobile device to access banking services and perform financial transactions	Convenient access to value-added services
Baptista and Oliveira (2015)	Closely related to mobile devices and communication networks and cannot exist without these (the device is the means to interact with banking applications, and the communication network is the way to send/receive information and transactions to/from the bank)	A mobile commerce application
Baptista and Oliveira (2017)	A type of execution of financial services in the course of which, within an electronic procedure, the customer uses mobile communication techniques in conjunction with mobile devices or the ability to bank virtually anytime and anywhere	Accessing and conducting banking transactions anytime, anywhere
Chawla and Joshi (2017)	An innovative channel whereby the customer interacts with a bank via a mobile device such as a smartphone or a PDA	An innovative channel
Gupta *et al.* (2017)	The conduct of banking activities using a mobile device whereby customers can access their accounts to verify balances, transfer funds, pay bills and perform various other transactions	Provision of banking services on mobile devices
Sharma (2017)	A service provided by banks or other financial institutions that allows their customers to conduct a range of financial and non-financial transactions that can be realised remotely using a mobile device such as a mobile phone or tablet on dedicated mobile applications (apps) provided by the financial institutions	Conduct of financial and non-financial services

Table 2.

Citation	Definition of mobile banking	Contribution
Yuan *et al.* (2016)	Users adopt mobile terminals such as cell phones to access payment services including account inquiry, transference and bill payment. Compared to traditional/online banking, its main advantages are ubiquity and immediacy, meaning it can free users from temporal and spatial limitations and can enable them to conduct payment anytime from anywhere	Accessing and conducting banking transactions anytime, anywhere
Barnes and Corbitt (2003)	A channel whereby the customer interacts with a bank via a mobile device, such as a mobile phone or PDA	An innovative channel

Table 2.

As evident from Table 2, the research has considered mobile banking an innovative channel; an application of the mobile commerce; a sub-set of electronic commerce; a cost-effective service available anytime, anywhere; and a natural evolution of electronic banking. These definitions of mobile banking when synthesised provided a new perspective on mobile banking technology, systems and services. This study, therefore, proposes the following definition of mobile banking:

> Mobile banking, also referred to as cell phone banking, is an innovative and cost-effective application of mobile commerce with extended capabilities, which is used virtually by bank account holders using web browser or downloadable mobile application on smart phones or tablet with internet connectivity to access the traditional and value-added financial and non-financial services including funds transfer, investment advices, utility bills payment, balance enquiry, security alerts or notifications, new product or service promotion, conveniently anytime anywhere.

3.1.2 Mobile payment. Unlike mobile banking, the mobile payment technology and services were introduced to broaden the scope of payment services, including the value-added services using different payment technologies, such as radio frequency, NFC and the quick response code. The key to mobile payment, including the mobile wallet, is the downloadable application. According to Karjaluoto *et al.* (2019), the downloadable mobile applications for mobile payment contain several features and payment options, provide broader and more cost-effective service options and better protection, and primarily target banked and de-banked consumers. *De-banked consumers* refer to those who refuse to access and use various alternative delivery channels despite the availability of these to them and who refuse to maintain any formal relationship with any bank in the form not only of a checking account but also of a savings account (Shaikh and Karjaluoto, 2016). Most of these de-banked consumers are Millennials, Generation Z and Generation Alpha and rely on value-added mobile-only financial and payment services (Shaikh and Karjaluoto, 2019).

Prior research (Liébana-Cabanillas and Lara-Rubio, 2017; Ghezzi *et al.*, 2010) has considered mobile payment applications *star* or *killer* applications in the mobile communication field; a business activity; a mobile wallet; and a contactless payment system. A summary of the definitions of mobile payment proposed in the historical and contemporary literature is given in Table 3. After synthesising these definitions, this study proposes the following definition of mobile payments:

> Mobile payments, also referred to as mobile wallet, is anytime anywhere payment mechanism offered by banking and non-banking entities including FinTech, which can be executed seamlessly in a proximity and remote mode by anyone with a handheld device and peer-to-peer or mobile payment application to access the value-added services and conduct micro and macro payments electronically including funds transfer, utility bills payment, making donations, mobile balance pop-up etc.

Citation	Definition of mobile payment	Contribution
Chen (2008)	Making digital payments using mobile devices, including wireless handsets (e.g. cell phones and Blackberry devices), personal digital assistants (PDA), radio frequency devices and near-field-communication-based devices	Making digital payments using a variety of portable devices
Au and Kauffman (2008)	Any payment where a mobile device is used to initiate, authorise and confirm an exchange of financial value in return for goods and services	An exchange of financial value
Gerpott and Kornmeier (2009)	A solution utilising mobile devices to make e-transactions, such as banking transactions or bill payments	An e-transaction solution
Liébana-Cabanillas et al. (2014)	A business activity involving an electronic device with a connection to a mobile network enabling the successful completion of an economic transaction	A business activity
Zhou (2011)	Means that users adopt mobile terminals to conduct payment at anytime from anywhere	Anytime, anywhere payment mechanism
Amoroso and Magnier-Watanabe (2012)	Any payment in which a mobile device, such as a mobile phone or any other device capable of connecting to mobile communication networks, is utilised to initiate, authorise and confirm a commercial transaction [4]. A mobile wallet is a type of electronic wallet that carries out transactions using a mobile device and the former is an evolution of the latter	A mobile wallet
Dahlberg et al. (2008), Tan et al. (2014)	The payment for goods, services and bills with a mobile device such as a mobile phone, smartphone or PDA by taking advantage of wireless and other communication technologies	A wireless and other communication technology payment mechanism
Karjaluoto et al. (2020)	Mobile payments are referred to as contactless payment system that, for example, uses the NFC technology to initiate, authorise and confirm a commercial transaction at any merchant outlet near the point of sale terminal	Contactless payment system
Liébana-Cabanillas and Lara-Rubio (2017), Ghezzi et al. (2010)	Considered by many experts one of the applications with the greatest potential in this sector, even referring to it as the future "star" or "killer" application in mobile communications; any type of individual or business activity involving an electronic device connected to a mobile network, thus enabling the successful completion of an economic transaction	A star or killer application
Ondrus and Pigneur (2007)	Wireless transactions of a monetary value from one party to another using a mobile device whose physical form can vary from a mobile phone to any other wireless-enabled device (e.g. PDA, laptop, key ring, watch) capable of securely processing a financial transaction over a wireless network	Wireless transaction of a monetary value

Table 3.
Studies on mobile
payment

3.1.3 Mobile money. Various terms have been used to represent mobile money services, such as *branchless banking*, *banking for the poor*, *mobile transfers*, *SMS banking* and *agent banking*. According to the World Bank Global Findex Database (2018), over 1.7 billion adults globally are unbanked. Yet, many of these unbanked people own a cell phone that can help them access formal payment and other financial services (Glavee-Geo *et al.*, 2019).

Mobile money, defined as a financial innovation that provides transfers, payments and other financial services at a low or zero cost to individuals in developing countries where banking and capital markets are deficient and financial inclusion is low (Pelletier *et al.*, 2020), has an enormous potential to reach the unbanked. It has been widely considered a crucial technology for escaping poverty and disparities. To obtain this revolutionary service's benefits, all that one needs is a feature phone with the standard network coverage. Unlike tellers, who provide customer service in bank branches, or ATMs, mobile money depends on an agent network and is based on a straightforward business logic: high volume, low value. This logic entails that mobile money promotes high transaction volume with low monetary value. This makes mobile money very different from mobile banking and mobile payment, both of which facilitate high-value, low-volume transactions. The explanation by Suárez (2016) and Heyer and Mas (2011) of the crux of mobile money and how it differs from the mobile banking and mobile payment technologies provide much relief. For example, mobile money can be implemented in emerging and developing countries where there are no financial alternatives or delivery channels available. The presence of any alternative delivery channel will dilute the mobile money initiative. Also, there must be a high mobile phone diffusion rate amongst a wider segment of the population destined to adopt and use mobile money. There must also be a sufficient demand for formal or documented financial services. A favourable regulatory environment supporting the market's supply side and technological innovation is required.

A summary of the mobile money definitions proposed in the historical and contemporary literature is given in Table 4. The synthesis of these definitions allows us to suggest the following more comprehensive definition of mobile money.

> Mobile money, also referred to as branchless or agent banking, is a financial inclusion tool used in many developing and emerging countries by financially excluded rural or less privileged communities with no or limited access to formal banking services such as branches, ATMs, POS and Internet banking, to send and receive the funds and making micro payments across vast distances without being limited to location and time, using a feature phone with no internet connectivity using a simple short-message service (SMS) technology anytime anywhere.

3.2 Theory, construct, method, moderator framework (TCMM)

3.2.1 Theoretical underpinnings (T). Figure 1 provides a snapshot of the theories, models and frameworks used in the MFS field obtained from the literature included in our review. Nonetheless, from the perspective of method (see Figure 2), the articles' synthesis revealed that most of the studies included in the review had used technology of acceptance model (TAM) and its modifications (35 and 30%) and unified theory of acceptance and use of technology (UTAUT) and its modifications (24 and 21%). Instead of relying on a specific model or framework, the authors of 17 studies (15%) made their theoretical models consist of various factors and relationships, and made explicit assumptions and caveats underpin them. These new hypothesised relationships between and amongst various factors have provided several theoretical contributions.

3.2.2 Constructs or variables (C). Several constructs or variables (dependent and outcome) were used to examine consumer attitude towards adopting and using MFSs and similar

Citation	Definition of mobile money	Contribution
N'dri and Kakinaka (2020)	The best tool for individual financial inclusion because it allows individuals, especially those in the financially excluded rural communities in many developing countries, to transfer purchasing power through a simple short-message service (SMS) technology, with a low cost of sending money across vast distances	A financial inclusion tool
Pelletier et al. (2020)	A financial innovation that provides transfers, payments and other financial services at a low or zero cost to individuals in developing countries where banking and capital markets are deficient and financial inclusion is low	Increases financial inclusion while delivering high value (almost no transaction fee)
N'dri and Kakinaka (2020)	Expected to resolve issues related to the difficulty of obtaining financial access to the traditional financial institutions, and to promote the financial inclusion of poor people in developing countries	Also referred to as mobile financial services and meant to promote financial inclusion
Batista and Vicente (2020)	Based on a network of agents, enables users to save money in their accounts and to send money to other people using only a mobile phone with network coverage	Agent banking
Glavee-Geo et al. (2019), Lepoutre and Oguntoye (2018)	The technology or service that enables a consumer to access, transfer, store and use money via handheld devices, including a mobile phone	The use of mobile phones to conduct financial transactions
Murendo et al. (2018)	The use of cell phones to perform financial and payment functions such as remittance transfers, airtime purchase, savings and utility bill and school fee payments	The use of mobile phones to conduct financial transactions
Dermish et al. (2011)	An innovative banking and payment channel that allows consumer-oriented companies, including banks, to offer financial and other customer-friendly solutions outside the traditional bank premises, with handheld devices as the primary channels	Non-traditional method of conducting financial transactions
Lashitew et al. (2019)	Leverages the rapidly expanding mobile phone access in developing countries to provide accessible and affordable financial and payment services to previously un-banked, low-income segments of society; can also be viewed as an inclusive innovation given its capacity to foster financial inclusion by reaching previously un-banked populations	Promotes financial inclusion by reaching out to the un-banked population
Kiconco et al. (2020)	Requires SMS-related skills and informal financial skills similar to receiving or sending remittances through the usual platforms	SMS banking

Table 4.
Studies on
mobile money

Citation	Definition of mobile money	Contribution
Gichuki and Mulu-Mutuku (2018)	Has the potential to bring efficiency to the banking sector by facilitating micro-banking services at the convenience of clients; can provide loan disbursements, repayments and savings (mobile phones can efficiently provide 100% financial services to the lower end of the market)	Also called micro-banking
Lepoutre and Oguntoye (2018)	Can be accessed and used via mobile phone	Convenient banking
Senyo and Osabutey (2020)	A form of FinTech innovation that enables financial transactions through mobile devices and is highly regarded as an essential game changer in deepening financial inclusion	A FinTech innovation

Table 4.
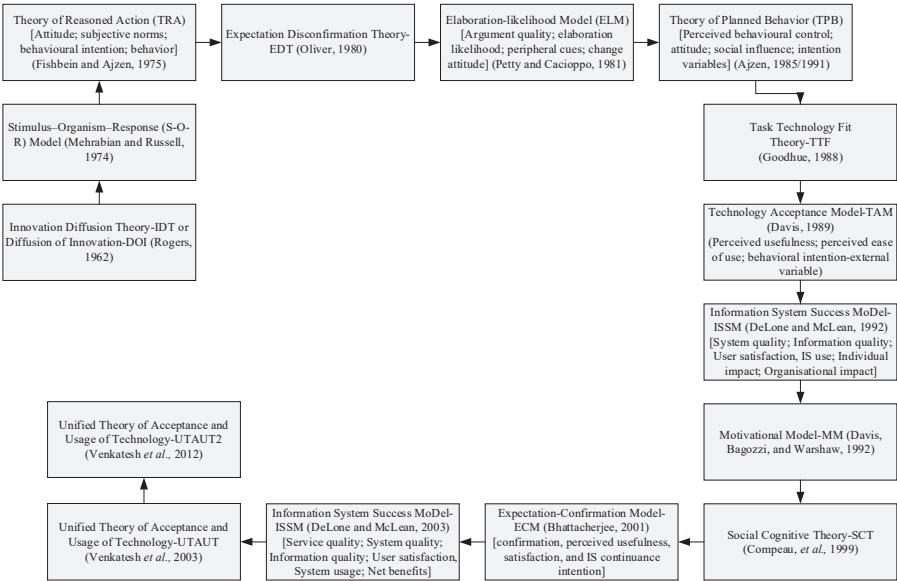
Figure 1.
Snapshot of the theories, models, and frameworks used in the mobile financial services field

technologies and their behaviour and intention regarding these. Understanding how these constructs and outcome variables affect the consumer decision-making process has always been a point of interest in academia and the industry. The synthesis of the 115 empirical studies in our review provided valuable information regarding this matter, and the use frequency of constructs such as *perceived ease of use and perceived usefulness*, *effort expectancy* and *performance expectancy* was quite obvious, especially after considering the frequent use of TAM and UTAUT and their modifications. Table 5 provides the frequency of use of the constructs in the MFS domain in our sample of studies published within the period from 2009 to 2020 (frequency >10). More specifically:

(1) *Perceived ease of use* and its conceptually identical constructs (*effort expectancy*, *self-efficacy* and *complexity*) were found in 93 (81%) of the studies;

(2) *Consumer behavioural intention* and closely related terms such as *usage intention*, *intention to use* and *usage behaviour* were found in 87 (76%) of the studies;

(3) *Perceived usefulness* and its conceptually analogous constructs (*performance expectancy*, *perceived performance* and *relative advantage*) were found in 82 (71%) of the studies; and

(4) *Trust (including perceived trust)* was found in 68 (59%) of the studies.

The psychological science variables such as *social influence*, which is considered akin or similar to the variable *subjective/social norms*, also received much attention from previous research. In total, 57 studies (50%) examined the effects of *social influence*, including *subjective/social norms*, on various antecedents/variables in the context of MFS adoption and use. For example, previous studies (Baptista and Oliveira, 2017; Oliveira *et al.*, 2014) found that social influence positively affects consumer use intention and adoption of MFSs. The variable *social influence* reflects the notion that user behaviour is influenced by the way the peers, friends or family members value IT and the related services (Baptista and Oliveira, 2017), such as MFSs and their associated applications.

Considering the nature of online and mobile transactions, which are considered highly risky and prone to fraud and misuse, the variables *perceived trust* and *perceived risk*, both product-related factors, are also considered significant in the prior research, primarily affecting the adoption and use intention and the attitudes and behaviour of consumers. *Consumer trust* (initial, cognitive and emotional) was used as an independent and outcome construct in 68 studies (59%) while *perceived risk* was used 43 times (37%). Most of these studies examined the negative effect of perceived risk on various variables, such as attitude towards MFS adoption and use and behavioural intention to adopt and use MFSs (Glavee-Geo *et al.*, 2017; Makanyeza and Makanyeza, 2017), relationship quality (Chen, 2012) and performance expectancy (Luo *et al.*, 2010).

S#	Constructs	Definition	Frequency of use (no. of studies)
1	Perceived ease of use (including effort expectancy, self-efficacy and complexity)	• *Perceived ease of use* (technology of acceptance model [TAM]) is defined as the degree to which a person believes that the system can be used without much mental effort (Davis, 1989, p. 320) • *Effort expectancy* (unified theory of acceptance and use of technology [UTAUT]) refers to the degree of ease associated with using the system (Venkatesh *et al.*, 2003, p. 450) • *Self-efficacy*, an important personal resource, is strictly related to ease of use and reflects an individual's belief in his or her ability to succeed in specific situations or accomplish a certain task (Bandura, 1997; Ma *et al.*, 2021) • The information system literature supports the influence of *ease of use* (low complexity) on the consumer adoption and use of a new technology (Turner *et al.*, 2020). *Complexity* (diffusion of innovation [DOI] theory) is similar to *perceived ease of use* (Kaur *et al.*, 2020) and is defined as the prospective users' perception of the level of difficulty they have in comprehending and using the innovation (Rogers, 1962)	93
2	Behavioural intention/ use intention/ intention to use/ use behaviour	• *Behavioural intention* explains whether customers will remain (favourable behaviour) or retreat from (unfavourable behaviour) their relationship with their service providers (Zeithaml *et al.*, 1996) • According to the theory of reasoned action (TRA), an individual's *behavioural intention*, which results in actual behaviour, is influenced by his or her *subject norms and attitude* and the attitude is influenced by individual beliefs (Ajzen and Fishbein, 1980)	87
3	Perceived usefulness (including performance expectancy and relative advantage)	• *Perceived usefulness* (TAM) is defined as the degree to which a person believes that using a particular system will enhance his or her job performance (Davis, 1989, p. 320) • *Performance expectancy* (UTAUT) is the degree to which users believe that using a system will help them achieve gains in job performance (Venkatesh *et al.*, 2003, p. 450) • *Relative advantage* (DOI theory) is defined as the degree to which users perceive a new technology as superior to its precursor (Rogers, 1962)	82
4	Trust (including perceived trust)	• *Perceived trust* is the belief that others will react in predictable and expectable ways (Luhmann, 1979)	68
5	Social influence (including subjective and social norm[s])	• *Social influence* can be described as the change in individuals' thoughts, feelings, communication or behaviour resulting from the thoughts, feelings, communication or behaviour of one or more other people (Kim and Hollingshead, 2015) • *Subjective norm or norms* (TRA) is defined as a person's perception that most of the people who are important to him or her think he or she should or should not perform the behaviour (Fishbein and Ajzen, 1975)	57
6	Risk (including perceived risk)	• *Perceived risk* is defined as a combination of uncertainty plus seriousness of the outcome involved (Bauer, 1967)	43

(continued)

S#	Constructs	Definition	Frequency of use (no. of studies)
7	Facilitating conditions, including perceived behavioural control	• *Facilitating conditions* is defined as the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system (Venkatesh *et al.*, 2003, p. 453). Taylor and Todd (1995) underscored the overlap between *facilitating conditions* and *perceived behavioural control* • *Perceived behavioural control* (theory of planned behaviour) refers to one's perception of the ease or difficulty associated with performing the behaviour (Ajzen, 1991)	28
8	Perceived security (including structural assurance and perceived credibility)	• In the online payment context, *perceived security* is defined as the extent to which a consumer or user believes that initiating a digital payment is secure and risk-free (Baabdullah *et al.*, 2019) • *Structural assurance* refers to the extent to which customers believe that institutional structures "like guarantees, regulations, promises, legal recourse or other procedures are in place to promote success" (McKnight *et al.*, 2002, p. 393). The construct *structural assurance* refers to trustees beliefs and is used to address and cover customers' concerns regarding security in any technology or information system (Geebren *et al.*, 2021) • *Perceived credibility* is defined as the extent to which consumers feel that the firm/provider has the knowledge or ability to fulfil its claims, and that the firm can be trusted to tell the truth (Newell and Goldsmith, 2001, p. 235)	27
9	Hedonic motivation	• Pleasure-oriented or *hedonic motivation* (UTAUT2) is defined as the fun or pleasure that results from technology use (Venkatesh *et al.*, 2012)	16
10	Perceived value	• *Perceived value* refers to the overall assessment that a customer or user makes of the usefulness of a technology or system, based on his or her perceptions of what he or she receives from its use and what he or she has to give in return (Karjaluoto *et al.*, 2019). According to Zeithaml (1988), *perceived value* involves the overall evaluation of the discrepancy between the perceived benefit from and the cost of obtaining the product or service • Research (Park and Park, 2009; Holbrook, 2006) has provided two perspectives on *perceived value*: motivation and goal orientation. The motivation orientation of *perceived value* includes the utilitarian and hedonic values while the goal orientation includes the economic, social, hedonic and altruistic values	15
11	Personal innovativeness	• *Personal innovativeness* is defined as the willingness of an individual to try out any new information technology or system (Agarwal and Prasad, 1998, p. 206). Agarwal and Prasad (1998) also developed, proposed and validated the measures for it	14
12	Perceived cost (including monetary sacrifice)	• *Perceived cost* is considered one of the major barriers to adopting mobile financial services (Dahlberg *et al.*, 2008). It is defined as the extent to which a person believes that using technology, system or service will cost money (Wessels and Drennan, 2010)	13

(continued)

Table 5.

S#	Constructs	Definition	Frequency of use (no. of studies)
13	Compatibility (including job relevance, cognitive fit and task–technology fit)	• *Compatibility* (Diffusion of Innovation theory) is defined as the degree to which technology or system is perceived as consistent with the existing values, needs and experiences of users or customers (Rogers, 1962; Moore and Benbasat, 1991). Research has considered perceived *compatibility* similar to *job relevance* (Venkatesh and Davis, 2000), *cognitive fit* (Vessey, 1991) and *task–technology fit* (Goodhue and Thompson, 1995)	12
14	Information quality/service quality/system quality	• *Information quality* (information system success model) refers to the accuracy, reliability, completeness, timeliness and correlation of the data produced by the information system (DeLone and McLean, 1992). *Information quality* affects perceived usefulness, thereby affecting users' satisfaction with the information system or technology (Seddon and Kiew, 1996) • *Service quality* (information system success model) refers to the difference between the anticipated and the actual perceived quality of services provided by a system (DeLone and McLean, 1992). It covers tangibility, reliability, responsiveness, assurance and empathy (Cheng, 2012) • *System quality* covers the system inquiry functions, document transmission speed, response time and software and hardware access speed (DeLone and McLean, 1992)	11

Table 5.

3.2.3 Methods and markets (M). Most of the studies that were included in our review used the quantitative or survey method (103 studies or 90%), and a few used mixed methods (12 studies or 10%). Most of the studies were conducted in emerging markets such as China (16 studies or 14%) and India (11 studies or 10%), followed by Taiwan (8 studies or 7%), South Korea (7 studies or 6%) and Ghana (6 studies or 5%). Five studies (or 4%) were conducted in Iran, Malaysia and the USA. Of the 115 studies included in our review, only three (or 3%) conducted a multi-country assessment (See Figure 3).

3.2.4 Moderators (M). In addition to the main constructs (independent or dependent variables), several moderators (also known as contingent variables) were used in the reviewed research articles to examine how a moderator could affect the strength of the relationship between an independent variable and a dependent variable. Research has divided these moderators into three major categories: (1) the demographic moderators gender, age, profession and income (Chaouali and Souiden, 2019; Glavee-Geo *et al.*, 2017; Baptista and Oliveira, 2017); (2) the cultural moderators individualism/collectivism, uncertainty avoidance, masculinity/femininity and power distance (Baptista and Oliveira, 2015) and (3) the psychological moderators self-efficacy, perceived image, subjective norms, personal innovativeness (Mohammadi, 2015), trust and perceived risk (Chung and Kwon, 2009) (see Table 6).

For example, examining UTAUT2 with cultural moderators, Baptista and Oliveira (2015) provided new insights into the variables affecting the acceptance of mobile banking and how culture influences individual user behaviour regarding it. The study finding suggests that collectivism, uncertainty avoidance, short term and power distance are the most significant cultural moderators.
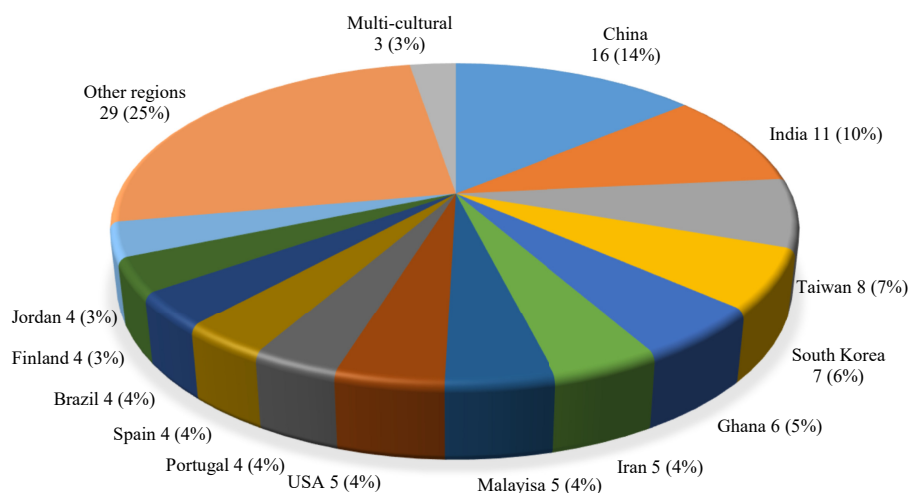
S#	Moderator	Frequency
1	Gender	12
2	Age	11
3	Experience	6
4	Self-efficacy	2
5	Consumer involvement	1
6	Early adopter	1
7	Frequency	1
8	Income	1
9	Individualism/collectivism	1
10	Knowledge	1
11	Late adopter	1
12	Long/short term	1
13	Masculinity/femininity	1
14	Mobile experience	1
15	Mobile payment user type	1
16	Perceived ease of use	1
17	Perceived image	1
18	Perceived risk	1
19	Personal innovativeness	1
20	Power distance	1
21	Privacy empowerment	1
22	Privacy policy	1
23	Subjective norms	1
24	Task–technology fit	1
25	Uncertainty avoidance	1
26	Usage	1
27	Voluntariness	1

4. Comprehensive framework of MFS domains
The comprehensive framework of the MFS domains that we used in our review is shown in
Figure 4. This proposed framework has identified the *service dynamics* and has segregated
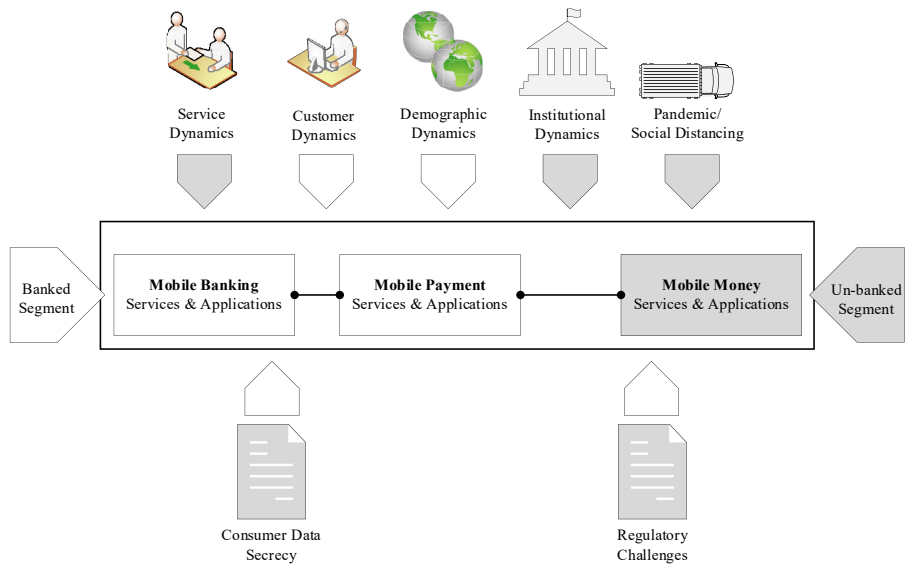
the services offered by mobile banking into two domains: financial and non-financial. This segregation was identified earlier by Shaikh and Karjaluoto (2015) in their highly cited article entitled "Mobile banking adoption – a literature review". The financial services accessed and executed by the consumers include fund transfer, cash withdrawal and utility bill payment. Non-financial services include balance inquiry, receiving essential notifications, chat-bots and a conversation with robo-advisor. Chawla and Joshi (2017) classified MFSs and the associated offerings into three broad categories: banking services, payment services and value-added services. Banking services largely represent innovative and downloadable mobile apps and website and text banking. Payment services include peer-to-peer payment, utility bill payment and POS banking using NFC payment mechanisms. Value-added services include virtual wallets, advisory including virtual support, personal financial management, cloud storage and wearables.

The term *customer dynamics* refers to the classification of the consumers into different domains considering their choices, behaviours, habits, use purpose and level of access to the banking and payment technologies and alternative delivery channels. Banked consumers can access and use the products, services and channels anytime, anywhere. Un-banked consumers, on the other hand, have limited or no access to banking and payment services. Here, mobile money technology and services provided relief to many.

The *demographic or regional dynamics* or classification and user dynamics mainly imply the applicability and feasibility of offering various MFSs to the demographically dispersed population. More specially, reaching a demographically dispersed potential consumer base and providing them with formal banking services have always been challenging. This is true of many unbanked segments in Africa (Baptista and Oliveira, 2015). A novel retail mobile banking service initiative called branchless banking was introduced in the 1990s to several developing countries, such as Kenya and Ghana, and several emerging countries, such as Brazil and South Africa. For instance, the branchless banking scheme called M-Pesa introduced in Kenya in early 2007 was phenomenally successful (Dermish *et al.*, 2011). It is now being considered a catalyst for much of the research done on branchless banking to date.

The *institutional dynamics* segregate all institutions that develop and deploy mobile-based financial and payment services, such as government and regulatory bodies, banking and microfinance entities and non-banking entities such as merchants, FinTech and third-party developers. In addition to the banking entities traditionally considered solely responsible for developing and deploying various banking and financial services and alternative delivery channels, the participation of non-banking entities in the MFS ecosystem is growing primarily due to the global recession in 2008 and the promulgation of PSD2 and open-banking regulation in 2018. This changing regulatory landscape has structurally disrupted the traditional banking ecosystem, transformed the retail banking and payment landscape, and has widened the scope and increased the use of MFSs.

Published in May 2018, PSD2 of the European Commission (EC) requires banking companies and credit unions to provide third-party app developers and service providers such as FinTech with access to their consumer data. This conspicuous development has transformed the banking and payment landscape, and thus also the bank–customer relationship. Moreover, these revolutionary guidelines will empower non-banking entities such as PayPal and technology titans such as Facebook to develop and deploy a wide range of banking, financial and payment products according to the needs and requirements of the consumers, thereby creating several challenges and competition for the diligently regulatory banks.

Concerning the COVID-19 pandemic and social distancing, as of this article's writing, the pandemic was still raging, and people worldwide were getting used to the new normal. The pandemic has created wide-ranging challenges and has worsened the situation for many traditional banking and payment players as it increased the demand for more digital, contactless, remote, safe and clean services. Consequently, the digital and remote retail payment services increased across the globe; consumers began availing of these services more frequently, and the use of publicly shared devices like ATMs and POS terminals was reduced exponentially. COVID-19 has boosted the demand for more remote services, including the demand for mobile-based financial and payment services.

5. Discussion

The consumer behaviour and fast-emerging mobile and contactless technologies have widened the differences amongst the three domains and have therefore enriched the financial landscape. For instance, the institutions have been segregated to provide financial services to consumers. Here, unlike the banking sector, which was traditionally responsible for developing and deploying banking services, including mobile banking, the FinTech companies such as PayPal and the technology titans (Google, Facebook) are offering digital payment options and undertaking several initiatives to provide a host of services to the consumers on their cell phones and tablets. Unlike mobile money services, mobile banking and mobile payment services are diligently regulated and largely developed and deployed by banking companies and credit unions.

The new regulatory landscape has created a new breed of financial institutions such as FinTech offering mobile banking and payment services. In addition, the primary devices used for accessing and conducting mobile banking are mobile phones and tablets whereas laptops and personal computers are used to access and conduct Internet banking transactions. Further, the analysis of the literature suggests that the research on the actual continuous use of MFSs is particularly relevant and essential for the financial services sector, including banking companies, mainly for two major reasons. Firstly, the relationship between a customer and an organisation changes over time. Customer relationships' dynamic nature is especially important in service industries that offer continuous services, such as financial and insurance services (Shaikh *et al.*, 2015). Secondly, a huge investment underpins mobile telephone and technology development and implementation and the underlying purpose of

this investment is to create a sustainable and long-term relationship with the consumers, which is possible only when the consumer accepts and continuously uses the company's technology, service or product.

Our research revealed a trend in the evolution, development and growth of the MFS field. A shift in mobile banking and payment research was also observed. For example, in the 1990s, non-empirical studies (essentially focussing on conceptual work) and practitioner-oriented work in MFS dominated the literature. In the early 2000s, empirical research (e.g. survey studies, case studies, field studies) started dominating the literature, showing the maturity of the field.

The context and the technical aspects of the studies published in the MFS field also vary. For example, in the 1990s, SMS banking started to dominate MFSs. In 2007, after the advent of smartphones and other smart devices, the changing regulatory scenarios in many countries provided greater depth and support to the banking and non-banking industries. Consequently, downloadable mobile banking and payment applications were developed, providing access to traditional and value-added services. These developments widened the scope and increased the use of mobile banking and payment applications and services. Academic research on such applications and services started appearing in mainstream journals in the early 2000s, and such research has been sustained to this day.

Similarly, PDA use in conducting mobile banking transactions faded away after the introduction of smartphones in 2007. The services offered through mobile banking services vary considerably in scope and nature. For example, mobile banking includes non-financial mobile accounting (e.g. mini-bank statement, balance enquiry, chequebook request, service notifications and saving beneficiary details) and other value-added services, such as mobile brokerage (selling and buying financial instruments) and MFSs (utility bill payment, fund transfer, making donations and insurance policy subscription).

Like ATM and Internet banking, branchless banking has been considered a separate alternative delivery channel in various countries, such as Kenya, Ghana, Brazil, India and Pakistan. To deal with the regulatory aspects governing digital banking, several developing and emerging countries have drafted a separate set of regulations on branchless banking. Other striking advantages associated with branchless banking are (1) unlike mobile banking, branchless banking does not usually involve cutting-edge technology and sophisticated services and (2) the branchless banking channel is used mainly for payments and transfers, not for savings or credit, but these additional services may be offered in the future.

For the banking industry, COVID-19 has accelerated the transformation of banking from paper-based to digital/online, with the consumers' banking preferences and financial sentiments rapidly evolving. It has also fast-tracked the digitisation program across the banking and payment industry. Notwithstanding, not many articles have examined the role played by the COVID-19 pandemic in promoting the digital culture. However, it has been widely accepted (Haapio *et al.*, 2021; McKinsey and Company, 2020; Goodell, 2020) that the new normal has brought about noticeable changes in consumer engagement behaviour when accessing and using digital payment services, including MFSs. The same is also evident from the volume of publications of articles in the MFS field. Out of 115 articles published during 2009–2020 and included in this review, a noticeable increase in the publication of the articles in the MFS was noticed during the last four years, i.e. since 2017. This trend continues and further accelerated since 2019. This is perhaps due to the COVID-19 related crises and the consumer choices for more remote services using mobile applications.

5.1 Implications for theory and industry

Our systematic review has offered important theoretical contributions. Its initial contribution is the conceptualisation, validation and segregation of three major domains: mobile banking,

mobile payment and mobile money. As explained earlier, each of these domains follows a different path and targets a different consumer segment. Consequently, this noteworthy finding provides the research in the field with an opportunity to highlight the importance of each of these domains for improving customers' attitudes, behaviour and intention regarding the adoption and use of MFSs and how each of these domains meet the consumer variant needs for more innovative and portable banking and payment services.

From a careful reading of the literature, it was observed that research has identified four distinct research streams: (1) consumer pre-adoption resistance behaviour towards business information systems (Laukkanen *et al.*, 2009), (2) consumer pre-adoption acceptable behaviour towards business information systems (Hanafizadeh *et al.*, 2014), (3) consumer post-adoption or continuous use behaviour towards business information systems (Bhattacherjee, 2001; Shaikh and Karjaluoto, 2015, 2016) and (4) consumer pre- and post-adoption behaviours towards business information systems (Kim and Son, 2009). Two major research domains, pre-adoption or acceptance and post-adoption or continuous use, were considered paramount when investigating MFSs globally. We also found that the individual acceptance of information systems remained a central and recurrent theme in consumer behaviour and business information system research in the MFS field (Bhattacherjee and Sanford, 2006), but little empirical evidence of the continuous or sustained use of MFSs is available. This is of much concern as the long-term development of MFSs relies on users continued use of them (Yuan *et al.*, 2016).

Our TCMM framework-based review expanded the previous research by identifying and reporting the similarities amongst various variables, which provides vital information to the research when (1) constructing or modifying models or frameworks with added variables, (2) avoiding the overlapping of the variables and (3) seeking to improve the effectiveness and usability of the theoretical models. For example, our findings indicate that the variable *perceived usefulness* is akin to the variables *performance expectancy*, *perceived benefit*, *relative advantage* and *perceived performance*; *perceived ease of use* is similar to its antecedents *effort expectancy*, *perceived self-efficacy* and *complexity*; *social influence* is similar to *subjective/social norm*; *facilitation conditions* is similar to *perceived behavioural control*; *perceived financial cost* is akin to its antecedent *perceived financial resources* and *perceived credibility* is similar to its antecedents *perceived security and privacy* and *structural assurance*.

Another significant contribution of the TCMM framework-based review is the development of the "Comprehensive framework of MFS domains" as shown in Figure 4. We applied the TCMM framework to analyse MFS research and outline roadmaps for the future research in the three major research domains. Summarising the prioritisation of the variables affecting the consumer adoption and use of MFSs provide useful information for the research. For example, the results of our review suggest that the variables *perceived ease of use* (including *effort expectancy*, *perceived self-efficacy* and *complexity*), *perceived usefulness* (including *performance expectancy*, *perceived benefit*, *relative advantage* and *perceived performance*), *trust*, *social influence* (including *subjective and social norms*) and *risk* are the significant drivers of the behavioural intentions to adopt, resist and continuously use MFSs.

Our review suggests that consumers' decision to adopt and continuously use various innovative banking and payment services is primarily dominated by two major factors: the ease of use and usefulness of the services, which implies that the companies should simplify their offers and increase their customer utility. This will help the executives and marketing professionals effectively engage their customers across all touchpoints or alternative delivery channels to build customer commitment and achieve customer retention (Lemke *et al.*, 2011). SMS-based mobile banking and payment services provide limited options and are considered less hedonic. Downloadable banking and payment applications provide high security and a wide range of services to consumers. Adding more hedonic features to SMS-based banking and payment, such as those that produce pleasure and provide leisure will increase the

consumers' adoption and sustained use of such services, especially in emerging and developing countries.

The perceived value of MFSs has been sparsely used as an exogenous and endogenous variable in the extended research. In the simplest terms, *price* is what you pay for a service or product while *value* is what you get for what you pay. Particularly at the present time, when the benefits and advantages of MFSs are being considered, we believe that the industry players must have a clear understanding of what value creation means and must develop a value-minded approach. Unlike mobile banking and payment services, USSD- and SMS-based branchless banking services' uptake looks considerably high, especially in developing and emerging countries. Banking companies and other financial institutions should continue investing in the mobile money or branchless banking business and developing models of such to provide sustainable financial services, obtain an additional revenue source and increase their consumer base. After all, for most of the 'bottom-of-the-pyramid underbanked and unbanked population', *it is either mobile or nothing* (Dogbevi, 2010; Glavee-Geo *et al.*, 2019).

6. Limitations and future research agenda

Our review was not without any limitations. One of its major limitations is the type of studies considered and included in the review. Although MFSs have received greater attention from academicians and practitioners of late, the practitioner-oriented articles published in renowned and predominantly practitioner-oriented journals were not considered and included in our review. In addition, our review was dominated by survey studies; non-survey studies were excluded from the review. Other study limitations and a comprehensive list of the future research directions are discussed below.

6.1 Mobile money, financial inclusion and the bottom-of-the-pyramid consumers

As evident from the TCMM framework and the resulting "Comprehensive framework of MFS domains" shown in Figure 4, few empirical studies on *branchless banking* (mobile money) were found, which were searched to contribute to the understanding of the bottom-of-the-pyramid consumers' adoption and use behaviour. In other words, the low levels of financial inclusion of a large number of mobile phone subscribers in emerging and developing countries make it imperative to investigate if an expansion of mobile phone deployment can generally contribute to social welfare, consumer well-being, greater financial inclusion (Ghosh, 2016) and the greater use of MFSs.

6.2 New methodical domains, including experiments and simulations

While a strong quantitative tendency characterised the articles that were included in our review, a few empirical studies grounded in a mix-method approach, including qualitative and quantitative methods, were found (cf. Lashitew *et al.*, 2019). Quantitative modelling and measurement were used to explain MFS adoption and continuous use in specific contexts. Our review also showed the lack of certain methodological domains, such as experiments and simulations. Most of the cause–effect relationships implicitly argued for in the MFS literature were based on correlational studies. Future research may consider using other research methods, such as experimental research and simulation, in examining the various domains of MFSs. Methodological innovations in MFS research will provide robustness of the findings, a strong validation of theories and potentially new theory development.

6.3 Visualisation approaches and the mobile financial services field

Future studies should also consider using bibliometric networks to visualise publications within the three main fields (mobile banking, mobile payments and mobile money) with

regard to citation, co-citation, bibliographic coupling and keyword co-occurrence. The visualisation approaches, such as the distance-, graph- and timeline-based approaches (Van Eck and Waltman, 2014), can help provide insightful findings in the area of MFSs.

6.4 Requirement of more comparative or multi-country assessments

Comparative studies of different countries can also help explore the differences amongst countries in consumer perceptions of the perceived value of MFSs due to the differences in culture, preferences, demographics and institutional contexts amongst countries. Although PSD2 was primarily meant for the European Union (EU) member countries, some non-EU member countries have also adopted it. Therefore, studies on the impact of PSD2 on the MFS users/consumers, banks and non-financial actors in non-EU member countries may be insightful. The possibility of PSD2 creating innovation opportunities and challenges outside the EU or the European Economic Community (EEC) cannot be underemphasised. Future studies investigating the impact of MFSs on consumers within and outside the EU/EEC will be useful to policymakers and managers for policy reforms and service design decisions regarding MFSs in such regions.

6.5 New regulations: the key driving force for mobile financial services

The EC developed and implemented PSD2 to create a safer and more inclusive and innovative European payment system. Amongst the many objectives of PSD2 are to protect consumers when they pay online and to promote the development of an innovative online and mobile payment culture (European Commission, 2015). Collaboration with FinTech presented strategic opportunities despite the initial technical challenges (Brodsky and Oakes, 2017). The implementation of PSD2 presents many worthwhile research possibilities. For example, future studies can investigate if the outcomes envisaged by the regulation have been met. The impact of PSD2 on banks, bank customers and non-banking actors can be better examined through qualitative interviews to contribute to the understanding of the directive's challenges and success factors. Large-scale quantitative data collection through a survey of MFS users/consumers in the EU member countries and beyond can help establish a robust relationship between the implementation success factors and/or barriers and their impact on customer value.

6.6 Open banking and mobile financial services

PSD2 implementation supports open banking. Open banking is a collaborative model in which banking data are shared through an application programming interface between two or more unaffiliated parties to deliver enhanced capabilities to the marketplace (Brodsky and Oakes, 2017). However, while open banking provides enhanced value and benefits to end-users, it also creates data security challenges. Future research in the MFS field can explore the impact of PSD2 on risk, data security and value creation. PSD2 is expected to usher in an entirely new financial service ecosystem and lead to fiercer competition between banks and non-banks, in which banks' roles may shift markedly (Brodsky and Oakes, 2017). Research examining open-banking models in the MFS field and their impact on customer experience is a future-study option.

6.7 Mobile financial applications

The research on the adoption and use of downloadable mobile banking/payment applications (mobile communication technologies are ubiquitous and span a wide range of applications) is highly limited, perhaps overlooked by the previous research. Future studies should consider investigating consumer attitudes towards and behaviour regarding the use of these

applications against the backdrop of increased penetration of smartphones and increased use of innovative transactional applications for payment purposes.

6.8 New demographic groups, including millennials, generation Z and generation alpha
Our review showed that the previous studies in the MFS field also focussed on the impact of demographics (e.g. gender differences in MFS adoption/use). The new demographic groups (the millennials, generation Z and generation alpha) allow MFS research regarding such groups' needs, expectations and preferences. Research that also seeks to combine psychological variables with innovation adoption theories to better explain the MFS phenomenon will lead to new insights and will contribute to theory building. For example, the recently developed *picky shopper scale* (Cheng *et al.*, 2021) differentiates between *picky by acceptance* and *picky by rejection*. Future research can integrate the picky shopper scale into studies comparing the shopping behaviours and innovation adoption of generation X, generation Y and the millennials using MFSs as a context.

6.9 Mobile money and the associated challenges
MFSs have seen many innovations and digital transformations in recent years. For example, mobile money (Glavee-Geo *et al.*, 2019; Senyo and Osabutey, 2020) is a form of FinTech innovation that enables financial transactions through mobile services and is a driver of financial inclusion. Unlike formal banking services, mobile money technology relies on an agent network (Glavee-Geo *et al.*, 2019). FinTech is a disintermediation force where disruptive technologies are the main drivers (Das, 2019). While mobile money agents play a vital role in this transformation in most of the countries where mobile money has been introduced, cases of fraud and other exploitative activities have been reported (Akomea-Frimpong *et al.*, 2019). Future empirical studies can investigate the impact of such behaviours (fraud, exploitation) on the adoption and use of mobile money, and its ethical considerations. In addition, the mobile money agents' role as *service agents* also requires further research, most especially when the actions or inactions of the agents can have a significant impact on the service levels.

6.10 Non-financial value-added services
Much emphasis has been placed on examining the financial aspects of MFSs, and their non-financial aspects have been sparsely examined. Some of these non-financial services are real-time and important account messaging, including service notifications and alerts, which have created a new research domain dealing with non-financial transactions. Nonetheless, very few attempts have been made to consider the importance of non-financial services and the role that they play in providing a greater experience to the consumers. For example, examining the key marketing drivers of consumer experience with non-financial transactions available on mobile banking apps, Shaikh *et al.* (2020) found that the consumer awareness, usefulness and ease of use of non-financial transactions play significant roles in increasing consumers' sustained use of mobile financial apps. Future research may also examine the effect of the digital notifications in such apps on the attitudes and behaviours of consumers.

6.11 A dedicated scale for mobile financial services
On top of the future research endeavours mentioned in the previous sections, developing dedicated scales for MFSs will benefit both scholarly research and practice when such scales are used in the survey design. The development of dedicated scales for MFSs is thus recommended.

6.12 Mobile financial services and the COVID-19 pandemic
The COVID-19 pandemic has brought about significant disruptions in the social and economic lives of people all over the world. Social distancing, restrictions on mass gatherings

and avoidance of physical touchpoints due to the risk of infection have led to a shift from paper-based and other physical touchpoint/contacts (e.g. ATMs) to online transactions. It can be argued that the COVID-19 pandemic has accelerated the digitisation process across the banking, payment and retail sectors. Future research should examine the role played by the pandemic in promoting a digital financial culture. Hence, future studies should consider the impact of the COVID-19 pandemic on digital financial transformation and digitalisation.

6.13 Artificial intelligence (AI)-enabled mobile financial services

The term *artificial intelligence* (AI) was coined by John McCarthy in 1957 and referred to computers with cognitive skills similar to humans, resulting in immense efficiency gains for firms that use it, and for their clients (Russell and Norvig, 1995). The popular AI tools used in the banking and payment industry include robo-advisors, chat-bots, conversational AI, biometric authentication, call centre agent matching, account management and fraud detection (Mistry, 2018). Despite these motivations, the impact and use of AI in the banking and payment sector have not been studied to date (Deubner, 2021). As such, with the rise of AI, the roles and behaviours of bank and retail customers need to be re-evaluated (Jakšič and Marinč, 2019). Despite the desire of the payment industry to have their customers interact with their AI-enabled solutions, it is unknown if their customers have the desire to do so (Payne *et al.*, 2018), thereby leaving a huge research gap in the examination of such phenomenon. Therefore, future studies in the area of AI-based mobile banking and payment are recommended.

6.14 Artificial intelligence-enabled mobile banking and payment services (AI-MBPSs) and gender disparity

Future research on AI-MBPSs will be consequential if they will also examine gender differences in the adoption and use of AI-MBPSs, especially in countries traditionally considered to have a male-dominated society, with significant gender disparity. Such research may solicit the experiences of female customers when accessing and using AI-MBPSs, thereby providing deep insights into the role of gender in AI-MBPS adoption and use. To the best of our knowledge, no previous study has examined the gender differences in AI-MBPS adoption and use.

References

Agarwal, R. and Prasad, J. (1998), "A conceptual and operational definition of personal innovativeness in the domain of information technology", *Information Systems Research*, Vol. 9 No. 2, pp. 204-215, doi: 10.1287/isre.9.2.204.

Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211, doi: 10.1016/0749-5978(91)90020-T.

Ajzen, I. and Fishbein, M. (1980), *Understanding Attitudes and Predicting Social Behavior*, Prentice-Hall, Englewood Cliffs, NJ.

Akomea-Frimpong, I., Andoh, C., Akomea-Frimpong, A. and Dwomoh-Okudzeto, Y. (2019), "Control of Fraud on Mobile money services in Ghana: an exploratory study", *Journal of Money Laundering Control*, Vol. 22 No. 2, pp. 300-317, doi: 10.1108/JMLC-03-2018-0023.

Al-Ajam, A.S. and MdNor, K. (2015), "Challenges of adoption of internet banking service in Yemen", *International Journal of Bank Marketing*, Vol. 33 No. 2, pp. 178-194, doi: 10.1108/IJBM-01-2013-0001.

Alkhowaiter, W.A. (2020), "Digital payment and banking adoption research in Gulf countries: a systematic literature review", *International Journal of Information Management*, Vol. 53, pp. 1-17, doi: 10.1016/j.ijinfomgt.2020.102102.

Amoroso, D.L. and Magnier-Watanabe, R. (2012), "Building a research model for mobile wallet consumer adoption: the case of mobile Suica in Japan", *Journal of Theoretical and Applied Electronic Commerce Research*, Vol. 7 No. 1, pp. 94-110, doi: 10.4067/S0718-18762012000100008.

Au, Y.A. and Kauffman, R.J. (2008), "The economics of mobile payments: understanding stakeholder issues for an emerging financial technology application", *Electronic Commerce Research and Applications*, Vol. 7 No. 2, pp. 141-164, doi: 10.1016/j.elerap.2006.12.004.

Baabdullah, A.M., Alalwan, A.A., Rana, N.P., Patil, P. and Dwivedi, Y.K. (2019), "An integrated model for m-banking adoption in Saudi Arabia", *International Journal of Bank Marketing*, Vol. 37 No. 2, pp. 452-478, doi: 10.1108/IJBM-07-2018-0183.

Bandura, A. (1997), *Self-efficacy: The Exercise of Control*, Freeman, New York.

Baptista, G. and Oliveira, T. (2015), "Understanding mobile banking: the unified theory of acceptance and use of technology combined with cultural moderators", *Computers in Human Behavior*, Vol. 50, pp. 418-430, doi: 10.1016/j.chb.2015.04.024.

Baptista, G. and Oliveira, T. (2017), "Why so serious? Gamification impact in the acceptance of mobile banking services", *Internet Research*, Vol. 27 No. 1, pp. 118-139, doi: 10.1108/IntR-10-2015-0295.

Barnes, S.J. and Corbitt, B. (2003), "Mobile banking: concept and potential", *International Journal of Mobile Communications*, Vol. 1 No. 3, pp. 273-288, doi: 10.1504/IJMC.2003.003494.

Batista, C. and Vicente, P.C. (2020), "Improving access to savings through mobile money: experimental evidence from African smallholder farmers", *World Development*, Vol. 129, pp. 1-17, doi: 10.1016/j.worlddev.2020.104905.

Bauer, R.A. (1967), "Consumer behavior as risk taking", in Cox, D. (Ed.), *Risk Taking and Information Handling in Consumer Behavior*, Harvard University Press, Cambridge, MA.

Bhattacherjee, A. (2001), "Understanding information systems continuance: an expectation-confirmation model", *MIS Quarterly*, Vol. 25 No. 3, pp. 351-370, doi: 10.2307/3250921.

Bhattacherjee, A. and Sanford, C. (2006), "Influence processes for information technology acceptance: an elaboration likelihood model", *MIS Quarterly*, Vol. 30 No. 4, pp. 805-825, doi: 10.2307/25148755.

Brodsky, L. and Oakes, L. (2017), "Data sharing and open banking", available at: https://www.mckinsey.com/industries/financial-services/our-insights/data-sharing-and-open-banking (accessed 6 April 2021).

Chaouali, W. and Souiden, N. (2019), "The role of cognitive age in explaining mobile banking resistance among elderly people", *Journal of Retailing and Consumer Services*, Vol. 50, pp. 342-350, doi: 10.1016/j.jretconser.2018.07.009.

Chaouali, W., Souiden, N. and Ladhari, R. (2017), "Explaining adoption of mobile banking with the theory of trying, general self-confidence, and cynicism", *Journal of Retailing and Consumer Services*, Vol. 35, pp. 57-67, doi: 10.1016/j.jretconser.2016.11.009.

Chawla, D. and Joshi, H. (2017), "Consumer perspectives about mobile banking adoption in India–a cluster analysis", *International Journal of Bank Marketing*, Vol. 35 No. 4, pp. 616-636, doi: 10.1108/IJBM-03-2016-0037.

Chen, L.D. (2008), "A model of consumer acceptance of mobile payment", *International Journal of Mobile Communications*, Vol. 6 No. 1, pp. 32-52, doi: 10.1504/IJMC.2008.015997.

Chen, S.C. (2012), "To use or not to use: understanding the factors affecting continuance intention of mobile banking", *International Journal of Mobile Communications*, Vol. 10 No. 5, pp. 490-507, doi: 10.1504/IJMC.2012.048883.

Cheng, Y.M. (2012), "The effects of information systems quality on nurses' acceptance of the electronic learning system", *Journal of Nursing Research*, Vol. 20 No. 1, pp. 19-30, doi: 10.1097/JNR.0b013e31824777aa.

Cheng, A., Baumgartner, H. and Meloy, M.G. (2021), "Identifying picky shoppers: who they are and how to spot them", *Journal of Consumer Psychology*, Vol. 31 No. 4, pp. 706-725, doi: 10.1002/jcpy.1223.

Chung, N. and Kwon, S.J. (2009), "The effects of customers' mobile experience and technical support on the Intention to use mobile banking", *Cyberpsychology and Behavior*, Vol. 12 No. 5, pp. 539-543, doi: 10.1089/cpb.2009.0014.

Dahlberg, T., Mallat, N., Ondrus, J. and Zmijewska, A. (2008), "Past, present and future of mobile payments research: a literature review", *Electronic Commerce Research and Applications*, Vol. 7 No. 2, pp. 165-181, doi: 10.1016/j.elerap.2007.02.001.

Das, S.R. (2019), "The future of fintech", *Financial Management*, Vol. 48 No. 4, pp. 981-1007, doi: 10. 1111/fima.12297.

Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13 No. 3, pp. 319-340, doi: 10.2307/249008.

DeLone, W.H. and McLean, E.R. (1992), "Information systems success: the quest for the dependent variable", *Information Systems Research*, Vol. 3 No. 1, pp. 60-95, doi: 10.1287/isre.3.1.60.

Dermish, A., Kneiding, C., Leishman, P. and Mas, I. (2011), "Branchless and mobile banking solutions for the poor: a survey of the literature", *Innovations*, Vol. 6 No. 4, pp. 81-98, doi: 10.1089/cpb. 2009.0014.

Deubner, B. (2021), "PSD2 as an enabler for data-driven, intelligent banking services", available at: https://ccecosystems.news/en/psd2-as-an-enabler-for-data-driven-intelligent-banking-services/ (accessed 26 April 2021).

Dogbevi, E.K. (2010), "More in Africa use mobile phones than on any other continent", available at: www.ghanabusinessnews.com/2010/01/04/more-in-africa-usemobile-phones-than-on-any-other-continent (accessed 10 March 2021).

Dorfleitner, G., Oswald, E.M. and Zhang, R. (2019), "From credit risk to social impact: on the funding determinants in interest-free peer-to-peer lending", *Journal of Business Ethics*, Vol. 170, pp. 375-400, doi: 10.1007/s10551-019-04311-8.

European Commission (2015), "Payment services (PSD 2) - directive (EU) 2015/2366", available at: https://ec.europa.eu/info/law/payment-services-psd-2-directive-eu-2015-2366_en (accessed 13 June 2022).

Fishbein, M. and Ajzen, I. (1975), *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research*, Addison-Wesley, Reading, MA.

Geebren, A., Jabbar, A. and Luo, M. (2021), "Examining the role of consumer satisfaction within mobile eco-systems: evidence from mobile banking services", *Computers in Human Behavior*, Vol. 114, pp. 1-12, doi: 10.1016/j.chb.2020.106584.

Gerpott, T.J. and Kornmeier, K. (2009), "Determinants of customer acceptance of mobile payment systems", *International Journal of Electronic Finance*, Vol. 3 No. 1, pp. 1-30, doi: 10.1504/IJEF. 2009.024267.

Ghezzi, A., Renga, F., Balocco, R. and Pescetto, P. (2010), "Mobile Payment Applications: offer state of the art in the Italian market", *Info*, Vol. 12 No. 5, pp. 3-22, doi: 10.1108/ 14636691011071130.

Ghosh, S. (2016), "Does mobile telephony spur growth? Evidence from Indian states", *Telecommunications Policy*, Vol. 40 No. 10, pp. 1020-1031, doi: 10.1016/j.telpol.2016.05.009.

Gichuki, C.N. and Mulu-Mutuku, M. (2018), "Determinants of awareness and adoption of mobile money technologies: evidence from women micro entrepreneurs in Kenya", *Women's Studies International Forum*, Vol. 67, pp. 18-22, doi: 10.1016/j.wsif.2017.11.013.

Glavee-Geo, R., Shaikh, A.A. and Karjaluoto, H. (2017), "Mobile banking services adoption in Pakistan: are there gender differences?", *International Journal of Bank Marketing*, Vol. 35 No. 7, pp. 1090-1114, doi: 10.1108/IJBM-09-2015-0142.

Glavee-Geo, R., Shaikh, A.A., Karjaluoto, H. and Hinson, R.E. (2019), "Drivers and outcomes of consumer engagement: insights from mobile money usage in Ghana", *International Journal of Bank Marketing*, Vol. 38, pp. 1-20, doi: 10.1108/IJBM-01-2019-0007.

Goodell, J.W. (2020), "COVID-19 and finance: agendas for future research", *Finance Research Letters*, Vol. 35, pp. 1-5, doi: 10.1016/j.frl.2020.101512.

Goodhue, D.L. and Thompson, R.L. (1995), "Task-technology fit and individual performance", *MIS Quarterly*, Vol. 19 No. 2, pp. 213-236, doi: 10.2307/249689.

Gu, J.C., Lee, S.C. and Suh, Y.H. (2009), "Determinants of behavioral Intention to mobile banking", *Expert Systems with Applications*, Vol. 36 No. 9, pp. 11605-11616, doi: 10.1016/j.eswa.2009.03.024.

Gupta, S., Yun, H., Xu, H. and Kim, H.W. (2017), "An exploratory study on mobile banking adoption in Indian metropolitan and urban areas: a scenario-based experiment", *Information Technology for Development*, Vol. 23 No. 1, pp. 127-152, doi: 10.1080/02681102.2016.1233855.

Haapio, H., Mero, J., Karjaluoto, H. and Shaikh, A.A. (2021), "Implications of the COVID-19 pandemic on market orientation in retail banking", *Journal of Financial Services Marketing*, Vol. 26 No. 4, pp. 205-214, doi: 10.1057/s41264-021-00099-9.

Hair, J.F., Hult, G.T.M., Ringle, C.M. and Sarstedt, M. (2017), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, Sage Publications, Thousand Oaks, CA.

Hanafizadeh, P., Behboudi, M., Koshksaray, A.A. and Tabar, M.J.S. (2014), "Mobile-banking adoption by Iranian bank clients", *Telematics and Informatics*, Vol. 31 No. 1, pp. 62-78, doi: 10.1016/j.tele.2012.11.001.

Heyer, A. and Mas, I. (2011), "Fertile grounds for mobile money: towards a framework for analysing enabling environments", *Enterprise Development and Microfinance*, Vol. 22 No. 1, pp. 30-44, doi: 10.3362/1755-1986.2011.005.

Holbrook, M.B. (2006), "Consumption experience, customer value, and subjective personal introspection: an illustrative photographic essay", *Journal of Business Research*, Vol. 59 No. 6, pp. 714-725, doi: 10.1016/j.jbusres.2006.01.008.

Jakšič, M. and Marinč, M. (2019), "Relationship banking and information technology: the role of artificial intelligence and FinTech", *Risk Management*, Vol. 21 No. 1, pp. 1-18, doi: 10.1057/s41283-018-0039-y.

Karjaluoto, H., Shaikh, A.A., Saarijärvi, H. and Saraniemi, S. (2019), "How perceived value drives the use of mobile financial services apps", *International Journal of Information Management*, Vol. 47, pp. 252-261, doi: 10.1016/j.ijinfomgt.2018.08.014.

Karjaluoto, H., Shaikh, A.A., Leppäniemi, M. and Luomala, R. (2020), "Examining consumers' usage intention of contactless payment systems", *International Journal of Bank Marketing*, Vol. 38 No. 2, pp. 332-351, doi: 10.1108/IJBM-04-2019-0155.

Karjaluoto, H., Glavee-Geo, R., Ramdhony, D., Shaikh, A.A. and Hurpaul, A. (2021), "Consumption values and mobile banking services: understanding the urban–rural dichotomy in a developing economy", *International Journal of Bank Marketing*, Vol. 39 No. 2, pp. 272-293, doi: 10.1108/IJBM-03-2020-0129.

Kaur, P., Dhir, A., Bodhi, R., Singh, T. and Almotairi, M. (2020), "Why do people use and recommend m-wallets?", *Journal of Retailing and Consumer Services*, Vol. 56, pp. 1-11, doi: 10.1016/j.jretconser.2020.102091.

Kiconco, R.I., Rooks, G. and Snijders, C. (2020), "Learning mobile money in social networks: comparing a rural and urban region in Uganda", *Computers in Human Behavior*, Vol. 103, pp. 214-225, doi: 10.1016/j.chb.2019.09.005.

Kim, Y.J. and Hollingshead, A.B. (2015), "Online social influence: past, present, and future", *Annals of the International Communication Association*, Vol. 39 No. 1, pp. 163-192, doi: 10.1080/23808985.2015.11679175.

Kim, S.S. and Son, J.Y. (2009), "Out of dedication or constraint? A dual model of post-adoption phenomena and its empirical test in the context of online services", *MIS Quarterly*, Vol. 33 No. 1, pp. 49-70, doi: 10.2307/20650278.

Kim, M., Zoo, H., Lee, H. and Kang, J. (2018), "Mobile financial services, financial inclusion, and development: a systematic review of academic literature", *The Electronic Journal of Information Systems in Developing Countries*, Vol. 84 No. 5, pp. 1-17, doi: 10.1002/isd2.12044.

Lashitew, A.A., van Tulder, R. and Liasse, Y. (2019), "Mobile phones for financial inclusion: what explains the diffusion of mobile money innovations?", *Research Policy*, Vol. 48 No. 5, pp. 1201-1215, doi: 10.1016/j.respol.2018.12.010.

Laukkanen, T., Sinkkonen, S. and Laukkanen, P. (2009), "Communication strategies to overcome functional and psychological resistance to Internet banking", *International Journal of Information Management*, Vol. 29 No. 2, pp. 111-118, doi: 10.1016/j.ijinfomgt.2008.05.008.

Lee, H., Harindranath, G., Oh, S. and Kim, D.J. (2015), "Provision of mobile banking services from an actor–network perspective: implications for convergence and standardization", *Technological Forecasting and Social Change*, Vol. 90, pp. 551-561, doi: 10.1016/j.techfore.2014.02.007.

Lemke, F., Clark, M. and Wilson, H. (2011), "Customer experience quality: an exploration in business and consumer contexts using repertory grid technique", *Journal of the Academy of Marketing Science*, Vol. 39 No. 6, pp. 846-869, doi: 10.1007/s11747-010-0219-0.

Lepoutre, J. and Oguntoye, A. (2018), "The (non-) emergence of mobile money systems in Sub-Saharan Africa: a comparative multilevel perspective of Kenya and Nigeria", *Technological Forecasting and Social Change*, Vol. 131, pp. 262-275, doi: 10.1016/j.techfore.2017.11.010.

Liébana-Cabanillas, F. and Lara-Rubio, J. (2017), "Predictive and explanatory modeling regarding adoption of mobile payment systems", *Technological Forecasting and Social Change*, Vol. 120, pp. 32-40, doi: 10.1016/j.techfore.2017.04.002.

Liébana-Cabanillas, F., Sánchez-Fernández, J. and Muñoz-Leiva, F. (2014), "Antecedents of the adoption of the new mobile payment systems: the moderating effect of age", *Computers in Human Behavior*, Vol. 35, pp. 464-478, doi: 10.1016/j.chb.2014.03.022.

Luhmann, N. (1979), *Trust and Power*, John Wiley & Sons, Chichester.

Luo, X., Li, H., Zhang, J. and Shim, J.P. (2010), "Examining multi-dimensional trust and multi-faceted risk in initial acceptance of emerging technologies: an empirical study of mobile banking services", *Decision Support Systems*, Vol. 49 No. 2, pp. 222-234, doi: 10.1016/j.dss.2010.02.008.

Ma, J., Ollier-Malaterre, A. and Lu, C.Q. (2021), "The impact of techno-stressors on work–life balance: the moderation of job self-efficacy and the mediation of emotional exhaustion", *Computers in Human Behavior*, Vol. 122, pp. 1-10, doi: 10.1016/j.chb.2021.106811.

Makanyeza, C. and Makanyeza, C. (2017), "Determinants of consumers' Intention to adopt mobile banking services in Zimbabwe", *International Journal of Bank Marketing*, Vol. 35 No. 6, pp. 997-1017, doi: 10.1108/IJBM-07-2016-0099.

McKinsey and Company (2020), "The 2020 McKinsey global payments report", available at: https://www.mckinsey.com/industries/financial-services/our-insights/data-sharing-and-open-banking (accessed 5 May 2021).

McKnight, D.H., Choudhury, V. and Kacmar, C. (2002), "The impact of initial consumer trust on intentions to transact with a web site: a trust building model", *The Journal of Strategic Information Systems*, Vol. 11 No. 3, pp. 297-323, doi: 10.1016/S0963-8687(02)00020-3.

Mehrad, D. and Mohammadi, S. (2016), "Word of Mouth impact on the adoption of mobile banking in Iran", *Telematics and Informatics*, Vol. 34 No. 7, pp. 1351-1363, doi: 10.1016/j.tele.2016.08.009.

Mistry, D. (2018), "Chatbots in banking can play the role of financial concierge", available at: https://thefinancialbrand.com/72607/banking-ai-chatbot-pfm-personalization/ (accessed 10 February 2021).

Mohammadi, H. (2015), "A study of mobile banking usage in Iran", *International Journal of Bank Marketing*, Vol. 33 No. 6, pp. 733-759, doi: 10.1108/IJBM-08-2014-0114.

Moore, G.C. and Benbasat, I. (1991), "Development of an instrument to measure the perceptions of adopting an information technology innovation", *Information Systems Research*, Vol. 2 No. 3, pp. 192-222, doi: 10.1287/isre.2.3.192.

Munoz-Leiva, F., Climent-Climent, S. and Liébana-Cabanillas, F. (2017), "Determinants of intention to use the mobile banking apps: an extension of the classic TAM model", *Spanish Journal of Marketing-ESIC*, Vol. 21 No. 1, pp. 25-38, doi: 10.1016/j.sjme.2016.12.001.

Murendo, C., Wollni, M., De Brauw, A. and Mugabi, N. (2018), "Social network effects on mobile money adoption in Uganda", *The Journal of Development Studies*, Vol. 54 No. 2, pp. 327-342, doi: 10.1080/00220388.2017.1296569.

N'dri, L.M. and Kakinaka, M. (2020), "Financial inclusion, mobile money, and individual welfare: the case of Burkina Faso", *Telecommunications Policy*, Vol. 44 No. 3, pp. 1-16, doi: 10.1016/j.telpol.2020.101926.

Newell, S.J. and Goldsmith, R.E. (2001), "The development of a scale to measure perceived corporate credibility", *Journal of Business Research*, Vol. 52 No. 3, pp. 235-247, doi: 10.1016/S0148-2963(99)00104-6.

Oliveira, T., Faria, M., Thomas, M.A. and Popovič, A. (2014), "Extending the understanding of mobile banking adoption: when UTAUT meets TTF and ITM", *International Journal of Information Management*, Vol. 34 No. 5, pp. 689-703, doi: 10.1016/j.ijinfomgt.2014.06.004.

Ondrus, J. and Pigneur, Y. (2007), "Cross-industry preferences for development of mobile payments in Switzerland", *Electronic Markets*, Vol. 17 No. 2, pp. 142-152, doi: 10.1080/10196780701296386.

Park, M. and Park, J. (2009), "Exploring the influences of perceived interactivity on consumers'e-shopping effectiveness", *Journal of Customer Behaviour*, Vol. 8 No. 4, pp. 361-379, doi: 10.1362/147539209X480990.

Paul, J. and Benito, G.R. (2018), "A review of research on outward foreign direct investment from emerging countries, including China: what do we know, how do we know and where should we be heading?", *Asia Pacific Business Review*, Vol. 24 No. 1, pp. 90-115, doi: 10.1080/13602381.2017.1357316.

Paul, J. and Rosado-Serrano, A. (2019), "Gradual internationalization vs born-global/International Business Review 29 (2020) 101717 international new venture models: a review and research agenda", *International Marketing Review*, Vol. 36 No. 6, pp. 830-858, doi: 10.1108/IMR-10-2018-0280.

Payne, E.M., Peltier, J.W. and Barger, V.A. (2018), "Mobile banking and AI-enabled mobile banking: the differential effects of technological and non-technological factors on digital natives' perceptions and behavior", *Journal of Research in Interactive Marketing*, Vol. 12 No. 3, pp. 328-346, doi: 10.1108/JRIM-07-2018-0087.

Pelletier, A., Khavul, S. and Estrin, S. (2020), "Innovations in emerging markets: the case of mobile money", *Industrial and Corporate Change*, Vol. 29 No. 2, pp. 395-421, doi: 10.1093/icc/dtz049.

Rogers, E.M. (1962), *Diffusion of Innovations*, 1st ed., Free Press, New York.

Russell, S.J. and Norvig, P. (1995), *Artificial Intelligence: A Modern Approach*, Prentice-Hall, Englewood Cliffs, NJ.

Seddon, P. and Kiew, M.Y. (1996), "A partial test and development of DeLone and McLean's model of IS success", *Australasian Journal of Information Systems*, Vol. 4 No. 1, pp. 90-109, doi: 10.3127/ajis.v4i1.379.

Senyo, P.K. and Osabutey, E.L. (2020), "Unearthing antecedents to financial inclusion through FinTech innovations", *Technovation*, Vol. 98, pp. 1-14, doi: 10.1016/j.technovation.2020.102155.

Shaikh, A.A. and Karjaluoto, H. (2015), "Mobile banking adoption: a literature review", *Telematics and Informatics*, Vol. 32 No. 1, pp. 129-142, doi: 10.1016/j.tele.2014.05.003.

Shaikh, A.A. and Karjaluoto, H. (2016), "On some misconceptions concerning digital banking and alternative delivery channels", *International Journal of E-Business Research (IJEBR)*, Vol. 12 No. 3, pp. 1-16.

Shaikh, A.A. and Karjaluoto, H. (2019), "Mobile financial services: introduction, definition, and conceptualization", *Routledge Studies in Marketing*.

Shaikh, A.A., Karjaluoto, H. and Chinje, N.B. (2015), "Continuous mobile banking usage and relationship commitment - a multi-country assessment", *Journal of Financial Services Marketing*, Vol. 20 No. 3, pp. 208-219, doi: 10.1057/fsm.2015.14.

Shaikh, A.A., Alharthi, M.D. and Alamoudi, H.O. (2020), "Examining key drivers of consumer experience with (non-financial) digital services – an exploratory study", *Journal of Retailing and Consumer Services*, Vol. 55, pp. 1-10, doi: 10.1016/j.jretconser.2020.102073.

Sharma, S.K. (2017), "Integrating cognitive antecedents into TAM to explain mobile banking behavioral intention: a SEM-neural network modelling", *Information Systems Frontiers*, Vol. 21, pp. 815-827, doi: 10.1007/s10796-017-9775-x.

Suárez, S.L. (2016), "Poor people's money: the politics of mobile money in Mexico and Kenya", *Telecommunications Policy*, Vol. 40 No. 10, pp. 945-955, doi: 10.1016/j.telpol.2016.03.001.

Tam, C. and Oliveira, T. (2016), "Understanding the impact of m-banking on individual performance: DeLone and McLean and TTF perspective", *Computers in Human Behavior*, Vol. 61, pp. 233-244, doi: 10.1016/j.chb.2016.03.016.

Tan, G.W.H., Ooi, K.B., Chong, S.C. and Hew, T.S. (2014), "NFC mobile credit card: the next Frontier of mobile payment?", *Telematics and Informatics*, Vol. 31 No. 2, pp. 292-307, doi: 10.1016/j.tele.2013.06.002.

Taylor, S. and Todd, P.A. (1995), "Understanding information technology usage: a test of competing models", *Information Systems Research*, Vol. 6 No. 4, pp. 144-176, doi: 10.1287/isre.6.2.144.

Turner, F., Merle, A. and Gotteland, D. (2020), "Enhancing consumer value of the co-design experience in mass customization", *Journal of Business Research*, Vol. 117, pp. 473-483, doi: 10.1016/j.jbusres.2020.05.052.

Van der Boor, P., Oliveira, P. and Veloso, F. (2014), "Users as innovators in developing countries: the global sources of innovation and diffusion in mobile banking services", *Research Policy*, Vol. 43 No. 9, pp. 1594-1607, doi: 10.1016/j.respol.2014.05.003.

Van Eck, N.J. and Waltman, L. (2014), "Visualizing bibliometric networks", *Measuring Scholarly Impact*, Springer, Cham, pp. 285-320.

Venkatesh, V. and Davis, F.D. (2000), "A theoretical extension of the technology acceptance model: four longitudinal field studies", *Management Science*, Vol. 46 No. 2, pp. 186-204, doi: 10.1287/mnsc.46.2.186.11926.

Venkatesh, V., Morris, M.G., Davis, G.B. and Davis, F.D. (2003), "User acceptance of information technology: toward a unified view", *MIS Quarterly*, Vol. 27 No. 3, pp. 425-478, doi: 10.2307/30036540.

Venkatesh, V., Thong, J. and Xu, X. (2012), "Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology", *MIS Quarterly*, Vol. 36 No. 1, pp. 157-178, doi: 10.2307/41410412.

Veríssimo, J.M.C. (2016), "Enablers and restrictors of mobile banking app use: a fuzzy set qualitative comparative analysis (fsQCA)", *Journal of Business Research*, Vol. 69 No. 11, pp. 5456-5460, doi: 10.1016/j.jbusres.2016.04.155.

Vessey, I. (1991), "Cognitive fit: a theory-based analysis of the graphs versus tables literature", *Decision Sciences*, Vol. 22 No. 2, pp. 219-240, doi: 10.1111/j.1540-5915.1991.tb00344.x.

Webster, J. and Watson, R.T. (2002), "Analysing the past to prepare for the future: writing a literature review", *MIS Quarterly*, Vol. 26 No. 2, pp. 13-23, doi: 10.2307/41410412.

Wessels, L. and Drennan, J. (2010), "An investigation of consumer acceptance of M-banking", *International Journal of Bank Marketing*, Vol. 28 No. 7, pp. 547-568, doi: 10.1108/02652321011085194.

World Bank Global Findex Database (2018), "Financial inclusion on the rise, but gaps remain", available at: https://www.worldbank.org/en/news/press-release/2018/04/19/financial-inclusion-on-the-rise-but-gaps-remain-global-findex-database-shows (accessed 16 March 2021).

Xie, E., Reddy, K.S. and Liang, J. (2017), "Country-specific determinants of cross-border mergers and acquisitions: a comprehensive review and future research directions", *Journal of World Business*, Vol. 52 No. 2, pp. 127-183, doi: 10.1016/j.jwb.2016.12. 005.

Yuan, S., Liu, Y., Yao, R. and Liu, J. (2016), "An investigation of users' continuance intention towards mobile banking in China", *Information Development*, Vol. 32 No. 1, pp. 20-34, doi: 10.1177/0266666914522140.

Zeithaml, V.A. (1988), "Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence", *Journal of Marketing*, Vol. 52 No. 3, pp. 2-22, doi: 10.1177/002224298805200302.

Zeithaml, V.A., Berry, L. and Parasuraman, A. (1996), "The behavioral consequences of service quality", *Journal of Marketing*, Vol. 52 No. 3, pp. 2-22, doi: 10.1177/002224299606000203.

Zhou, T. (2011), "The effect of initial trust on user adoption of mobile payment", *Information Development*, Vol. 27 No. 4, pp. 290-300, doi: 10.1177/0266666911424075.

Further reading

Akturan, U. and Tezcan, N. (2012), "Mobile banking adoption of the youth market: perceptions and intentions", *Marketing Intelligence and Planning*, Vol. 30 No. 4, pp. 444-459, doi: 10.1108/02634501211231928.

Holloway, K., Niazi, Z. and Rouse, R. (2017), *IPA Women's Economic Empowerment through Financial Inclusion: A Review of Existing Evidence and Remaining Knowledge Gaps*, Innovations for Poverty Action, New Haven, CT.

Kang, H., Lee, M.J. and Lee, J.K. (2012), "Are you still with us? A study of the post-adoption determinants of sustained use of mobile-banking services", *Journal of Organizational Computing and Electronic Commerce*, Vol. 22 No. 2, pp. 132-159, doi: 10.1080/10919392.2012.667710.

Koenig-Lewis, N., Palmer, A. and Moll, A. (2010), "Predicting young consumers' take up of mobile banking services", *International Journal of Bank Marketing*, Vol. 28 No. 5, pp. 410-432, doi: 10.1108/02652321011064917.

Laukkanen, T., Sinkkonen, S., Kivijärvi, M. and Laukkanen, P. (2007), "Innovation resistance among mature consumers", *Journal of Consumer Marketing*, Vol. 24 No. 7, pp. 419-427, doi: 10.1108/07363760710834834.

Paul, J. and Criado, A.R. (2020), "The art of writing literature review: what do we know and what do we need to know?", *International Business Review*, Vol. 29 No. 4, pp. 1-7, doi: 10.1016/j.ibusrev.2020.101717.

Riivari, J. (2005), "Mobile banking: a powerful new marketing and CRM tool for financial services companies all over Europe", *Journal of Financial Services Marketing*, Vol. 10 No. 1, pp. 11-20, doi: 10.1057/palgrave.fsm.4770170.

Slade, E.L., Dwivedi, Y.K., Piercy, N.C. and Williams, M.D. (2015), "Modeling consumers' adoption intentions of remote mobile payments in the United Kingdom: extending UTAUT with innovativeness, risk, and trust", *Psychology and Marketing*, Vol. 32 No. 8, pp. 860-873, doi: 10.1002/mar.20823.

Statista (2020), "Device usage increase due to the coronavirus worldwide 2020", available at: https://www.statista.com/statistics/1106607/device-usage-coronavirus-worldwide-by-country// (accessed 1 May 2021).

Thakur, R. and Srivastava, M. (2014), "Adoption readiness, personal innovativeness, perceived risk and usage intention across customer groups for mobile payment services in India", *Internet Research*, Vol. 24 No. 3, pp. 369-392, doi: 10.1108/IntR-12-2012-0244.

Venkatesh, V. and Bala, H. (2008), "Technology acceptance model 3 and a research agenda on interventions", *Decision Sciences*, Vol. 39 No. 2, pp. 273-315, doi: 10.1111/j.1540-5915.2008.00192.x.

Yap, K.B., Wong, D.H., Loh, C. and Bak, R. (2010), "Offline and online banking – where to draw the line when building trust in e-banking?", *International Journal of Bank Marketing*, Vol. 28 No. 1, pp. 27-46, doi: 10.1108/02652321011013571.

Zhou, T. (2013), "An empirical examination of continuance intention of mobile payment services", *Decision Support Systems*, Vol. 54 No. 2, pp. 1085-1091, doi: 10.1016/j.dss.2012.10.034.

Corresponding author

Aijaz A. Shaikh can be contacted at: aijaz.a.shaikh@jyu.fi