Telematics and Informatics 32 (2015) 129–142

Contents lists available at ScienceDirect

Telematics and Informatics

journal homepage: www.elsevier.com/locate/tele

# Mobile banking adoption: A literature review

Aijaz A. Shaikh *, Heikki Karjaluoto

*Jyväskylä University School of Business and Economics, P.O. Box 35, FI-40014 University of Jyväskylä, Finland*

ARTICLE INFO

*Article history:*
Received 30 January 2014
Received in revised form 19 May 2014
Accepted 25 May 2014
Available online 2 June 2014

*Keywords:*
Literature review
Mobile banking
M-banking
Mobile banking adoption
Technology acceptance model

ABSTRACT

Electronic commerce (e-commerce) continues to have a profound impact on the global business environment, but technologies and applications also have begun to focus more on mobile computing, the wireless Web, and mobile commerce. Against this backdrop, mobile banking (m-banking) has emerged as an important distribution channel, with considerable research devoted to its adoption. However, this research stream has lacked a clear roadmap or agenda. Therefore, the present article analyzes and synthesizes existing studies of m-banking adoption and maps the major theories that researchers have used to predict consumer intentions to adopt it. The findings indicate that the m-banking adoption literature is fragmented, though it commonly relies on the technology acceptance model and its modifications, revealing that compatibility (with lifestyle and device), perceived usefulness, and attitude are the most significant drivers of intentions to adopt m-banking services in developed and developing countries. Moreover, the extant literature appears limited by its narrow focus on SMS banking in developing countries; virtually no studies address the use of m-banking applications via smartphones or tablets or consider the consequences of such usage. This study makes several recommendations for continued research in the area of mobile banking.



**Contents**

1. Introduction . . . 130
2. M-banking . . . 130
3. Research methodology . . . 132
4. Results . . . 133
   4.1. Main theories . . . 136
   4.2. Main antecedents of attitude (ATT), intention (INT), and usage (USE) . . . 136
   4.3. Demographics . . . 136
5. Conclusions . . . 137
   5.1. Limitations . . . 137
   5.2. Further research . . . 137
      5.2.1. Research design . . . 138
      5.2.2. Transnational and cross-cultural studies . . . 138
      5.2.3. Ethnographic studies . . . 138
      5.2.4. Microfinance institutions . . . 138
      5.2.5. M-banking adoption from service providers' and network carriers' perspectives . . . 138

* Corresponding author. Tel.: +358 468911363.
*E-mail addresses:* aijaz.a.shaikh@jyu.fi (A.A. Shaikh), heikki.karjaluoto@jyu.fi (H. Karjaluoto).

http://dx.doi.org/10.1016/j.tele.2014.05.003
0736-5853/

5.2.6. Development of legal and regulatory frameworks . . . 138
5.2.7. Research on smartphone and tablet PC users . . . 138
5.2.8. Relationship between m-banking, m-payments and electronic payments . . . 139
Appendix A . . . 139
References . . . 140

## 1. Introduction

Mobile banking (m-banking) is among the latest in a series of recent mobile technological wonders. Although automated teller machine (ATM), telephone, and Internet banking offer effective delivery channels for traditional banking products, but as the newest delivery channel established by retail and microfinance banks in many developed and developing countries, m-banking is likely to have significant effects on the market (Safeena et al., 2012). In particular, the expanded uses of smartphones has increased demand for m-banking services, prompting many more banks, microfinance institutions, software houses, and service providers to offer this innovative service together with new sets of products and applications designed to extend their client reach (including to unbanked populations), improve customer retention, enhance operational efficiency, increase market share, and provide new employment opportunities (Shaikh, 2013).

Despite such benefits, the use of mobile phones or tablets to conduct banking transactions or access financial information is not as widespread as might be expected (e.g., Dineshwar and Steven, 2013; Luarn and Lin, 2005; Shih et al., 2010), as demonstrated by popular media reports (e.g., Accenture, 2013). Juniper Research (2013) has revealed that more than 1 billion people are expected to use m-banking globally by 2017, but that level represents only 15% of the global mobile subscription base—a base that accounts for approximately 96% of the world's population (International Telecommunication Union, 2011). In addition, approximately half of all mobile subscribers remain unbanked, with limited access to traditional financial services, as Table 1 reveals.

These trends suggest that significant growth opportunities remain, leading to predictions of potentially massive increases in the number of m-banking users. These figures also warrant further investigations of any persistent adoption issues in m-banking, especially in the case of mobile subscribers.

Several studies analyze m-banking and associated factors that influence consumers' adoption of it, using both qualitative and quantitative methods. Despite considerable research on m-banking adoption that has appeared in international journals across disciplines, a review of literature on m-banking adoption remains missing. Such a review represents an important milestone in the development of a research field. It provides an opportunity to step back and review the collective intelligence that has been amassed from an eclectic body of research that uses various samples, methods, and theories. This effort is particularly important when the findings of isolated studies contradict one another (Hanafizadeh et al., 2014). This study accordingly seeks to extend the understanding of mobile technologies by undertaking a detailed review of m-banking adoption.

Considering the complexity of mobile technology and the variety of services being offered, this study seeks to contribute to the m-banking literature by exploring and analyzing the current state of knowledge on m-banking and its adoption across various strata of populations living in both developed and developing countries. In so doing, it can unify and synthesize disparate streams of research into a more coherent body of knowledge, as well as identify and discuss the methodologies, frameworks, and models applied in this field. Finally, this study summarizes the major findings and identifies gaps that demand further research. For these efforts, this study relies on the term "participant" to denote the unit of analysis used in any reviewed study. Only factors or antecedents that determine m-banking adoption, pre-adoption, or acceptance appear in this review.

The next section contains a brief overview of m-banking and its definition. After presenting the research methodology, this article outlines the results of the analysis, some conclusions and limitations, and finally, recommendations for research.

## 2. M-banking

M-banking dates back to the end of the 1990s when the German company Paybox, in collaboration with Deutsche Bank, launched the first service. Initially, it was deployed and tested mostly in European countries: Germany, Spain, Sweden, Austria, and the United Kingdom. Among developing countries, Kenya was the first to introduce a text-based m-banking service, M-Pesa, in 2007. By 2012, there were more than seven million registered M-Pesa users in Kenya. As Veijalainen et al. (2006) argue, the main driving force for the rapid acceptance of small mobile devices is the capability they offer for obtaining services and running applications at any time and any place, including while on the move.

**Table 1**
M-banking users (International Telecommunication Union, 2011).

| | | |
|---|---|---|
| Global population | 7.100 billion | 100% |
| Mobile phone subscription | 6.835 billion | 96% |
| M-banking accounts/users | 0.590 billion | **8.6%** |

**Table 2**
Main services offered through m-banking.

| Financial services | Non-financial services |
|---|---|
| Bill payments | Balance enquiry |
| Peer-to-peer payments | Mini-bank statement |
| Fund transfers | PIN change |
| Remittance | Checkbook request |
| Shopping and donations | Due alerts for payments |
| Mobile balance recharge | Locate ATMs |

Researchers use various terms to refer to mobile banking, including m-banking (Liu et al., 2009), branchless banking (Ivatury and Mas, 2008), m-payments, m-transfers, m-finance (Donner and Tellez, 2008), or pocket banking (Amin et al., 2006). As an important component of electronic banking, m-banking usually constitutes an alternative delivery channel (ADC) for various financial and non-financial transactions, as summarized in Table 2. Other prominent ADCs include ATMs, point-of-sale terminals, interactive voice response, mobile phones, and the Internet.

Regardless of the terminology they use, scholars generally define m-banking as an application of m-commerce that enables customers to access bank accounts through mobile devices to conduct transactions such as checking account status, transferring money, making payments, or selling stocks (e.g., Alafeef et al., 2012; Harma and Dubey, 2009; Lee and Chung, 2009). In addition, a few studies (e.g., Akturan and Tezcan, 2012; Masrek et al., 2012; Shih et al., 2010) cite m-banking as an innovative communication channel in that the customer interacts with a bank through a portable device.

However, the dynamic markets for mobile devices and m-banking suggest the need for a fresh definition that captures recent advances in the field. Previous definitions have not, for example, explicitly stated which mobile devices qualify for use under the term m-banking. Nevertheless, accessing banking services from a laptop should not be considered m-banking, since their user interface is similar to that of desktop PCs. Laptops are aligned with the online/Internet banking category rather than with m-banking. This study accordingly proposes the following definition of m-banking:

> A product or service offered by a bank or a microfinance institute (bank-led model) or MNO (non-bank-led model) for conducting financial and non-financial transactions using a mobile device, namely a mobile phone, smartphone, or tablet.

Cruz et al. (2010) identify the difference between m-banking and m-payments and argue that, if a bank is not directly involved in the instrumental gratification of a service offered, it is usually called a "mobile payment (m-payment)." Examples of such services include payments through overhead-priced SMS (e.g., ring tones) prepaid account loading (e.g., used for cinema tickets), or a charge made to the subscriber's account (e.g., credit card or invoice-based payment mechanism).

From the m-banking service perspective, the ecosystem depicted in Fig. 1 comprises several applications, channels, and methods for conducting m-banking, as well as major services offered through m-banking channels.

Retail and microfinance banks located in both developed and developing countries typically offer four points of access to m-banking services: (1) mobile applications that can be downloaded to a smartphone, (2) mobile browsers that can be used with any mobile or smartphone that has a Web browser, (3) applications that can be downloaded to a tablet, and (4) short

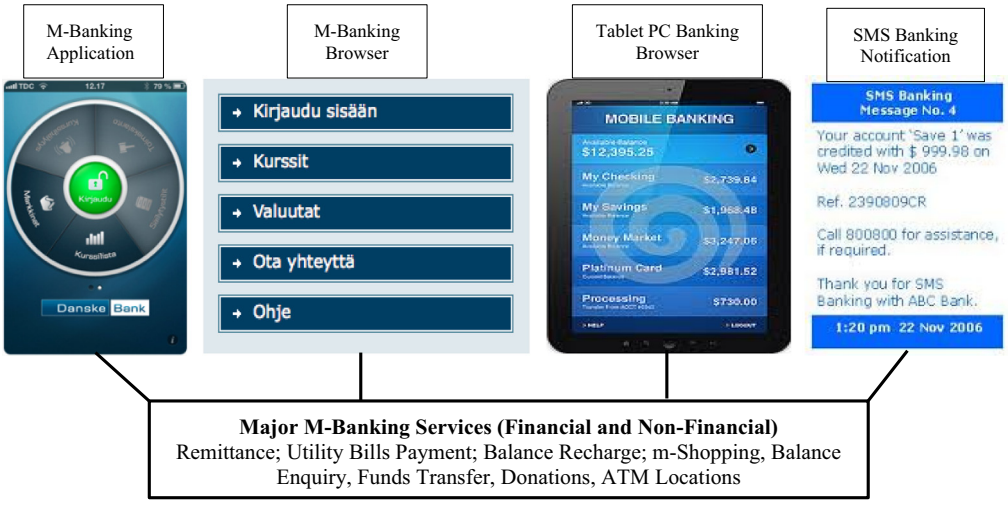


**Fig. 1.** M-banking applications, channels and services.

messaging services (SMS) that provide notifications of account information. The first three routes require an Internet connection on the mobile device; SMS relies on standard Global System for Mobile Communication (GSM) networks. Overall, though, m-banking has changed the financial landscape, and portable devices are now considered ADCs that use different applications to deliver financial and non-financial services and products to consumers.

## 3. Research methodology

The literature search spanned 33 information systems, marketing, and business administration journals, as well as a few records of conference proceedings. To identify published articles pertaining to m-banking adoption, this search involved various databases (e.g., Science Direct, Emerald, IEEE, Inderscience, Taylor & Francis, ACM, Wiley) and multiple relevant key terms, such as mobile banking (m-banking) adoption, mobile banking acceptance, mobile banking adoption intention, mobile banking adoption attitude, mobile banking usage behavior, mobile banking embracing, and mobile banking utilization. The identified articles represented a broad range of scientific, mostly peer-reviewed journals. In addition, the Google search engine revealed other articles that might not have been accessible in the online databases. Initial developments in this research field were heavily influenced by practitioners, so the literature review incorporates both academic sources (peer-reviewed journal publications, working papers, and conference papers) and practitioner sources (non-peer-reviewed consultants) reports and surveys, official reports, journal articles, and other occasional papers) (Duncombe and Boateng, 2009). To ensure the inclusion of current developments, the period reviewed spanned January 2005–March 2014 (Inclusive). The search resulted in 55 relevant publications, of which 48 (87%) were published in scientific journals and seven (13%) were

**Table 3**
Articles on m-banking adoption (January 2005–March 2014).

| | Name of Journals | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | African Journal of Business Management | – | – | – | – | – | – | 1 | – | – | – | 1 | 1.8 |
| 2 | Australian Journal of Basics and Applied Sciences | – | – | – | – | - | - | 1 | – | – | – | 1 | 1.8 |
| 3 | Behavior and Information Technology | – | – | – | – | 1 | 1 | – | – | – | – | 2 | 3.6 |
| 4 | Canadian Journal of Administrative Sciences | – | – | – | – | 1 | – | – | – | – | – | 1 | 1.8 |
| 5 | Computers in Human Behavior | 1 | – | – | – | – | 1 | – | 1 | – | – | 3 | 5.5 |
| | Conference Proceedings | – | – | – | – | 2 | – | 3 | 2 | – | – | 7 | 13 |
| 6 | Decision Support Systems | – | – | – | – | – | 1 | – | – | – | – | 1 | 1.8 |
| 7 | Electronic Commerce Research and Applications | – | – | – | – | – | 1 | – | – | – | – | 1 | 1.8 |
| 8 | Expert Systems with Applications | – | – | – | – | 1 | – | – | – | – | – | 1 | 1.8 |
| 9 | Information Technology Management | – | – | – | – | – | – | – | 1 | – | – | 1 | 1.8 |
| 10 | Info | – | – | – | – | – | – | – | 1 | – | – | 1 | 1.8 |
| 11 | Information Systems Journal | – | – | – | – | 1 | – | – | – | – | – | 1 | 1.8 |
| 12 | International Journal of Mobile Communications | – | – | 1 | - | 1 | 3 | 1 | 1 | – | – | 7 | 13 |
| 13 | Interacting with Computers | – | – | – | – | 1 | – | – | – | – | – | 1 | 1.8 |
| 14 | International Business and Management | – | – | – | – | – | – | – | – | 1 | – | 1 | 1.8 |
| 15 | International Journal of Bank Marketing | – | – | – | – | – | 4 | – | – | – | – | 4 | 7.2 |
| 16 | International Journal of Business and Social Sciences | – | – | – | – | – | – | 1 | – | – | – | 1 | 1.8 |
| 17 | International Journal of Business Research and Development | – | – | – | – | – | – | – | – | 1 | – | 1 | 1.8 |
| 18 | International Journal of Computer Theory and Engineering | – | – | – | – | – | – | – | 1 | – | – | 1 | 1.8 |
| 19 | International Journal of Information Management | – | – | – | – | – | – | 1 | – | – | – | 1 | 1.8 |
| 20 | International Journal of Innovative Research and development | – | – | – | – | – | – | – | – | 1 | – | 1 | 1.8 |
| 21 | International Journal of Multidisciplinary Research | – | – | – | – | – | – | 1 | – | – | – | 1 | 1.8 |
| 22 | International Journal of Trade, Economics and Finance | – | – | – | – | – | – | 1 | – | – | – | 1 | 1.8 |
| 23 | Internationalization, Design and Global Development Lecture Notes in CS | – | – | – | – | 1 | – | – | – | – | – | 1 | 1.8 |
| 24 | Internet Research | – | – | – | – | – | – | 1 | – | – | – | 1 | 1.8 |
| 25 | Journal of Business Administration and Education | – | – | – | – | – | – | – | – | 1 | – | 1 | 1.8 |
| 26 | Journal of Electronic Commerce Research | – | – | – | – | – | – | – | 1 | - | – | 1 | 1.8 |
| 27 | Journal of Internet Banking and Commerce | – | 1 | – | – | – | – | 1 | 1 | – | – | 3 | 5.5 |
| 28 | Marketing Intelligence & Planning | – | – | – | – | – | – | – | 1 | – | – | 1 | 1.8 |
| 29 | Research Journal of Applied Sciences | – | – | – | – | – | – | 1 | – | – | – | 1 | 1.8 |
| 30 | Sunway Academic Journal | – | – | 1 | – | – | – | – | – | – | – | 1 | 1.8 |
| 31 | Telematics and Informatics | – | – | – | – | – | – | – | – | – | 1 | 1 | 1.8 |
| 32 | The Electronic Journal of Information Systems in Developing Countries | – | – | – | – | – | 1 | 1 | – | – | – | 2 | 3.6 |
| 33 | World Journal of Social Sciences | – | – | – | – | – | – | – | – | 1 | – | 1 | 1.8 |
| | Total | 1 | 1 | 2 | 0 | 9 | 12 | 14 | 10 | 5 | 1 | 55 | 100 |

conference publications. These various articles applied different research methods and referred to various geographic regions. Webster and Watson's (2002) classification focused on the model, theory, or framework they used; the constructs analyzed; the geographic location; and the research opportunities they proposed.

## 4. Results

The studies included in this review investigated and identified several influences on consumer adoption behavior toward m-banking. In general, they provided interesting insights into the diffusion pattern of m-banking. For most studies, the underlying objective was to discover deeper motivations and associations that significantly influenced potential adopters' attitudes and intentions across various social systems so that they could articulate behavioral intentions toward mobile banking adoption. Of the 55 studies included in this review, around two-thirds (65%) were published from 2010 to 2012. No study was published in 2008, and only one appeared in 2005 and 2006, with one more in 2014 (see Table 3).

Of the 33 journals that published articles on m-banking adoption, 27 (82%) journals published only one article on m-banking services adoption from January 2005 to March 2014. Further, the *International Journal of Mobile Communications* published the most articles (seven articles, or 13%), followed by the *International Journal of Bank Marketing* (four, or 7%), *Computers in Human Behavior* (three, or 6%), the *Journal of Internet Banking and Commerce* (three, or 6%), and then others combined (37, or 69%).

The studies relied on different methods to collect their empirical data, including survey instruments and interviews, and triangulation was also evident. The average (mean) sample size was 365 consumers. Quantitative research was the most popular method: of 55 studies, 45 (82%) used a quantitative (survey) method to collect data, and only three (5%) employed qualitative methods such as interviews. In addition, five studies (9%) used both qualitative and quantitative methods, and two studies were conceptual in nature. Among the most frequently investigated regions were Southeast Asia (e.g., Malaysia and Singapore), East Asia (e.g., Taiwan, China, and Korea), and Africa (e.g., Ghana, Zimbabwe, and South Africa); a few studies applied to Europe (e.g., Finland, Germany, and Turkey) and South Asia (e.g., India), as Fig. 2 details. The geographic distribution reveals that, of these 55 studies, nine (16%) were conducted in developed countries and the remaining 46 (84%) in developing countries.

During the review process, few constructs were identified that have not been covered in prior research but merit consideration. These constructs include consumer awareness (Dineshwar and Steven, 2013; Jain, 2013; Sharma, 2011), personal involvement (Zhou, 2012b), network externality (Zhou, 2012a), policy and regulatory frameworks (Thulani et al., 2011), experience, and religiosity (Amin and Ramayah, 2010).

Analyzing the acceptance models used by these studies reveals a large and heterogeneous set. In total, 11 technological and social psychological adoption theories, models, and frameworks provided foundations for investigations of the consumer adoption of m-banking services. As Table 4 reveals, some authors used one specific adoption theory or an extension of it, such as the technology acceptance model (TAM) (e.g., Aboelmaged and Gebba, 2013; Chitungo and Munongo, 2013; Safeena et al., 2012), innovation diffusion theory (IDT) (e.g., Kim et al., 2009; Lin, 2011), or the unified theory of acceptance and use of technology (UTAUT) (e.g., Luo et al., 2010; Tan et al., 2010; Yu, 2012). Others combined different theories, such as TAM with the theory of planned behavior (Aboelmaged and Gebba, 2013); TAM and IDT (Ramdhony and Munien, 2013); UTAUT, IDT, and the ubiquitous computing framework (Saeed, 2011); or UTAUT with the task–technology fit (Zhou et al., 2010) model. In addition, a few authors (e.g., Laukkanen and Cruz, 2012; Zhou, 2011) have used self-developed models comprising various constructs.

The results of these various studies suggest some guidance for how to increase m-banking adoption among the different population strata, living in both developed and developing countries (e.g., Saeed, 2011). Several recommendations include

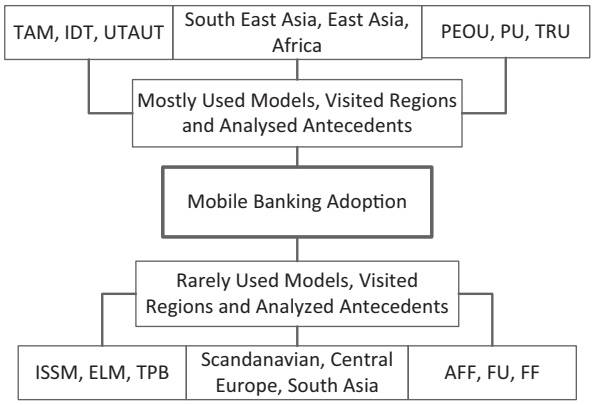


**Fig. 2.** Scope and focus of literature on m-banking adoption.

**Table 4**
Articles included in the review.

| No. | Author(s) | Theories | Significant direct relationships with ATT, INT and USE [a] | Countries and sampling[b] |
|---|---|---|---|---|
| 1 | Hanafizadeh et al. (2014) | TAM+ | PU → INT (0.54); PEOU → INT (0.33); NI → INT (−0.22); RIS → INT (−0.12); COS → INT (−0.10); COM → INT (0.75); TRU → INT (0.62); CRE → INT (0.37) | Iran (361) |
| 2 | Aboelmaged and Gebba (2013) | TAM, TPB | PU → ATT (0.581); ATT → INT (0.351); SI → INT (0.268) | UAE (119) |
| 3 | Ramdhony and Munien (2013) | TAM, IDT | NA | Mauritius (169) |
| 4 | Jain (2013) | SDM | NA | India (100) |
| 5 | Chitungo and Munongo (2013) | TAM2+ | PU → INT (0.337); PEOU → INT (0.155); RA → INT (0.177); PERI → INT (0.101); SI → INT (0. 204); RIS → INT (−0.177); COS → INT (0.146) | Zimbabwe (275) |
| 6 | Huili et al. (2013) | SDM | NA | Conceptual |
| 7 | Zhou (2012b) | ELM | NA | China (240) |
| 8 | Zhou (2012a) | SDM | TRU → INT (0.39); FLOW → INT (0.28); Actual Use → INT (0.69) | China (200) |
| 9 | Tobbin (2012) | TAM | NA | Ghana (69) |
| 10 | Teo et al. (2012) | TAM2 | PU → INT (0.304); PEOU → INT (0.228); SI → INT (0.160) | Malaysia (193) |
| 11 | Akturan and Tezcan (2012) | TAM+ | PU → ATT (0.363); ATT → INT (0.855); PB → ATT (0.434); RIS (social) → ATT (0.132); RIS (performance) → ATT (−0.131) | Turkey (435) |
| 12 | Laukkanen and Cruz (2012) | SDM | IND → INT (0.083); LTO → INT (0.083); MAS → INT (0.128) | Finland, Portugal (3582) |
| 13 | Ravendran et al. (2012) | SDM | NA | Australia (8) |
| 14 | Safeena et al. (2012) | TAM+ | NA | India (53) |
| 15 | Amin et al. (2012) | TAM+ | CRE → INT (0.282); ENJ → INT (0.240); SE → INT (0.277) | Malaysia (152) |
| 16 | Yu (2012) | UTAUT | PERE → INT (0.318); EE → INT (0.080); SI → INT (0.721); CRE → INT (0.147); COS → INT (−0.352); FC → INT (0.560); SE → INT (0.165) | Taiwan (441) |
| 17 | Saeed (2011) | UTAUT, IDT, UCF | NA | USA (223) |
| 18 | Lin (2011) | IDT | RA → ATT (0.303); PEOU → ATT (0.110); COM → ATT (0.208); PCOMP → ATT (0.329); INTEG → ATT (0.102); ATT → INT (0.196) | Taiwan (368) |
| 19 | Sheng et al. (2011) | TAM, DOI | PU → INT (0.464); PEOU → INT (0.378); COM → INT (0.138); RIS → INT (−0.177) | China (278) |
| 20 | Zhou (2011) | SDM | PU → INT (0.37); TRU → INT (0.42) | China (210) |
| 21 | Bankole et al. (2011) | UTAUT+ | UE → INT (0.319); EE → INT (0.1041); PD → INT (0.138); INT → USE (0.307) | Nigeria (231) |
| 22 | Mohd Daud et al. (2011) | TAM+ | PU → INT (0.426); CRE → INT (0.161); CA → INT (0.330) | Malaysia (300) |
| 23 | Khraim et al. (2011) | DOI | NA | Jordan (301) |
| 24 | Saleem and Rashid (2011) | SDM | NA | Pakistan (300) |
| 25 | Alafeef et al. (2011) | SDM | NA | Jordan (80) |
| 26 | Hsu et al. (2011) | TAM+ | PU → ATT (0.38); PEOU → ATT (0.17); SEC → ATT (0.24); PU → INT (0.15); SI → INT (0.26); ATT → INT (0.72) | Taiwan (275) |
| 27 | Raleting and Nel (2011) | TAM+ | PU → ATT (0.570); PEOU → ATT (0.197) | South Africa (SA) (465) |
| 28 | Bankole and Cloete (2011) | UTAUT+ | NA | SA, Nigeria (451) |
| 29 | Sharma (2011) | SDM | NA | India (100) |
| 30 | Thulani et al. (2011) | SDM | NA | Zimbabwe (15) |
| 31 | Schierz et al. (2010) | TAM+ | COM → ATT (0.61); IM → ATT (0.07); SEC → ATT (0.08); PU → ATT (0.10); SI → ATT (0.17); COM → INT (0.66); IM → INT (0.07); ATT → INT (0.24) | Germany (1447) |
| 32 | Shih et al. (2010) | ELM | PINV → INT (coefficients ranging from 0.72 to 0.79) (five different models) | Taiwan (330) |
| 33 | Tan et al. (2010) | UTAUT | PU → INT (0.439); PEOU → INT (0.291); CONV → INT (0.051); SEC → INT (0.497) | Malaysia (184) |
| 34 | Wessels and Drennan (2010) | TAM+ | PU → INT (0.318); RIS → INT (−0.056); COS → INT (−0.124); COM → INT (0.295) ATT → INT (0.269) | Australia (314) |
| 35 | Koenig−Lewis et al. (2010) | TAM, IDT | PU → INT (0.394); COM → INT (0.385); RIS → INT (−0.185) | Germany (263) |
| 36 | Luo et al. (2010) | UTAUT | PERE → INT (0.499); TRU → INT (0.131); RIS → INT (−0.231); TRU → INT (0.177); SE → INT (0.167) | USA (122) |
| 37 | Shen et al. (2010) | BCF | CONV → INT (0.86); SEC → INT (0.20) | Taiwan (400) |
| 38 | Zhou et al. (2010) | UTAUT, TTF | PE → USE (0.37); SI → USE (0.22); FC → USE (0.24); TTF → USE (0.30) | China (250) |
| 39 | Riquelme and Rios (2010) | TAM2, DOI | PU → INT (0.46); RIS → INT (−0.39); SI → INT (0.31) | Singapore (600) |
| 40 | Püschel et al. (2010) | SDM | Mobile banking users: PEOU → ATT (0.505); RA → ATT (0.458); VIS → ATT (0.454); COM → ATT (0.326); RD → ATT (0.147); TRI → ATT (−0.208); IMA → ATT (−0.267); PBC → INT (0.229); SI → INT (0.178); ATT → INT (0.156) | Brazil (666) |
| 41 | Rao Hill and Troshani (2010) | SDM | ENJ → INT (0.493); PU → INT (0.373); SEC → INT (0.049) | Australia (593) |
| 42 | Amin and Ramayah (2010) | SDM | ATT → INT (0.249); SI → INT (0.286); SEC → INT (0.392) | Malaysia (115) |
| 43 | Yang (2009) | RMM | NA | Taiwan (178) |
| 44 | Gu et al. (2009) | TAM+ | PU → INT (0.380); PEOU → INT (0.213); TRU → INT (0.352) | Korea (910) |
| 45 | Chung and Kwon (2009) | ISSM | NA | Korea (397) |

**Table 4** (*continued*)

| No. | Author(s) | Theories | Significant direct relationships with ATT, INT and USE [a] | Countries and sampling[b] |
|---|---|---|---|---|
| 46 | Crabbe et al. (2009) | TAM+ | PU → ATT (0.298); PU (sustained usefulness) → ATT (0.222); CRE → ATT (0.157); PELIT → ATT (−0.129); PU → INT (0.200); ATT → INT (0.314); PU (sustained) → USE (0.559); PU (sustained) → USE (sustained) (0.484); USE → USE (sustained) (0.400) PU → USE (sustained) (0.185) | Ghana (271) |
| 47 | Kim et al. (2009) | IDT | TRU → INT (0.33); PB → INT (0.18) | Korea (192) |
| 48 | Liu et al. (2009) | TAM+ | PU → INT (0.85); TRU → INT (0.12) | China (438) |
| 49 | Medhi et al. (2009) | SDM | NA | India, Kenya,Philipp,SA (90) |
| 50 | Lee and Chung (2009) | ISSM | NA | Korea (276) |
| 51 | Barati and Muhammadi (2009) | TAM+ | NA | Conceptual |
| 52 | Amin et al. (2007) | TAM+ | PU → INT (0.140); PEOU → INT (0.302); CRE → INT (0.205); SE → INT (0.294) | Malaysia (239) |
| 53 | Sulaiman et al. (2007) | DOI | NA | Malaysia (279) |
| 54 | Amin et al. (2006) | SDM | NA | Malaysia (615) |
| 55 | Luarn and Lin (2005) | TAM | PU → INT (0.31); PEOU → INT (0.33); CRE → INT (0.36); SE → INT (0.18); COS → INT (−0.19) | Taiwan (180) |

*Notes*: TAM = technology acceptance model; TAM+ = extended TAM; IDT = innovation diffusion theory/DOI = diffusion of innovation theory; ELM = elaboration likelihood model; SST A/IUM = self-service technology attitude/intention to use model; TTF = task technology fit; TPB = theory of planned behavior; UTAUT = unified theory of acceptance and use of technology; ISSM = information system success model; UCF = ubiquitous computing framework; BCF = benefit cost framework; and RMM = Rasch measurement model. SDM = self-developed model. NA = Not Applicable. INT = Intention to Use. ATT = Attitude.

[a] The definitions of the constructs appear in Appendix.

[b] Statistical measures for valid responses, mean $N = 365$.

**Table 5**
Meta-analysis of average (means) path coefficients between antecedents of m-banking and attitude and intention.[a]

| | Attitude | Intention |
|---|---|---|
| Compatibility | 0.231 | 0.446 |
| Perceived usefulness | 0.342 | 0.380 |
| Attitude | - | 0.372 |
| Trust | n/a[a] | 0.338 |
| Perceived ease of use | 0.246 | 0.278 |
| Credibility | n/a[a] | 0.254 |
| Social influence | n/a[a] | 0.244 |
| Perceived behavioral control/self-efficacy | n/a[a] | 0.229 |
| Perceived cost | n/a[a] | 0.182 |
| Relative advantage | 0.381 | n/a[a] |
| Risk | n/a[a] | −0.148 |

[a] Average (mean) path coefficients were not calculated for the relationships if fewer than two studies used them.

the development of dedicated marketing programs to create positive attitudes toward m-banking and to attract consumers (Wessels and Drennan, 2010). Marketers could emphasize m-banking's usefulness and compatibility with the consumers' lifestyles, though the design of the m-banking systems must also minimize the risk and cost that consumer face. Another recommendation places more emphasis on gaining consumers' trust by providing reliable, appropriate information (Lee and Chung, 2009). In addition, a few studies offer guidelines with regard to prioritizing different antecedents and developing appropriate strategies to encourage adoption (e.g., Tan et al., 2010). Consumer segmentation (Koenig-Lewis et al., 2010), targeting marketing communication by gender (Riquelme and Rios, 2010), and seamlessly integrating mobile technology services and applications into ordinary banking activities (Yang, 2009) emerged among multiple marketing and business strategies that might encourage potential adopters and presumably increase m-banking adoption rates.

Multiple studies also attempt to identify antecedents of adoption. A particularly prominent antecedent is consumer trust in mobile banking, its associated applications, and the bank, according to several authors (e.g., Jain, 2013; Lee and Chung, 2009; Lin, 2011; Zhou, 2011). Some synergy between satisfaction and trust also emerged from a few studies that report that trust significantly affects the degree of satisfaction and is thus an important variable for m-banking environments (Lee and Chung, 2009). Furthermore, studies conducted in developing (but not developed) countries identify social and culture factors as strong influences on m-banking adoption (Alafeef et al., 2011; Bankole et al., 2011). Similarly, combining these factors with a range of demographic factors indicates that the impact of social and cultural features is significant (Crabbe et al., 2009).

Several independent and dependent variables appear in investigations of varying aspects of consumer decision-making processes related to m-banking adoption. In particular, three main dependent variables (attitude, intention, and usage) and eight independent variables [perceived ease of use, perceived usefulness, trust, social influence, perceived risk, perceived behavioral control (or self-efficacy), compatibility with lifestyle and device, and facilitating conditions] emerged from this review. These contributions constitute the main research stream, as depicted in Table 5 and Appendix.

Of these three dependent variables, a majority of the studies focus on the antecedents of behavioral intention (e.g., Luo et al., 2010; Teo et al., 2012; Zhou, 2011). Fewer studies investigate the antecedents of attitude (e.g., Akturan and Tezcan, 2012; Lin, 2011; Püschel et al., 2010). Only Crabbe et al. (2009) use all three dependent variables (attitude, intention, and use) to assess the impact of social and cultural factors on the adoption of m-banking in Ghana. They find that several independent variables, such as technology usage and services, exert positive influences on adopters but negative influences for non-adopters. In addition, perceived credibility and facilitating conditions affect attitudes toward m-banking adoption. In combination with a range of demographic factors, the impact of social and cultural features emerges as significant.

### 4.1. Main theories

The adoption of technology can be described in various ways. Some studies take a process approach and examine in-depth processes (e.g., Majchrzak et al., 2000); others focus on the relationships between technology adoption and influential variables, as exemplified by the UTAUT and the TAM (Im et al., 2011). The TAM is very popular as a framework for examining intentions to adopt m-banking. Of the 55 studies, 23 (42%) used the TAM as their theoretical framework. This theory asserts that perceived usefulness and ease of use are fundamental determinants of system adoption and usage (Bankole et al., 2011); however, because the TAM excludes economic and demographic factors and external variables, it seemingly has limited use for explaining users' attitudes and behavioral intentions toward mobile service adoptions (Venkatesh and Davis, 2000). Therefore, among the 23 studies that have used TAM as their theoretical framework, many m-banking adoption studies extend or supplement the original TAM by including additional constructs, such as relative advantage and personal innovativeness (Chitungo and Munongo, 2013), perceived risk, perceived cost of use, compatibility with lifestyle and needs (Hanafizadeh et al., 2014), and perceived security (Hsu et al., 2011). Furthermore, the TAM omits any trust-based constructs related to e- or m-commerce and assumes that there are no barriers preventing a user from adopting an information system if he or she chooses to do so (Luarn and Lin, 2005).

Innovation diffusion theory, as developed by Rogers (1995), is the second most widely used model: nine studies (16%) use IDT as their theoretical framework. According to this theory, the adoption rate of a new technology depends on five innovation characteristics: relative advantage, compatibility, complexity, observability, and trialability. Although IDT acknowledges a behavioral process, movement from awareness to acceptance, it does not explain how attitudes form and ultimately lead to acceptance or rejection, nor how innovation attributes fit the process (Bhattacherjee, 2000).

The third most common theory is UTAUT, as developed by Venkatesh et al. (2003). Of 55 studies, seven (13%) use it. This theory focuses on the motivations for user behavior, such as perceived usefulness or relative advantage (Zhou, 2012b). As an extension of the TAM model, it is based on four factors: performance expectancy, effort expectancy, social influence, and facilitating conditions. The greatest limitation of UTAUT is that it does not include cultural factors (Im et al., 2011).

### 4.2. Main antecedents of attitude (ATT), intention (INT), and usage (USE)

This review reveals the intriguing development and consolidation of antecedents used in prior research to study and analyze consumers' behavioral intentions toward m-banking. As many as 84 antecedents have been identified, as listed in Appendix. Studies feature both descriptive and exploratory investigations and measures of the impact of the various constructs using different adoption theories and models. Among the identified antecedents, perceived ease of use (PEOU) and perceived usefulness (PU) are the most commonly used; approximately one-third of all m-banking adoption studies cite them. Other commonly used antecedents include trust, social influence, perceived risk, self-efficacy, compatibility, facilitating conditions, cost, credibility, culture, demographic factors, and structural assurance. Notably, more than 90% of the studies examine intention as their dependent variable, but intention has been used only two times to predict m-banking usage (Bankole et al., 2011; Crabbe et al., 2009). Finally, around half of the antecedents (55%), as listed in Appendix, have been tested only once.

To assess the significance of these antecedents for explaining attitude toward, intention to use, and usage of m-banking, we conducted a meta-analysis (see Table 5) of the ten most commonly used antecedents and calculated mean scores for the path coefficients for each relationship. Only constructs used in at least two different studies were included in this analysis. In total, eight studies use attitude as a dependent variable, 28 papers use intention, and as mentioned, only two articles use usage as their dependent variable.

As Table 5 shows, compatibility, PU, and PEOU have served as antecedents for both attitude and intention. The effect of compatibility on intention is the strongest, followed by the effect of PU and attitude. The effect of PU on attitude and intention generally is stronger than that of PEOU. Credibility, social influence, perceived behavioral control/self-efficacy, and perceived cost have on average a low to medium effect on intention to use m-banking services.

### 4.3. Demographics

A common interest in the studies included in this review is the analysis of user demographics (e.g., Laukkanen et al., 2007; Lee et al., 2005), including age, gender, and education, to predict m-banking adoption. The impact of demographics on the adoption of various electronic devices also has been extensively studied (Laukkanen and Cruz, 2012). According to Crabbe et al. (2009), demographic factors play a significant role in adoption decisions. They find that social and cultural factors, such

as perceived credibility, facilitating conditions, perceived elitism, and demographic factors, significantly affect adoption decisions for m-banking in Ghana. Similarly, a survey conducted in Malaysia (Sulaiman et al., 2007) reveals that both demographic and psychographic variables affect the adoption of new innovations such as m-banking—in particular, age, gender, personal income, and education. Finally, in their investigation of the influence of demographic factors on the adoption of m-banking and its applications, Teo et al. (2012) also incorporate demographic factors and subjective norms with the TAM to assess intentions to adopt in Malaysia. They extend the TAM with four demographic factors (gender, age, education, and income) and subjective norms and thus reveal that education and income had positive relationships with PU, whereas gender and education related positively to PEOU.

## 5. Conclusions

This study provides a systematic review of literature on m-banking adoption published from January 2005 to March 2014 (Inclusive). The 55 relevant studies appear in 48 journal articles and seven conference proceedings and represent a reasonably deep view of the field of m-banking acceptance research. Since 2009, both empirical and conceptual research activities have increased and appear likely to grow increasingly pervasive. However, this literature review also shows that existing research is fragmented, constituted by various theoretical frameworks, with relatively small sample sizes (average $N = 365$) drawn from both developed and developing countries. Furthermore, it mostly depends on the TAM and its modifications to explain intentions to use m-banking. An analysis of the conceptual models expressly acknowledged in these studies reveals a large and heterogeneous sample, consisting of 11 models, theories, or frameworks used to study different constructs, attributes, and factors that lead to m-banking adoption. In addition, many of the studies in our sample provide customized research models that feature both internal and external factors.

Accenture (2013) reports that, in developing countries one form of m-banking, i.e., m-payments, is gaining a strong foothold. However, as an emerging service, the use of mobile phones to conduct banking transactions and access other financial information (especially in mature markets) has not been widely adopted (Juniper Research, 2013). In acknowledging this problem, studies have examined consumer behavioral intentions toward the adoption of m-banking using various antecedents. Impediments to acceptance or adoption have been investigated mainly using quantitative methods in studies that refer to a wide variety of influences on the acceptance of m-banking and other products offered by various banks, microfinance institutions, and mobile operators.

However, several dependent and independent variables can be identified as prominent in investigations of the consumer decision-making process for m-banking. For example, most research includes two main dependent variables (attitude and intention) and eight independent variables (perceived ease of use, perceived usefulness, trust, social influence, perceived risk, perceived behavioral control (or self-efficacy), compatibility with lifestyle and device, and facilitating conditions) that seemingly define the main research stream. Furthermore, the results reveal that compatibility, PU, and attitude are the most significant drivers of intentions toward using m-banking.

Finally, extant research has focused almost entirely on SMS banking, without addressing more developed m-banking, such as applications. This choice has limited the contributions to current knowledge. To suggest further research directions, this review also consolidates the antecedents already used to study consumer behavioral intentions.

### 5.1. Limitations

Some limitations of this review offer opportunities for additional research. First, the review centers on research pertaining to consumer acceptance or adoption of m-banking, but m-banking is vast in scope, comprising aspects such as infrastructure, technology, and innovation. It also offers both growth potential and potential pitfalls. Incorporating all these aspects of m-banking into future literature reviews would be useful for delineating the evolving banking channel. Second, the acceptance or adoption of m-banking is the core of this study, so it excluded factors that prompt post-adoption usage or consumers' continuous intentions to use m-banking. Third, although m-banking and m-payments are two important components of mobile financial applications (Mallat et al., 2004), the literature search was conducted with the key term 'm-banking', so excluding the scant specific literature on m-payments from the primary scope. However, as most of the studies reviewed did not distinguish between m-banking and m-payments, our literature review is limited in that it was impossible to scrutinize specific categories of m-banking, such as m-payments. Similarly, studies specifically discussing factors that might prevent the adoption of m-banking were also considered beyond the scope of this study. Fourth, the literature search focused on m-banking acceptance or adoption, which might have led to the exclusion of some important and relevant articles. Fifth, despite clear reasons to commence the review in January 2005, m-banking (such as SMS banking) also existed before that point.

### 5.2. Further research

The following recommendations for research derive partly from the directions, recommendations, and suggestions mentioned in the reviewed studies, as well as from the analysis of the results of the present study. For example, most studies of consumer behavior in m-banking are cross-sectional in nature or limited to a single demographic location such that they

measure the perceptions and intentions of consumers at a single point in time. As a result, it is not possible to elicit extensive generalizations from their conclusions. In addition, most studies have limited their data collection to a single country, using banking as a test bed. To overcome such common limitations, several areas offer the potential to deliver additional and relevant insights.

*5.2.1. Research design*

In emphasizing the need for qualitative research, more studies should use unstructured interviews to analyze consumer behavioral intentions toward m-banking adoption. To improve the quality and relevance of their studies, researchers might collect more empirical data, supported by different guiding theories, to clarify adoption patterns across a range of consumers. Combinations of qualitative and quantitative approaches also might effectively test these conceptual models and investigate semantic relationships among the factors or constructs applied. This recommendation is based on the recognition that prior research mostly has used survey instruments to collect data and test hypotheses.

*5.2.2. Transnational and cross-cultural studies*

M-banking is a worldwide phenomenon; studies that undertake a comparative analysis of developed and developing economies using different models and approaches could produce meaningful insights into the behavior and attitudes of participants. As suggested by Crabbe et al. (2009), cross-cultural and transnational studies would enable researchers to determine how specific social and cultural characteristics of a society influence the adoption of technologies and services among its members. A quick overview of the 55 studies included in this review suggests that only three (Laukkanen and Cruz, 2012; Bankole and Cloete, 2011; Medhi et al., 2009) are transnational. A comparative analysis of m-banking adoption by stakeholders living in rural and urban areas is also necessary; no prior study has addressed this critical aspect. Many researchers have highlighted the need for broad-based, large-scale, longitudinal studies of m-banking adoption, and it follows that eliminating short-term effects by considering a more representative sample over time would extend understanding.

*5.2.3. Ethnographic studies*

Following initiatives in developed countries, most developing countries recently have started creating unique, customized, dedicated m-banking solutions for their consumers. For example, the Philippines (G-Cash) and Pakistan (easypaisa) have introduced innovative services to meet the banking needs of consumers who live in remote, rural areas and have little or no access to the formal banking system. Ethnographic research in these countries would likely provide valuable insights into adoption by local consumers.

*5.2.4. Microfinance institutions*

If it is defined to include microfinance institutions, the m-banking sphere has opened new investment and innovation opportunities and expanded the scope of banking to serve low-income markets. However, most studies focus on banking contexts, leaving substantial scope for exploring the integration of microfinance with m-banking. Creating an m-banking culture, particularly in developing economies, may produce differentiated findings and potentially help microfinance institutions to develop future marketing plans with a better understanding of their consumers' preferences and choices.

*5.2.5. M-banking adoption from service providers' and network carriers' perspectives*

Explorations of m-banking adoption from the perspective of service providers, such as software houses, MNOs, IT solution providers, or network carriers, would be welcome. As indicated by Accenture (2013), "m-payments bridge the telco industry to other industries from banking and financial services to consumer goods and the public sector." Industry convergence offers new opportunities for the different players in the m-banking ecosystem, an aspect not yet examined in m-banking literature.

*5.2.6. Development of legal and regulatory frameworks*

Considering the enormous benefits associated with m-banking, such as providing financial services to unbanked communities, reducing banks' operating costs, providing new growth opportunities, and enabling new innovations in financial services, many countries have formalized m-banking by introducing regulatory frameworks. Further studies of these frameworks could prove valuable. Moreover, most consumers probably are not aware of the presence of such legal or regulatory frameworks governing the products or services they use. Investigating consumer awareness and understanding in this area would be worthwhile.

*5.2.7. Research on smartphone and tablet PC users*

Surprisingly, no study has explicitly investigated the behavior of smartphone or tablet users in relation to m-banking. Because users of smartphones and tablets adopt applications provided by their banks to access m-banking, they might differ considerably in their attitudes and intentions toward m-banking. Therefore, it would be interesting to investigate issues such as continued intentions to use among this particular subset of consumers.

*5.2.8. Relationship between m-banking, m-payments and electronic payments*

Another critical theme for future research is to understand the relationship between m-banking, m-payments, and electronic payments. As argued by Dahlberg et al. (2008), the relationships between these technologies and services are unclear and there is still some confusion about whether these are just a new access channel serving existing services, or a new payment instrument, or both. Studies examining this question would add value to the existing literature.

## Appendix A

Antecedents of m-banking adoption.

| No. | ID | Description | Frequency | Theory |
|---|---|---|---|---|
| 1 | PEOU | Perceived ease of use | 27 | TAM, IDT, SDM |
| 2 | PU | Perceived usefulness | 23 | TAM, SST A/I UM |
| 3 | TRU | Trust | 16 | BCF, IDT, ISSM, SDM, TAM, UTAUT |
| 4 | SI | Social influence/subjective norm | 15 | TAM, SDM, TPB, UTAUT |
| 5 | RIS | Perceived risk | 14 | TAM, IDT, SDM, SST A/I UM, UTAUT |
| 6 | SE | Self-efficacy | 11 | BCF, ELM, IDT, SDM, TAM, UTAUT |
| 7 | COM | Compatibility (lifestyle, device) | 10 | IDT, SDM, TAM, UCF |
| 8 | FC | Facilitation conditions | 9 | SDM, TAM, TTF, UCF, UTAUT |
| 9 | COS | Cost | 8 | RMM, TAM, UTAUT, |
| 10 | CRE | Credibility | 8 | IDT, TAM, UTAUT |
| 11 | CUL | Culture | 8 | SDM, UTAUT |
| 12 | DEM | Demographic factors | 8 | IDT, SDM, TAM, UTAUT |
| 13 | SA | Structural assurance | 8 | ELM, SDM, TAM, UTAUT |
| 14 | RA | Relative advantage | 6 | IDT, SDM, TAM |
| 15 | ATT | Attitude toward use/m-banking | 5 | SDM, TAM, TPB |
| 16 | SYSQ | System quality | 5 | ELM, ISSM, TAM, SDM |
| 17 | TRI | Trialability | 5 | IDT, SDM, TAM, UTAUT |
| 18 | EE | Effort expectancy | 4 | UTAUT |
| 19 | IQ | Information quality | 4 | ELM, ISSM, SDM |
| 20 | SEC | Security | 4 | BCF, SDM, TAM |
| 21 | ACC | Accessibility | 3 | IDT, SDM, UTAUT |
| 22 | CPX | Complexity | 3 | IDT, SDM |
| 23 | CONV | Convenience | 3 | BCF, IDT, UTAUT |
| 24 | NI | Need for interaction | 3 | SST A/I UM, TAM |
| 25 | PB | Perceived benefit | 3 | IDT, SDM, TAM |
| 26 | PBC | Perceived behavioral control | 3 | BCF, SDM, TPB |
| 27 | PERI | Personal innovativeness | 3 | IDT, SDM |
| 28 | PERE | Performance expectancy | 3 | UTAUT |
| 29 | SAT | Satisfaction | 3 | ISSM, UTAUT |
| 30 | SPE | Speed | 3 | SDM, RMM, TAM |
| 31 | UA | Uncertainty avoidance | 3 | SDM, UTAUT |
| 32 | CA | Consumer awareness | 2 | TAM |
| 33 | IMA | Image | 2 | SDM |
| 34 | PRI | Privacy | 2 | IDT, SDM |
| 35 | PEIN | Perceived innovativeness | 2 | SDM, TAM |
| 36 | ENJ | Perceived enjoyment | 2 | SDM, TAM |
| 37 | SQ | Service quality | 2 | ELM, ISSM |
| 38 | UBI | Ubiquity | 2 | SDM |
| 39 | AFF | Affordability | 1 | SDM |
| 40 | ALE | Alertness | 1 | UTAUT |
| 41 | BAN | Banking needs | 1 | IDT |
| 42 | BEI | Behavioral introspection | 1 | BCF |
| 43 | BEN | Benevolence | 1 | IDT |
| 44 | COIN | Conventional interface | 1 | SDM |
| 45 | DEV | Device type/features | 1 | SDM |
| 46 | ECOF | Economic factor | 1 | SDM |
| 47 | EXPEC | Expectations | 1 | SDM |

(*continued on next page*)

**Appendix A** (*continued*)

| No. | ID | Description | Frequency | Theory |
|---|---|---|---|---|
| 48 | EXP | Experience | 1 | SDM |
| 49 | EXPER | Expertise | 1 | BCF |
| 50 | EXTI | External influence | 1 | SDM |
| 51 | FREP | Firm reputation | 1 | IDT |
| 52 | FLOW | Flow (experience) | 1 | SDM |
| 53 | FU | Frequency of usage | 1 | SDM |
| 54 | FF | Functional factor | 1 | SDM |
| 55 | IP | Information presentation | 1 | ISSM |
| 56 | INTEG | Integrity | 1 | IDT |
| 57 | MPE | Mobile phone efficacy | 1 | UTAUT |
| 58 | OF | Organizational factor | 1 | SDM |
| 59 | PCOMP | Perceived competence | 1 | IDT |
| 60 | PELIT | Perceived elitism | 1 | TAM |
| 61 | PLBC | Perception of latest banking channels | 1 | SDM |
| 62 | PINV | Personal involvement | 1 | ELM |
| 63 | PERS | Personalization | 1 | UTAUT |
| 64 | REPU | Reputation | 1 | SDM |
| 65 | RD | Results demonstrability | 1 | SDM |
| 66 | SITNO | Situational normality | 1 | TAM |
| 67 | SC | Service compatibility | 1 | UTAUT |
| 68 | SADO | Services adopted | 1 | SDM |
| 69 | SF | Strategic factor | 1 | SDM |
| 70 | TBI | Tag-based interface | 1 | SDM |
| 71 | TCHA | Task characteristics | 1 | UTAUT |
| 72 | TF | Technological factor | 1 | SDM |
| 73 | TA | Technology anxiety | 1 | BCF |
| 74 | TECHA | Technology characteristics | 1 | UTAUT |
| 75 | TR | Technology readiness | 1 | ELM |
| 76 | IM | Individual mobility | 1 | TAM |
| 77 | UE | Utility expectancy | 1 | UTAUT |
| 78 | VIS | Visibility | 1 | SDM |
| 79 | IR | Innovation resistance | 1 | TAM |
| 80 | PD | Power distance | 1 | UTAUT |
| 81 | TTF | Task technology fit | 1 | TTF |
| 82 | IND | Individualism | 1 | SDM |
| 83 | LTO | Long-term orientation | 1 | SDM |
| 84 | MAS | Masculinity | 1 | SDM |

*Notes*: Frequency refers to the number of times a specific antecedent was used; the constructs are listed in descending order of their frequency.

## References


Aboelmaged, M.G., Gebba, T.R., 2013. Mobile banking adoption: an examination of technology acceptance model and theory of planned behavior. Int. J. Bus. Res. Dev. 2 (1), 35–50.

Accenture, 2013. Mobile web watch 2013: the new persuaders. <http://www.accenture.com/SiteCollectionDocuments/PDF/Technology/accenture-mobile-web-watch-2013-survey-new-persuaders.pdf> (accessed January 1, 2014).

Akturan, U., Tezcan, N., 2012. Mobile banking adoption of the youth market: perceptions and Intentions. Mark. Intell. Plan. 30 (4), 444–459.

Alafeef, M., Singh, D., Ahmad, K., 2011. Influence of demographic factors on the adoption level of mobile banking applications in Jordan. Res. J. Appl. Sci. 6 (6), 373–377.

Alafeef, M., Singh, D., Ahmad, K., 2012. The influence of demographic factors and user interface on mobile banking adoption: a review. J. Appl. Sci. 12 (20), 2082–2095.

Amin, H., Hamid, M.R.A., Tanakinjal, G.H., Lada, S., 2006. Undergraduate attitudes and expectations for mobile banking. J. Internet Bank. Commer. 11 (3), 1–10.

Amin, H., Ramayah, T., 2010. SMS banking: explaining the effects of attitude, social norms and perceived security and privacy. Electron. J. Inform. Syst. Dev. Countries 41 (2), 1–15.

Amin, H., Supinah, R., Aris, M.M., Baba, R., 2012. Receptiveness of mobile banking by Malaysian local customers in Sabah: an empirical investigation. J. Internet Bank. Commer. 17 (1), 1–12.

Amin, H., Baba, R., Muhammad, M.Z., 2007. An analysis of mobile banking acceptance by Malaysian customers. Sunway Acad. J. 4, 1–12.

Bankole, F.O., Bankole, O.O., Brown, I., 2011. Mobile banking adoption in Nigeria. Electron. J. Inform. Syst. Dev. Countries 47 (2), 1–23.

Bankole, O., Cloete, E., 2011. Mobile banking: a comparative study of South Africa and Nigeria. In: Proceedings of the IEEE Africon, Livingstone, Zambia.

Barati, S., Mohammadi, S., 2009. An efficient model to improve customer acceptance of mobile banking. Proceedings of World Congress on Engineering and Computer Science, vol. 2. International Association of Engineers (IAENG), San Francisco, USA, pp. 20–22.
Bhattacherjee, A., 2000. Acceptance of e-commerce services: the case of electronic brokerages. IEEE Trans. Syst. Man Cybern. Part A Syst. Hum. 30 (4), 411–420.
Chitungo, S.K., Munongo, S., 2013. Extending the technology acceptance model to mobile banking adoption in rural Zimbabwe. J. Bus. Admin. Educ. 3 (1), 51–79.
Chung, N., Kwon, S.J., 2009. Effect of trust level on mobile banking satisfaction: a multi-group analysis of information system success instruments. Behav. Inform. Technol. 28 (6), 549–562.
Crabbe, M., Standing, C., Standing, S., Karjaluoto, H., 2009. An adoption model for mobile banking in Ghana. Int. J. Mobile Commun. 7 (5), 515–543.
Cruz, P., Neto, L.B.F., Muñoz-Gallego, P., Laukkanen, T., 2010. Mobile banking rollout in emerging markets: evidence from Brazil. Int. J. Bank Mark. 28 (5), 342–371.
Dahlberg, T., Mallat, N., Ondrus, J., Zmijewska, A., 2008. Past, present and future of mobile payments research: a literature review. Electron. Commer. Res. Appl. 7 (2), 165–181.
Dineshwar, R., Steven, M., 2013. An investigation on mobile banking adoption and usage: a case study of Mauritius. In: Proceedings of the 3rd Asia-Pacific Business Research Conference, Kuala Lumpur, Malaysia.
Donner, J., Tellez, C.A., 2008. Mobile banking and economic development: linking, adoption, impact, and use. Asian J. Commun. 18 (4), 318–332.
Duncombe, R., Boateng, R., 2009. Mobile phones and financial services in developing countries: a review of concepts, methods, issues, evidence and future research directions. Third World Q. 30 (7), 1237–1258.
Gu, J., Lee, S., Suh, Y., 2009. Determinants of behavioral intention to mobile banking. Expert Syst. Appl. 36 (9), 11605–11616.
Hanafizadeh, P., Behboudi, M., Koshksaray, A.A., Tabar, M.J.S., 2014. Mobile-banking adoption by Iranian bank clients. Telematics Inform. 31 (1), 62–78.
Harma, M.K., Dubey, R., 2009. Prospects of technological advancements in banking sector using mobile banking and position of India. In: Proceedings of the International Association of Computer Science and Information Technology Spring Conference, Singapore.
Hsu, C., Wang, C., Lin, J.C., 2011. Investigating customer adoption behaviors in mobile financial services. Int. J. Mobile Commun. 9 (5), 477–494.
Huili, Y., Shanzhi, L., Yinghui, Y., 2013. A study of user adoption factors of mobile banking services based on the trust and distrust perspective. Int. Bus. Manage. 6 (2), 9–14.
Im, I., Hong, S., Kang, M.S., 2011. An international comparison of technology adoption: testing the UTAUT model. Inform. Manage. 48 (1), 1–8.
International Telecommunication Union, 2011. ICT facts and figures: the world in 2011. Available at: <www.itu.int/ITU-D/ict/facts/2011/material/ICTFactsFigures2011.pdf> (accessed January 1, 2014).
Ivatury, G., Mas, I., 2008. The early experience with branchless banking. CGAP Focus Note, No. 46, 2008. Available at: <http://ssrn.com/abstract=1655257> (accessed January 1, 2014).
Jain, Y., 2013. Mobile banking: a study on adoption and challenges in southern Rajasthan, India. Int. J. Innovat. Res. Dev. 2 (4), 902–914.
Juniper Research, 2013. Mobile banking handset and tablet market strategies 2013–2017. Available at: <http://www.juniperresearch.com/reports/mobile_banking> (accessed January 1, 2014).
Khraim, H.S., AL Shoubaki, Y.E., Khraim, A.S., 2011. Factors affecting Jordanian consumers' adoption of mobile banking services. Int. J. Bus. Soc. Sci. 2 (20), 96–105.
Kim, G., Shin, B., Lee, H.G., 2009. Understanding dynamics between initial trust and usage intentions of mobile banking. Inform. Syst. J. 19 (3), 283–311.
Koenig-Lewis, N., Palmer, A., Moll, A., 2010. Predicting young consumers' take up of mobile banking services. Int. J. Bank Mark. 28 (5), 410–432.
Laukkanen, T., Cruz, P., 2012. Cultural, individual and device-specific antecedents on mobile banking adoption: a cross-national study. In: Proceedings of the 45th IEEE Hawaii International Conference on System Sciences (HICSS), Hawaii.
Laukkanen, T., Sinkkonen, S., Kivijarvi, M., Laukkanen, P., 2007. Innovation resistance among mature consumers. J. Consum. Mark. 24 (7), 419–427.
Lee, E., Kwon, K., Schumann, D., 2005. Segmenting the non-adopter category in the diffusion of internet banking. Int. J. Bank Mark. 23 (5), 414–437.
Lee, K.C., Chung, N., 2009. Understanding factors affecting trust in and satisfaction with mobile banking in Korea: a modified DeLone and McLean's model perspective. Interact. Comput. 21 (5), 385–392.
Lin, H., 2011. An empirical investigation of mobile banking adoption: the effect of innovation attributes and knowledge-based trust. Int. J. Inf. Manage. 31 (3), 252–260.
Liu, Z., Min, Q., Ji, S., 2009. An empirical study on mobile banking adoption: the role of trust. In: Proceedings of the 2nd IEEE International Symposium on Electronic Commerce and Security, Nanchang, China.
Luarn, P., Lin, H., 2005. Toward an understanding of the behavioral intention to use mobile banking. Comput. Hum. Behav. 21 (6), 873–891.
Luo, X., Li, H., Zhang, J., 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. Decis. Support Syst. 49 (2), 222–234.
Majchrzak, A., Rice, R.E., Malhotra, A., King, N., Ba, S., 2000. Technology adaption: the case of a computer-supported inter-organizational virtual team 1. MIS Q. 24 (4), 569–600.
Mallat, N., Rossi, M., Tuunainen, V.K., 2004. Mobile banking services. Commun. ACM 47 (5), 42–46.
Masrek, M.N., Omar, N., Uzir, N.A., Khairuddin, I.E., 2012. The impact of technology trust on mobile banking utilization. Sci. Ser. Data Rep. 4 (12), 27–36.
Medhi, I., Ratan, A., Toyama, K., 2009. Mobile-banking adoption and usage by low-literate, low-income users in the developing world. In: Aykin, N. (Ed.), Internationalization, Design and Global Development, Lecture Notes in Computer Science, vol. 5623. Springer, Berlin Heidelberg, Germany, pp. 485–494.
Mohd Daud, N., Kassim, M., Ezalin, N., Said, M., Wan, W.S.R., Mohd Noor, M.M., 2011. Determining critical success factors of mobile banking adoption in Malaysia. Aust. J. Basic Appl. Sci. 5 (9), 252–265.
Püschel, J., Mazzon, J.A., Hernandez, J.M.C., 2010. Mobile banking: proposition of an integrated adoption intention framework. Int. J. Bank Mark. 28 (5), 389–409.
Raleting, T., Nel, J., 2011. Determinants of low-income non-users' attitude towards WIG mobile phone banking: evidence from South Africa. Afr. J. Bus. Manage. 5 (1), 212–223.
Ramdhony, D., Munien, S., 2013. An investigation on mobile banking adoption and usage: a case study of Mauritius. World J. Soc. Sci. 3 (3), 197–217.
Rao Hill, S., Troshani, I., 2010. Factors influencing the adoption of personalisation mobile services: empirical evidence from young Australians. Int. J. Mobile Commun. 8 (2), 150–168.
Ravendran, R., MacColl, I., Docherty, M., 2012. Tag-based interaction in online and mobile banking: a preliminary study of the effect on usability. In: Proceedings of the 10th Asia Pacific Conference on Computer Human Interaction (APCHI), Matsue-city, Shimane, Japan.
Riquelme, H.E., Rios, R.E., 2010. The moderating effect of gender in the adoption of mobile banking. Int. J. Bank Mark. 28 (5), 328–341.
Rogers, E., 1995. Diffusion of Innovations, 4th ed. Free Press, New York.
Saeed, K., 2011. Understanding the adoption of mobile banking services: an empirical assessment. In: Proceedings of the 7th Americas Conference on Information Systems, Detroit, Michigan.
Safeena, R., Date, H., Kammani, A., Hundewale, N., 2012. Technology adoption and Indian consumers: study on mobile banking. Int. J. Comput. Theory Eng. 4 (6), 1020–1024.
Saleem, Z., Rashid, K., 2011. Relationship between customer satisfaction and mobile banking adoption in Pakistan. Int. J. Trade Econ. Finance 2 (6), 537–544.
Schierz, P.G., Schilke, O., Wirtz, B.W., 2010. Understanding consumer acceptance of mobile payment services: an empirical analysis. Electron. Commer. Res. Appl. 9 (3), 209–216.
Shaikh, A.A., 2013. Mobile banking adoption issues in Pakistan and challenges ahead. J. Inst. Bankers Pak. 80 (3), 12–15.
Sharma, A., 2011. Mobile banking as technology adoption and challenges. Int. J. Multidiscip. Res. 1 (6), 147–157.

Shen, Y., Huang, C., Chu, C., Hsu, C., 2010. A benefit–cost perspective of the consumer adoption of the mobile banking system. Behav. Inform. Technol. 29 (5), 497–511.
Sheng, M., Wang, L., Yu, Y., 2011. An empirical model of individual mobile banking acceptance in China. In: Proceedings of the Computational and Information Sciences (ICCIS). IEEE, pp. 434–437.
Shih, K., Hung, H., Lin, B., 2010. Assessing user experiences and usage intentions of m-banking service. Int. J. Mobile Commun. 8 (3), 257–277.
Sulaiman, A., Jaafar, N.I., Mohezar, S., 2007. An overview of mobile banking adoption among the urban community. Int. J. Mobile Commun. 5 (2), 157–168.
Tan, K.S., Chong, S.C., Loh, P.L., Lin, B., 2010. An evaluation of e-banking and m-banking adoption factors and preference in Malaysia: a case study. Int. J. Mobile Commun. 8 (5), 507–527.
Teo, A., Tan, G.W., Cheah, C., Ooi, K., Yew, K., 2012. Can the demographic and subjective norms influence the adoption of mobile banking? Int. J. Mobile Commun. 10 (6), 578–597.
Thulani, D., Kosmas, N., Collins, M., Lloyd, C., 2011. Adoption and use of SMS/mobile banking services in Zimbabwe: an exploratory study. J. Internet Bank. Commer. 16 (2), 1–15.
Tobbin, P., 2012. Towards a model of adoption in mobile banking by the unbanked: a qualitative study. Info 14 (5), 74–88.
Veijalainen, J., Terziyan, V., Tirri, H., 2006. Transaction management for m-commerce at a mobile terminal. Electron. Commer. Res. Appl. 5 (3), 229–245.
Venkatesh, V., Davis, F.D., 2000. A theoretical extension of the technology acceptance model: four longitudinal field studies. Manage. Sci. 46 (2), 186–204.
Venkatesh, V., Morris, M.G., Davis, G.B., Davis, F.D., 2003. User acceptance of information technology: toward a unified view. MIS Q. 27 (3), 425–478.
Webster, J., Watson, R., 2002. Analyzing the past to prepare for the future: writing a literature review. MIS Q. 26 (2), 13–23.
Wessels, L., Drennan, J., 2010. An investigation of consumer acceptance of m-banking. Int. J. Bank Mark. 28 (7), 547–568.
Yang, A.S., 2009. Exploring adoption difficulties in mobile banking services. Can. J. Admin. Sci. 26 (2), 136–149.
Yu, C., 2012. Factors affecting individuals to adopt mobile banking: empirical evidence from the UTAUT model. J. Electron. Commer. Res. 13 (2), 104–121.
Zhou, T., 2011. An empirical examination of initial trust in mobile banking. Internet Res. 21 (5), 527–540.
Zhou, T., 2012a. Examining mobile banking user adoption from the perspectives of trust and flow experience. Inform. Technol. Manage. 13 (1), 27–37.
Zhou, T., 2012b. Understanding users' initial trust in mobile banking: an elaboration likelihood perspective. Comput. Hum. Behav. 28 (4), 1518–1525.
Zhou, T., Lu, Y., Wang, B., 2010. Integrating TTF and UTAUT to explain mobile banking user adoption. Comput. Hum. Behav. 26 (4), 760–767.