Unearthing Antecedents to Financial Inclusion through FinTech Innovations

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Abstract

Fintech innovations are enabling access to financial services through mobile devices among many unbanked in the world. Though fintech innovations are touted as game changers in deepening financial inclusion, their wide acceptance and use still remain limited. In the extant literature, technological and behavioural antecedents that influence users' behaviour toward financial technologies are not fully understood. This study argues that understanding antecedents to the actual use of fintech innovations will lead to deepening financial inclusion. Using mobile money–a type of fintech innovation, this study adopts the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and the Prospect theory. Drawing on survey data collected from 294 respondents, this study applies the partial least square structural equation modelling technique. The findings show that performance and effort expectancy have significant relationship with the intention to use mobile money services. However, contrary to well-established positions, price value, hedonic motivation, social influence and perceived risk do not influence intention and use of mobile money services. The study makes significant theoretical contributions and offers practical and policy implications for deepening financial inclusion.

Keywords: FinTech, Antecedents, Mobile Money, UTAUT2, Prospect Theory, SEM, Financial Inclusion

1. Introduction

According to the World Bank (2018), many people in the world do not have access to financial services irrespective of advances made in development. Largely, there is uneven access to financial services globally (Demirgüç-Kunt et al., 2018). One technological innovation that has emerged as a solution to inaccessibility of financial services is fintech (World Bank, 2018). Fintech refers to the provision of financial services through technology such as mobile phones (Demirgüç-Kunt et al., 2018; Gai et al., 2018). In this study, we focus on mobile money–a form of fintech innovation that enables financial transactions through mobile devices (Donovan, 2012). A report from the GSMA (2017a) estimates that by the end of the year 2018, about 107% of every 100 inhabitants in the world will have access to mobile phones. Similarly, the World Bank (2018) indicates that the mobile phone is accelerating the rise in financial inclusion globally. Thus, mobile money is highly regarded as an essential game changer in deepening financial inclusion.

Given that many organisations, especially the World Bank and the UN, have high hopes with regards to the potential of mobile money to reduce poverty and foster economic development, it is essential to holistically understand technological and behavioural antecedents that influence the use of the innovation. Currently, wide acceptance and use of mobile money remain limited as compared to cash systems (Grohmann et al., 2018). Moreover, mobile money has inherent risks that can lead to loss of financial assets (Osei-Assibey, 2015). Furthermore, due to the virtual nature of mobile money transactions, some people are hesitant in using the innovation (Baganzi and Lau, 2017). In addition, majority of the unbanked are people without formal education (Demirgüç-Kunt et al., 2018), as a result, some may find the use of mobile money innovation difficult. Furthermore, mobile phones and their related services operate by relying on formal languages such as English. This situation does not always favour a significant percentage of people in developing countries who have limited education. For instance, in Africa, most mobile money services are not provided in indigenous dialects but in formal languages such as English and French, hence a difficulty for some local illiterate or semi-literates to easily use the technology. For some of these reasons, there are still a large number of people, especially in developing countries, who do not have access to financial services. To address such social imbalances, there is a need to understand antecedents of mobile money use to enable service providers to redesign their services to foster wider acceptance and use to deepen financial inclusion.

So far, in the mobile money literature, the focus has been on intention to use the innovation (e.g., Chauhan, 2015; Narteh et al., 2017; Upadhyay and Jahanyan, 2016) while there is limited research on the antecedents of actual use of the technology. For instance, in investigating the adoption of mobile money services in Ghana, Narteh et al. (2017) focused on the behavioural intention while the perception of actual use was not examined. Given that users' intention does not automatically reflect on users' behaviour (Jang et al., 2016), it is important to extend the extant literature by unearthing antecedents to the actual use of mobile money services; a gap this study seeks to address. Furthermore, the majority of prior mobile money studies have relied on technology acceptance theories which focuses on factors inclined towards adoption drivers (e.g., Jaradat and Al-Mashaqba, 2014; Osei-Assibey, 2015; Tobbin and Kuwornu, 2011). As a result, other behavioural antecedents that drive or inhibit technology use are underexplored. The ubiquitous use of mobile technology involves a complex interaction of technology and human behaviour. Nevertheless, there are only a few studies that have investigated the use of mobile money from both technological and behavioural theory perspectives. Consequently, there is a need to understand antecedents of mobile money from a multi-theory perspective.

To address these gaps in the literature, this study extends existing research to unearth antecedents to the actual use of mobile money services from a multiple theory perspective. To achieve this, the study combines the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) with the Prospect theory. The UTAUT assesses technology antecedents while the Prospect theory focuses on the human cognitive behavioural aspect of technology use. Thus, the overarching research question is: *what are the antecedents of mobile money use*? By addressing this research question, our study makes three key contributions. First, we unearth antecedents to actual use of fintech innovations. Given that prior research has largely focused on behavioural intention without investigating actual use of fintech innovations, we consider our insights critical to both research and practice. Second, we identify the effect of both drivers and deterrents in the use of fintech innovations. Lastly, we contribute alternative perspectives to the debate on fintech innovation and financial inclusion by providing insights from both behavioural and technology lenses.

The rest of the paper is organised as follows. Section 2 presents the research background and theoretical foundation. In particular, the section discusses financial inclusion, prior studies on mobile money use, the UTAUT2 and the Prospect theory. Following this, Section 3 presents

the research model and hypotheses development. Next, Section 4 presents the research methodology. Thereafter, Section 5 presents the data analysis and results. Section 6 presents discussions of findings, theoretical, practical and policy implications as well as limitations and future research directions. Finally, Section 7 concludes the paper.

2. Background and Theoretical Foundation

2.1   *Financial inclusion through mobile money innovation*

Financial inclusion refers to access to useful and affordable financial products and services such as payment, deposit, insurance and loan by individuals and organisations (Dev, 2006; Grohmann et al., 2018). In the traditional financial industry, access to monetary products and services are mostly obtained through banks and other financial firms. However, in the contemporary setting, technology is enabling non-financial institutions such as telecommunication firms to provide financial services, commonly referred to as fintech innovation (Demirgüç-Kunt et al., 2018). With fintech innovations, people who previously could not have access to financial services are now empowered (World Bank, 2018). One such fintech innovation, often touted as a key enabler of financial inclusion, is mobile money (Peruta, 2017).

Mobile money innovation enables people to access financial services through their mobile phones in an ecosystem (Senyo et al., 2019) comprised of users, service providers, merchants, agents, banks and regulators (Donovan, 2012). Users represent individuals and organisations that utilise mobile money products and services. Service providers are organisations, mostly telecommunication operators, that offer mobile money services to users (Maurer, 2012). Merchants are individuals and organisations that accept mobile money payment for their goods and services. Agents are intermediaries between users and service providers who facilitate mobile money services such as cash deposit, withdrawal and transfer. Banks operate as custodians of mobile money funds for service providers. Lastly, regulators are governmental institutions with authority to superintend over activities within the mobile money ecosystem (Mugambi et al., 2014).

As a fintech innovation, mobile money enables users to undertake financial transactions such as bills payment, savings, money transfer, loan acquisition as well as purchase of products and services (Donovan, 2012). Hence, mobile money shares some characteristics of other

technological innovations such as mobile payment and online banking. However, there are notable differences between mobile money and traditional banking services. First, registration to use mobile money is less cumbersome as compared to opening a traditional bank account. With a registered mobile number and a valid national identification card, people can easily have a mobile money account, all under 5 mins, whereas this is not possible for a traditional bank account (Mugambi et al., 2014). Secondly, mobile money services are widely available, with remote areas able to participate, and there is no need for a physical branch to enable transaction performance as compared to traditional banks (Demirgüç-Kunt et al., 2018). Furthermore, mobile money offers convenience, low transaction cost and wide accessibility (Maurer, 2012) as transactions can be performed instantly from anywhere, at any time and at a relatively low service charge. Given that our study focuses on unearthing antecedents to the use of fintech innovations, we review related empirical literature on mobile money innovation.

2.2 Prior research on mobile money innovation

Mobile money research is considered relatively new in the broader mobile payment literature. Although there is generally limited research on mobile money, the subject area has started receiving much-needed attention and some insightful contributions have so far been made. A closer look at the extant mobile money literature reveals four key issues that need research attention. Table 1 presents summary of selected mobile money studies by uniquely capturing theoretical positions, contexts and constructs to flesh out the nuances of the gaps in the existing literature.

First, most prior mobile money studies (e.g., Baganzi and Lau, 2017; Narteh et al., 2017; Osei-Assibey, 2015; Tobbin and Kuwornu, 2011) have largely focused on technological factors while there is relative silence on social antecedents (Senyo et al., 2016). This situation is partially enabled by over reliance of mobile money studies on technology acceptance theories which focus on factors that are largely inclined towards adoption drivers. As a result, other behavioural antecedents, such as trust, risk, habit, hedonic motivation and social influence that drive or inhibit mobile money use are underexplored.

Second, previous studies (e.g., Baganzi and Lau, 2017; Chauhan, 2015; Narteh et al., 2017; Osei-Assibey, 2015) have largely investigated intention to use mobile money while knowledge on the antecedents, such as habit, performance and effort expectancy to the actual use of the

innovation remain limited. For instance, in investigating mobile money adoption in Uganda, Baganzi and Lau (2017) focus on factors that predict intention to use mobile money services. Similarly, Chauhan and Osei-Assibey (2015) also investigated factors that influence the intention to adopt mobile money in India and Ghana respectively. As a result, factors that influence intention to use mobile money services are well established. However, prior studies (e.g., Chauhan, 2015; Osei-Assibey, 2015; Upadhyay and Jahanyan, 2016) have not gone a step further to investigate the actual use of mobile money services. Given that there is a difference between intention and actual use of a technology (Jang et al., 2016), it is important to clarify this gap in the literature. Thus, there is a need to understand antecedents to the actual use of mobile money services, a gap this study seeks to address.

Third, existing studies (e.g., Baganzi & Lau, 2017; Narteh et al., 2017; Osei-Assibey, 2015; Tobbin & Kuwornu, 2011) have predominantly used technology adoption theories such as TAM and DOI while there is limited use of behavioural theories. For instance, in investigating mobile money adoption in Uganda, Baganzi & Lau (2017) used the TAM. Similarly, Narteh et al (2017) and Osei-Assibey (2015) combined the TAM with the DOI to investigate mobile money adoption in Ghana. For the most part, the technology adoption theories do not sufficiently explore the dynamics of human behavioural characteristics. Given that mobile money use is dependent on a trade-off between gains and losses, it is important to consider antecedents from these perspectives.

Lastly, prior mobile money studies (e.g., Chauhan, 2015; Jaradat & Al-Mashaqba, 2014; Rahman et al., 2017; Upadhyay & Jahanyan, 2016) have largely focused on adoption drivers while there is relative silence on inhibitors. Jaradat & Al-Mashaqba (2014), for example, focused on adoption drivers such as perceived ease of use, perceived usefulness, behavioural intention and usage behaviour to investigate mobile money adoption in Jordan. Similarly, Chauhan (2015) used trust, perceived usefulness, perceived ease of use, attitude towards use and behavioural intention as mobile money adoption drivers in India. Though an understanding of adoption drivers is essential, it is equally important to understand the effect of inhibitors since they can lead to non-adoption, discontinue use and ultimate extinction of a technological innovation. Thus, a study that considers the effect of both drivers and inhibitors is needed to provide broader understanding.

Table 1 Summary of selected mobile money studies

Studies	Theoretical positions	Context	Constructs
Narteh et al. (2017)	Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI)	The study was conducted in Ghana based on 300 responses The study used Partial least Square structural equation modelling (PLS-SEM) for data analysis	Perceived Usefulness Perceived ease of use Perceived trust Perceived cost of use Perceived complexity Relative advantage Behavioural intention
Rahman et al. (2017)	Technology Readiness Index (TRI) and TAM	The study was conducted in Bangladesh based on 360 responses The study used PLS-SEM for data analysis	Optimism Innovativeness Discomfort Insecurity Perceived ease of use Perceived usefulness Wellbeing
Upadhyay & Jahanyan (2016)	TAM, Task-technology fit, and Absorptive capacity	The study was conducted in India based on 196 responses The study used AMOS (analysis of a moment structures) -SEM for data analysis	System quality Task-technology fit Monetary value Connectivity Personal innovativeness Discomfort Absorptive capacity Structural assurance Perceived usefulness Perceived ease of use Use intention
Osei-Assibey (2015)	DOI & TAM	The study was conducted in Ghana based on 172 responses The study used logistic regression for data analysis	Perceived usefulness and Relative Advantage Perceived ease of use and Compatibility Complexity Perceived trust Perceived Risk Observability Trialability
Chauhan (2015)	TAM	The study was conducted in India based on 225 responses The study used PLS-SEM for data analysis	Trust Perceived usefulness Perceived ease of use Attitude towards Use Behavioural Intention to Use
Baganzi & Lau (2017)	TAM	The study was conducted in Uganda based on 438 responses The study used PLS-SEM for data analysis	Performance expectancy Self-efficacy Structural assurances Behavioural intention Trust belief Perceived risk
Jaradat & Al-Mashaqba (2014)	TAM	The study was conducted in Jordan based on 475 responses The study used SEM for data analysis	Perceived ease of use Perceived usefulness Behavioural intention Usage behaviour

Studies	Theoretical positions	Context	Constructs
Cobla & Osei-Assibey (2018)	The modern theory of consumption	The study was conducted in Ghana based on 506 responses The study used ordinary least squares regression for data analysis	Consumption Wealth Current disposal income Lagged disposable income
Murendoa, Wollni, De Brauwb, & Mugambi (2017)	Theory of social learning	The study was conducted in Uganda based on 477 responses The study used logistic regression for data analysis	Network size Strength of weak ties Social resources
Tobbin & Kuwornu (2011)	TAM	The study was conducted in Ghana based on 330 responses The study used AMOS-SEM for data analysis	Perceived Usefulness Perceived Ease of Use Trialability Relative Advantage Perceived Trust Transactional Cost Perceived Risk Reliability Perceived Privacy Behavioural Intention

2.3   Unified theory of acceptance and use of technology

The unified theory of acceptance and use of technology (UTAUT) was created by Venkatesh et al. (2003) to understand user acceptance and use of a technology. The theory was developed based on the synthesis and combination of constructs from eight existing models, namely Theory of reasoned action, Technology acceptance model, Motivational model, Theory of planned behaviour, Model of PC utilization, Diffusion of innovation theory and Social cognitive theory. The original UTAUT is constituted by four main constructs, namely performance expectancy, effort expectancy, social influence and facilitating conditions (Verdegem and De Marez, 2011). The theory posits that performance expectancy, effort expectancy and social influence have direct influence on behavioural intention while facilitating conditions is a direct determinant of behavioural intention and use behaviour (Venkatesh et al., 2003). Venkatesh et al. (2012) revised the original UTAUT into UTAUT2 by adding three new constructs namely, habit, hedonic motivation and price value to make the theory applicable in organisational and consumer contexts. In addition, the UTAUT2 accounts for more variance in behavioural intention and use of technology as compared to UTAUT.

Though the UTAUT2 has been widely used in technology adoption and use research (e.g., (Baudier et al., 2019; Chopdar et al., 2018) it is more inclined towards drivers and does not

account for other deterrents of technology use (Aquino Shluzas and Leifer, 2014). Furthermore, subsequent validation of the UTAUT by Venkatesh et al (2003) found that there is variation in the variance accounted for in behavioural intention and actual use of a technology. Thus, it is essential for studies to move beyond investigating intention to use a technology to understand the antecedents to the actual use of an innovation. This study adopts the UTUAT2 as one of its theoretical lenses because it is more comprehensive and suitable to unearth antecedents to mobile money use. However, from the discussions on UTAUT2, two issues are pertinent. First, there is a need to move beyond investigating behavioural intention to understand the actual use behaviour since there is a significant variance between intention and actual use (Macedo, 2017; Venkatesh et al., 2012). Second, to holistically investigate antecedents to technology use such as mobile money services, there is a need to complement the UTAUT with other theories (Dhir et al., 2018; Oliveira et al., 2016) such as the Prospect theory.

2.4 Prospect Theory

The Prospect theory was developed by Kahneman and Tversky (1979) to understand how people assess and choose from alternatives that involve risks and uncertain outcomes. As a cognitive psychology theory, Prospect theory infers that people's decision making are more inclined towards gains and losses rather than the final outcome. As such, deterrents, such as risks, are sometimes more important than drivers in people's decision making (Tversky and Kahneman, 1992). Though Prospect theory was originally created for psychology and the behavioural fields, it has been used in other settings such as Information Systems research to understand risks associated with technology use. Given that mobile money services have inherent risks which may deter people from using the technology, it is important to understand the effects of these risks. Thus, in this study, we draw on the Prospect theory to determine if perceived risks of mobile money influences people's use of the innovation.

3. Research Model and Hypotheses Development

This study draws inspiration from the UTAUT2 and the Prospect theory as discussed above to investigate the antecedents of mobile money use towards deepening financial inclusion. As echoed by many researchers (e.g., Fichman, 2004; Lyytinen and Rose, 2003), it is important to combine theories to obtain a holistic understanding of phenomenon. Following from this, we combine the UTAUT2 and the Prospect theory in this study since each of these theories offer unique antecedents. As such, combining these theories offers a strong perspective to unearth

antecedents to financial inclusion through fintech innovation. Moreover, these theories complement each other to address the research question. Whereas the UTAUT2 covers technology drivers, the Prospect theory focuses on deterrents. Thus, in this study, antecedents from UTAUT2, namely performance expectancy, effort expectancy, social influence, hedonic motivation, price value, facilitating conditions, behavioural intention and habit are combined with Prospect theory's deterrents, namely service trust, perceived risk, and agent trust. Figure 1 presents the research model developed from the hypotheses discussed.

3.1   Performance Expectancy (PE)

Performance expectancy refers to the degree to which a technology provides benefits to users in performing certain activities (Venkatesh et al., 2012). Generally, people are inclined towards a technology that offer numerous benefits. On the contrary, a technology that does not offer benefits may witness non-adoption. In the context of mobile money services, people are likely to use the technology if they can accrue some benefits. Though mobile money is touted to offer benefits such as convenience, access to financial services and faster transaction (Demirgüç-Kunt et al., 2018), its performance expectancy is yet to be fully explored in research. Thus, it is important to investigate if the perception of making gains influences people's decision to use mobile money services. In the extant literature, performance expectancy has been posited to have an influence on people's intention to use mobile shopping apps (Chopdar et al., 2018), gerontechnology (Chen and Chan, 2014), and ICT (Verdegem and De Marez, 2011). Following this basis, we consider performance expectancy of mobile money use through users' behavioural intention. Accordingly, we propose the hypothesis:

Hypothesis (H1): Performance expectancy influences users' behavioural intention to use mobile money services

3.2   Effort Expectancy (EE)

Effort expectancy examines the extent to which users find it easy to use a technology (Venkatesh et al., 2012). In particular, effort expectancy measures complexity or ease of use of a technology. According to Kim et al. (2016), at initial adoption stages of a technology, ease of use is crucial as it influences people's intention to use an innovation. Prior studies (e.g., Liébana-Cabanillas et al., 2019; Macedo, 2017; Venkatesh et al., 2003) have shown that there is a positive relationship between effort expectancy and intention to use a technology. For instance, Liébana-Cabanillas et al. (2019) show that effort expectancy has a positive effect on

users intention to use near field communication (NFC) technology in public transport payment. So far, in the context of mobile money services, the relationship between effort expectancy and intention to use the innovation has not been determined. As such, it is important to unearth the direction of the relationship. Hence, this study hypothesises that:

Hypothesis (H2): Effort expectancy influences users' behavioural intention to use mobile money services

3.3 Social Influence (SI)

Social influence examines the extent to which the opinion of important people such as families and friends matter in users' decision to use a technology (Venkatesh et al., 2012). Given that technology users have interpersonal relationships with others, their choices are sometimes influenced by people within their social ties. In cases where influencers have positive or negative perception about a technology, it is likely their preferences may affect the decision of their acquaintances. Previous studies (e.g., Jang et al., 2016; Macedo, 2017; Oliveira et al., 2016) on technology use has pointed to the significant effect of social influence in the use of an innovation. For instance, Oliveira (2016) points out that social influence positively affects users' intention to use mobile payments. In the context of mobile money services, social influence concerns if the perception of close associates play a role in users' decision to use or not to use the technology. Accordingly, this study proffers that:

Hypothesis (H3): Social influences affects users' behavioural intention to use mobile money services.

3.4 Hedonic Motivation (HM)

According to Venkatesh et al. (2012) hedonic motivation refers to pleasure derived from using a technology. In cases where people derive satisfaction from using a technology, there is bound to be repeated use. On the contrary, people may not use a technology if they do not derive pleasure from its use. In the extant technology adoption literature, hedonic motivation has witnessed inconclusive results. In some studies (e.g., Macedo, 2017; Venkatesh et al., 2012) hedonic motivation positively affect intention to use a technology whereas in other instances (e.g., Baudier et al., 2019; Oliveira et al., 2016) it has witnessed non-significant effects. Thus, the effect of hedonic motivation is context dependent. As an emerging technology, using mobile money services may be fun to people. Conversely, the financial value underpinning transactions could make the use of the technology purely transactional without any associated

fun. Given that the extant literature is inconclusive and, arguably, lack knowledge on the effect of hedonic motivation on the intention to use mobile money services, this study hypothesises that:

Hypothesis (H4): Hedonic motivation influences users' behavioural intention to use mobile money services.

3.5 *Price Value (PV)*

Price value is defined as the cognitive trade-off between benefits derived and cost associated with using a technology (Venkatesh et al., 2012). Generally, price value is higher when benefits derived are more than the cost incurred in using a technology. Similar to hedonic motivation, the technology adoption literature has provided mixed results on the influence of price value on intention to use an innovation. For instance, Macedo (2017) and Oliveira et al. (2016) have pointed out that price value does not influence intention to use a technology. On the contrary, Venkatesh et al. (2012) assert that price value has a positive effect on intention to use a technology. In the case of mobile money, our understanding of this relationship is arguably unknown. Given that mobile money technology is the only viable alternative to traditional banks in most developing countries, price value might not influence intention to use the innovation. As a result, people may still use mobile money irrespective of the trade-off between benefits and cost. On the basis of this discussion, we hypothesise that:

Hypothesis (H5): Price value influences users' behavioural intention to use mobile money services.

3.6 *Habit (HAB)*

Venkatesh et al. (2012) defines habit as an outcome of prior experiences due to the regularity of past behaviour. Habits are formed when people automatically perform certain actions as a result of repeated behaviour. Several studies (e.g., Baudier et al., 2019; Chopdar et al., 2018; Dhir et al., 2018) have established a positive influence of habit in technology use. For example, in investigating the adoption of mobile shopping apps in a cross-country study, Chopdar et al. (2018) found that habit has a positive influence on behavioural intention and use behaviour. Similarly, Baudier et al. (2019) showed a positive relationship between habit and behavioural intention. As an alternative to traditional banking services, mobile money has become a medium to access convenient, faster and low cost financial services (Demirgüç-Kunt et al., 2018). As such, repeated transactions with mobile money services may become a habit for most

people, which in the long run may positively affect behavioural intention and actual use of the technology. On this basis, this study hypothesises that:

Hypothesis (H6a): Habit influences users' behavioural intention to use mobile money services.

Hypothesis (H6b): Habit influences users' actual use of mobile money services.

3.7   *Perceived Risk (PR)*

Perceived risk refers to the perception of losses association with the use of a technology (Pavlou, 2003). Generally, most technologies have inherent risks due to the virtual nature of interactions (Abubakar et al., 2019). Similarly, for mobile money services, there is inherent risk of losing financial assets. As such, users are naturally hesitant about using mobile money services. Perceived risk within the digital environment has many facets such as privacy, financial, time and opportunity cost (Featherman and Pavlou, 2003). Some prior studies have explored the influence of perceived risk on the use of mobile payments (Liébana-Cabanillas et al., 2019) and mobile apps (Chopdar et al., 2018). With regards to mobile money services, some studies (e.g., Baganzi and Lau, 2017; Tobbin and Kuwornu, 2011) have emphasised the significance of perceived risks. However, the focus has been on regulatory and operational risk. As a result, there is limited understanding on the influence of perceived risks such as financial, privacy and performance perils on the use of mobile money services. Given that perceived risk influences the level of trust people repose in a technology and its providers, it is essential to understand the underlying mechanisms of these relationships. Thus, this study proposes the following hypothesis:

Hypothesis (H7a): Perceived risk influences users' behavioural intention to use mobile money services.

Hypothesis (H7b): Perceived risk influences mobile money service trust.

Hypothesis (H7c): Perceived risk influences mobile money agent trust.

3.8   *Facilitating Conditions (FC)*

Facilitating conditions is defined as the perception of available support and resources for a customer in using a technology (Venkatesh et al., 2012). Using any technological innovation requires resources such as devices, software, access to the Internet as well as certain skills sets.

To use mobile money services, customers need to have a mobile phone, subscription to a carrier provider as well as skills to manipulate the mobile phone. Thus, availability of facilitating conditions could lead to higher interest and subsequent use of mobile money services. Currently, there is higher penetration of mobile phones globally (GSMA, 2017a); a needed facilitator for the use of mobile money services. However, there is presently limited understanding in the literature on the role of facilitating conditions in users' behavioural intention and actual use of mobile money services. In prior studies, facilitating condition has been found to positively influence intention to use technologies such as mobile payment services (Oliveira et al., 2016), shopping apps (Chopdar et al., 2018), and ICTs (Macedo, 2017). Following this same vein in the literature, this study proffers that the availability of facilitating conditions such as mobile phones, access to mobile network services and support from others will result in greater intention and use of mobile money services. Hence, this study hypothesises that:

Hypothesis (H8a): Facilitating conditions influences users' behavioural intention to use mobile money services.

Hypothesis (H8b): Facilitating conditions influences actual use of mobile money services.

3.9   Agent Trust (AT)

Agent trust refers to the belief in the trustworthiness of an intermediary to perform obligations as understood by users (Plank et al., 1999). In the context of mobile money services, users largely depend on third-party intermediaries, referred to as agents to perform transactions such as cash deposit and withdrawal (Donovan, 2012). Due to operational arrangements in the mobile money ecosystem, risk issues transcend services to intermediaries. Recently there has been cases of mobile money fraud by agents (Akomea-Frimpong et al., 2019). In some instances, mobile money agents will claim to have made deposits into users account without actually sending the money (Akomea-Frimpong et al., 2019). As a result, users are not only conscious about the service risks but perils from dealing with agents. However, the mobile money literature (e.g., Chauhan, 2015; Cobla & Osei-Assibey, 2018; Osei-Assibey, 2015) have been silent on the relationship between perceived risks and agent trust. Without trust in agents, there will be less interest in using mobile money services. Thus, it is important to understand the effect of agent trust on facilitating condition, behavioural intention and actual use of mobile money services. Accordingly, this study hypothesised that:

Hypothesis (H9a): Agent trust influences users' behavioural intention to use mobile money services.

Hypothesis (H9b): Agent trust influences actual use of mobile money services.

Hypothesis (H9c): Agent trust influences facilitating conditions in using of mobile money services.

3.10   Service Trust (ST)

Plank et al. (1999) define service trust as the belief in the trustworthiness of services to fulfil obligations as understood by a customer. In the mobile money ecosystem, services such as airtime purchase, cash deposit and withdrawals are provided by telecommunication service providers. However, due to the virtual nature of the related transactions, there are inherent trust issues. More often, people who use mobile money services are individuals who have some level of belief in the offerings. On the contrary, there is still a large number of people who do not use mobile money services due in part to service trust issues (Grohmann et al., 2018) as a result of the tendency to lose money. Though some prior studies (e.g., Baganzi & Lau, 2017; Chauhan, 2015; Osei-Assibey, 2015) have explored the role of trust in the use of mobile money services, the focus has been on service providers while there is limited knowledge on the service trust. For instance, in investigating the role of trust in mobile money adoption, Osei-Assibey (2015) found that service provider trust has a significant relationship on mobile money adoption. In the same vein, Baganzi and Lau (2017) found that service provider trust has an influence on mobile money adoption. Given that reputable service providers can still produce flawed services, it is important to assess the effect of service trust in addition to provider trust. On this basis, this study proposes the following hypotheses:

Hypothesis (H10a): Service trust influences users' behavioural intention to use mobile money services.

**Hypothesis (H10b)**: Service trust influences actual use of mobile money services.

Hypothesis (H10c): Service trust influences facilitating conditions in using of mobile money services.

3.11   *Behavioural Intention (BI)*

Behavioural intention refers to the probability that users' will engage in a particular behaviour (Ajzen, 2002). For a technology, a higher behavioural intention could lead to increased use. In prior technology adoption literature, several studies (e.g., Chopdar et al., 2018; Macedo, 2017; Venkatesh et al., 2012) have established a positive relationship between behavioural intention and actual use. For instance, in investigating the use of ICT among older adults, Macedo (2017) shows that behavioural intention has a positive impact on use behaviour. However, in the mobile money literature, most studies (e.g., Chauhan, 2015; Narteh et al., 2017; Tobbin and Kuwornu, 2011; Upadhyay and Jahanyan, 2016) have treated behavioural intention as a main outcome variable. As a result, the relationship between behavioural intention and actual use of mobile money services is not established. In fact, Venkatesh et al. (2012) assert that there is a significant difference between behavioural intention and actual use of a technology. As such, it is important to understand the impact of behavioural intention and actual use behaviour. Given that the focus of this study is to move beyond existing research to unearth antecedents to actual use of mobile money services, it is important to investigate the relationship between behavioural intention and actual use behaviour. Based on the focus of the study and prior theoretical evidence we hypothesise that:

Hypothesis (H11): Behavioural intention influences actual use of mobile money services.
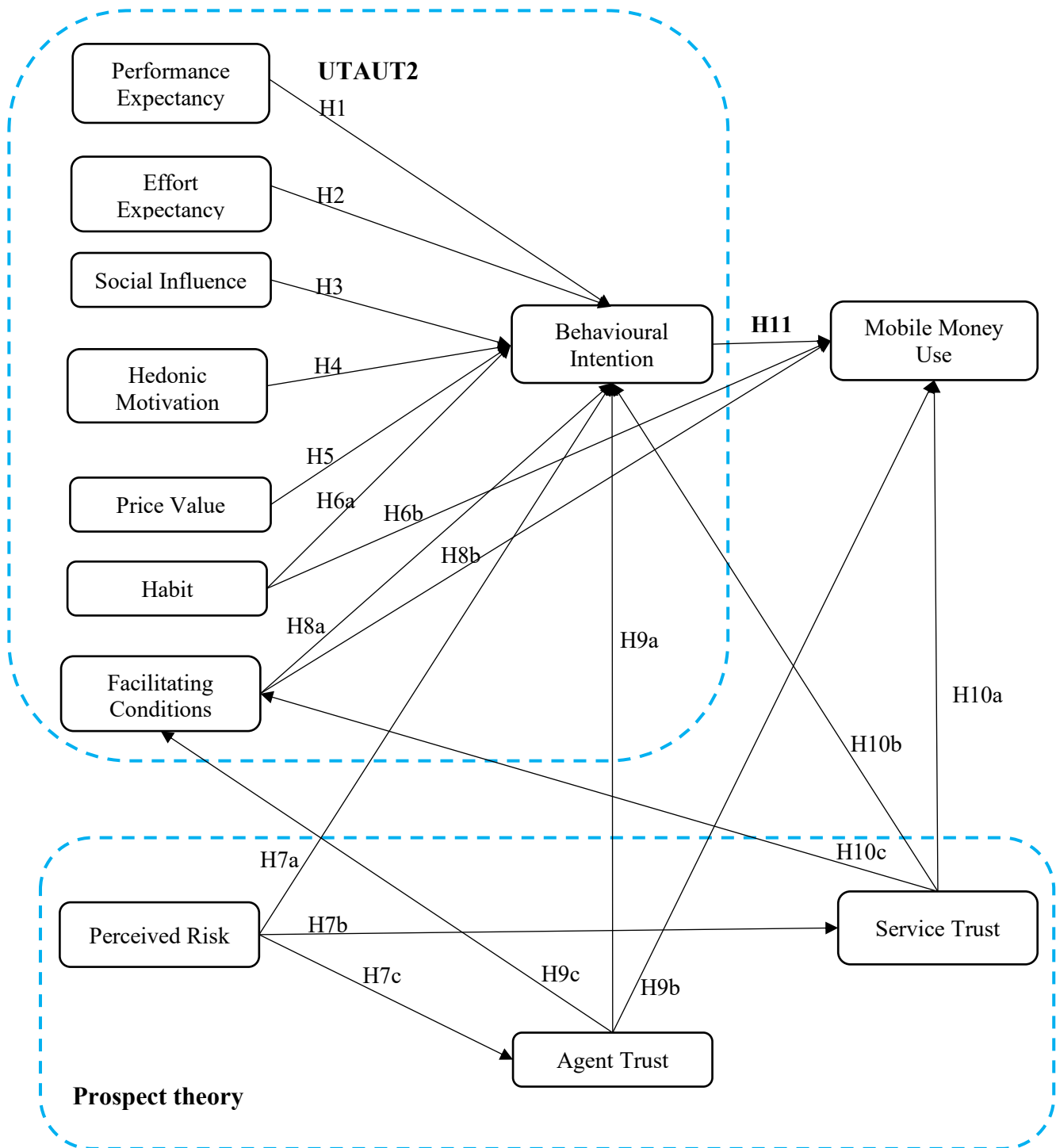
Figure 1 Research model

4. Research Methodology

4.1   Research Context

This study was conducted in Ghana, a middle-income country in Sub-Saharan Africa. Ghana has emerged as one of Sub-Saharan's Africa's fast-growing mobile money markets (Mattern, 2018). In the last five years, Ghana has become one of the developing countries that has embraced mobile money account ownership and the related expansion of financial inclusion.

From a humble beginning of only 350,000 users in 2009, Ghana's mobile money ecosystem has witnessed steady growth as account ownership among adults reached 39% in 2018 (Demirgüç-Kunt et al., 2018). This growth has been supported by the increase in mobile telephone penetration and phone ownership. As at 2017, there were about 19 million unique mobile phone subscribers, representing about 67% of the population (GSMA, 2017b). Similarly, Ghana has about 45% mobile internet penetration, an important input for deepening financial inclusion (GSMA, 2017c). In spite of these significant achievements in Ghana's mobile money ecosystems, there is still a long way to go as cash remains the dominant medium of transaction and a large number of people are still unbanked. These unique characteristics motivated the selection of Ghana as the empirical focus for this study.

The Ghanaian mobile money ecosystem comprises key actors, namely mobile network operators, commercial banks, Bank of Ghana (BoG), Ghana Interbank Payment and Settlement Systems (GhiPSS), merchants, users and agents (Cobla and Osei-Assibey, 2018). Mobile network operators are private telecommunication companies that offer mobile money services. Commercial banks are financial institution which hold monies deposited with mobile network operators since the mobile money service providers are not recognised as banking institutions. BoG is the central bank and regulator of Ghana's mobile money ecosystem. GhiPSS is a subsidiary of the central bank that provides interoperability platform for cross-network transactions given that there are different mobile money service providers. Merchants are organisations that accept mobile money payment for their goods and services. On the other hand, users are individuals and organisations that use mobile money services. Lastly, agents are intermediaries between mobile money users and service providers.

Although Ghana has witnessed a sharp increase in the number of adults having mobile money accounts, cash remains the dominant form of transactions (Cobla and Osei-Assibey, 2018). Thus, it is important to understand antecedents to the actual use of mobile money innovations towards deepening financial inclusion. In Ghana, mobile money is mainly used for cash transfer and bill payment (Narteh et al., 2017). However, in recent times, mobile money is being used to obtain microloans and pay subscription for insurance services. In Ghana currently, there is a digitalisation drive to achieve a cashless economy. As a result, there has been a number of reforms such as passage of the digital payment ACT and relaxation of some banking regulations (Akomea-Frimpong et al., 2019). Thus, it is now easy for users to obtain mobile

money accounts. With a registered phone SIM card, an individual is able to open a mobile money account under five minutes. With this account, the individual is able to undertake transactions such as cash deposit, electronic money transfer and payment for goods and services. Given that mobile money services can be accessed with a mobile phone without the need for a traditional bank, this innovation offers many benefits such as convenience, low transaction cost, access to financial services and faster transactions. Therefore, for many individuals and businesses, mobile money represents a viable alternative to traditional banks.

4.2   Measurement

To unearth antecedents to mobile money use, this study adapted items empirically validated in the extant literature. Items measuring performance and effort expectancy, social influence, price, habit, facilitating conditions, hedonic motivation, behavioural intention and mobile money use were adapted from Venkatesh et al. (2012). Also, items measuring perceived risk were adapted from Wu and Wang (2005) whereas those for service and agent trust were adapted from Pavlou (2003) and Gefen et al. (2003). The research questionnaire used for data collection was in two parts, namely demographic characteristics and perception of respondents on each variable in our model. Questions on the demographic characteristics borders on age, gender, level of highest education, and frequency of mobile money service use. On the other hand, the second part of the questionnaire as presented in Appendix A assesses the degree to which respondents agree or disagree with statements on each variable in our research model based on a 7-point Likert-scale ranging from 1 (strongly disagree) to 7 (strongly agree).

4.3   Data collection

Given that Ghana was the empirical focus of this study, the population was adults in the country. For the sample size determination, we followed Barclay, Higgins and Thomson's (1995) rule that sample size should be 10 times the largest number of structural paths directed at a particular construct in the structural model. In our research model (see Figure 1), the largest number of structural paths directed a particular construct is 10. Thus, going by the 10 times rule, a sample of 100 (i.e. 10 x 10=100) is deemed adequate. In this study, there was a need to collect adequate data that is representative of the population to achieve generalisation as well as the need to select an approach that aligns with the research methodology. With these requirements, we selected convenience sampling technique. We chose this technique for two reasons. First, convenience sampling is effective when a large sample is required   for

generalisation (Tsiotsou, 2015). Second, convenience sampling enables assessment of elements in a population through point of contact in an expedient and practical way.

Before the main data collection, we pilot tested the initial questionnaire to ascertain the face value and conceptual validity of the instrument. Next, we collected 46 responses to ascertain the appropriateness of the questionnaire. Based on the results of the pilot test, we modified questions on price value, habit and perceived risk for better clarity. In October 2017, the main data collection began and ended after a period of six months (October 2017 to March 2018). We administered the questionnaire through an online survey system to people living in Ghana. In all, a total of 460 responses were collected of which 294 were deemed suitable for use in this study. Given that the required sample was 100, we deemed the number of responses collected adequate for the study. To test for bias between the pilot and main data collected, the Kolmogorov–Smirnov test (Ryans, 1974) was used to compare the sample distribution. The result shows that the two data groups did not differ statistically, an indication of the absence of equality of continuous bias. In addition, we tested for common method bias using Harman's one-factor test (Podsakoff et al., 2003). Again, the dataset did not exhibit the presence of common method bias as eigenvalues of all the variables were greater than one.

5. Data Analysis and Results

The data analysis was conducted in three steps: descriptive, measurement model and structural model analysis. The descriptive analysis was conducted on the demographic characteristics of respondents through the SPSS software of which the results are presented in section 5.1. In terms of the measurement and structural model analysis, the study used the partial least square structural equation modelling (PLS-SEM). In particular, this study uses the SmartPLS version 3.2.7 for data analysis. The choice was informed by the exploratory nature of the research. In addition, this study used PLS-SEM because of its robustness to deal with complex relationships, skewed sample distribution and small sample size as compared with other techniques such as EQS, AMOS, and LISREL (Chin, 1998). The results of the measurement and structural model analysis are presented in section 5.2 and 5.3 respectively.

5.1   Demographic characteristics

To understand the demographic characteristics of the respondents, data analysis was conducted for four key attributes, namely age distribution, gender, level of education and frequency of

mobile money use. The results from these attributes are presented in Table 2. In terms of age distribution, majority of respondents (66%) are within 25-34 group. This age group is followed by respondents between the 35-54 group (23.5%), 18-24 group (5.8%), 45-54 group (4.4%) and 55-60 group (0.3%). This result indicates that sample is dominated by young adults. With regards to gender groupings, the results indicate that the sample is dominated by males (65%) compared to females (35%). The educational characteristics of respondents is dominated by holders of master's degree (65.3%), followed by first degree (28.2%), professional certificate (3.7%) and high school (0.3%) graduates. Lastly, in terms of frequency of use of mobile money services, the results show that majority of respondents use the technology 2-3 times a week (35.7%), followed by those who use it once a week (28.6%), monthly (16.7%), 4-6 times a week (10.9%) and daily (8.2%).

Table 2 Demographic characteristics

Variables	Levels	Frequency (n)	Percentage (%)
Age	18-24	17	5.8
	25-34	194	66
	35-44	69	23.5
	45-54	13	4.4
	55-60	1	0.3
Gender	Male	191	65
	Female	103	35
Highest educational level	High School	1	0.3
	Professional Certificate	11	3.7
	First Degree (Bachelors)	83	28.2
	Master's Degree	192	65.3
	Doctorate Degree	7	2.4
Frequency of mobile money service use	Daily	24	8.2
	4-6 times a week	32	10.9
	2-3 times a week	105	35.7
	Once a week	84	28.6
	Once a month	49	16.7

5.2 Measurement model

The result of the measurement model as presented in Table 3 estimates the fit between the research model and the data. Three main criteria: factor loadings, convergent and discriminant validity were used for the measurement model analysis. For factor loadings, the measurement model demonstrated a good fit as most indictors had scores greater than 0.70 except for four items (AT3, AT4, PR1 and ST2) which recorded loadings below the threshold of 0.4 and were

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removed from the final model. In all, the results of factor loading show a good indicator reliability as majority of factors met the threshold of 0.70. For convergent validity analysis, the average variance extracted (AVE) criterion was used. According to Hair et al. (2013), to achieve convergent validity, the AVE value for a construct must be above a threshold of 0.50. As presented in Table 2, the AVE value for all the constructs in the model are above the 0.50, an indication of a good convergent validity.

Table 3 Quality criterion (AVE, composite reliability, Cronbach's alpha) and factor loadings

Constructs	Items	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Effort Expectancy (EE)	EE1	0.882	0.910	0.937	0.788
	EE2	0.901			
	EE3	0.908			
	EE4	0.860			
Behavioural Intention (BI)	BI1	0.792	0.857	0.904	0.701
	BI2	0.792			
	BI3	0.864			
	BI4	0.897			
Performance Expectancy (PE)	PE1	0.858	0.815	0.890	0.730
	PE2	0.914			
	PE3	0.787			
Social Influence (SI)	SI1	0.934	0.949	0.967	0.908
	SI2	0.973			
	SI3	0.951			
Facilitating Conditions (FC)	FC1	0.921	0.835	0.902	0.757
	FC2	0.928			
	FC3	0.749			
Hedonic Motivation (HM)	HM1	0.923	0.906	0.941	0.841
	HM2	0.931			
	HM3	0.896			
Price Value (PV)	PV1	0.938	0.941	0.962	0.894
	PV2	0.945			
	PV3	0.954			
Habit (HAB)	HAB1	0.895	0.897	0.935	0.828
	HAB2	0.920			
	HAB3	0.916			
Perceived Risk (PR)	PR2	0.900	0.837	0.902	0.755
	PR3	0.911			
	PR4	0.791			
Agent Trust (AT)	AT1	0.897	0.805	0.883	0.716

Constructs	Items	Loadings	Cronbach's Alpha	Composite Reliability	AVE
	AT2	0.874			
	AT5	0.762			
Service Trust (ST)	ST1	0.892	0.851	0.909	0.770
	ST3	0.894			
	ST4	0.847			
Mobile Money Use Behaviour (UB)	UB1	0.893	0.903	0.940	0.838
	UB2	0.945			
	UB3	0.908			

In terms of discriminant validity, the study employed two criteria, namely Fornell and Larcker and Heterotrait-Monotrait (HTMT). To assess discriminant validity under the Fornell and Larcker (1981) criteria, we verified that the square root of the AVE for each variable exceeded the bivariate correlations between the other constructs (Fornell and Larcker, 1981). As presented in Table 4, the square root of the of AVE indicated on the diagonal of the correlation matrix shows that the values are between 0.837 and 0.946. Given that these values are higher than the bivariate correlation between any two constructs in the study, we posit that there is discriminant validity. Thus, this finding demonstrates that all the 12 constructs in our research model have greater variance that differentiate them.

Table 4 Fornell and Larcker discriminant validity criterion

	AT	BI	EE	FC	HAB	HM	PE	PR	PV	SI	ST	UB
AT	**0.846**											
BI	0.205	**0.837**										
EE	0.167	0.619	**0.888**									
FC	0.153	0.526	0.649	**0.870**								
HAB	0.195	0.335	0.152	0.163	**0.910**							
HM	0.220	0.446	0.331	0.389	0.466	**0.917**						
PE	0.096	0.706	0.552	0.525	0.391	0.458	**0.854**					
PR	-0.205	-0.082	0.029	0.020	-0.023	-0.172	0.018	**0.869**				
PV	0.435	0.193	0.072	0.111	0.225	0.259	0.094	-0.130	**0.946**			
SI	0.147	0.440	0.294	0.327	0.415	0.385	0.500	-0.052	0.172	**0.953**		
ST	0.631	0.358	0.268	0.276	0.304	0.343	0.214	-0.325	0.369	0.251	**0.878**	
UB	0.239	0.569	0.370	0.288	0.422	0.320	0.497	-0.072	0.112	0.352	0.343	**0.916**

In addition, to Fornell and Larcker criteria, we also assess discriminant validity using the HTMT approach since some existing methods do not in some cases detect lack of discriminant validity. HTMT evaluates if two variables are perfectly measured by their true correlations by

estimating the ratio of within and between constructs correlations (Henseler et al., 2015). To determine the presence of discriminant validity, the HTMT values must be lower than 0.85 (Henseler et al., 2015). In this study, the HTMT values as presented in Table 5 are between 0.040 and 0.768, a confirmation that there is discriminant validity between the constructs in the research model.

Table 5 HTMT discriminant validity criterion

	AT	BI	EE	FC	HAB	HM	PE	PR	PV	SI	ST
BI	0.235										
EE	0.180	0.703									
FC	0.185	0.615	0.735								
HAB	0.213	0.379	0.165	0.198							
HM	0.250	0.498	0.355	0.451	0.520						
PE	0.108	0.835	0.630	0.627	0.465	0.529					
PR	0.241	0.100	0.048	0.057	0.040	0.195	0.070				
PV	0.495	0.210	0.080	0.132	0.240	0.279	0.106	0.140			
SI	0.150	0.488	0.315	0.369	0.449	0.411	0.578	0.060	0.178		
ST	0.768	0.420	0.305	0.332	0.345	0.389	0.260	0.377	0.411	0.279	
UB	0.271	0.645	0.406	0.330	0.465	0.348	0.574	0.086	0.119	0.380	0.392

5.3 Structural model

The final step in the data analysis assesses the structural model by examining path significance, effect of each hypothesised relationship as well as explanatory power of the research model. As presented in Figure 2, the results confirmed hypotheses H1, H2, H6b, H7b, H7c, H10c, H11 while H3, H4, H5, H6, H7a, H8a, H8b, H9a, H9b, H9c, H10a, H10b were rejected. In addition, the model explained 61.4% of behavioural intention and 39.6% of actual use of mobile money services. Similarly, the model explained 10.6% of service trust, 7.7%% of facilitating condition and 4.2% of agent trust. Among the hypotheses confirmed, the results (see Table 5) indicates that there is a positive significant effect of performance expectancy (β= 0.660; $p < 0.000$) and effort expectancy (β= 0.273; $p < 0.010$), on behavioural intention to use mobile money services. Similarly, the result shows that Habit (β= 0.230; $p < 0.000$) and behavioural intention (β= 0.579; $p < 0.000$) both have positive significant effect on actual use of mobile money services. Furthermore, the results show that perceived risk has a negative significant influence on agent trust (β= -0.240; $p < 0.004$) and service trust (β= -0.377; $p < 0.000$). Lastly, the results indicate that service trust (β= 0.449; $p < 0.001$) has a positive significant influence on facilitating conditions in the use of mobile money services, confirming prior studies (Macedo, 2017).
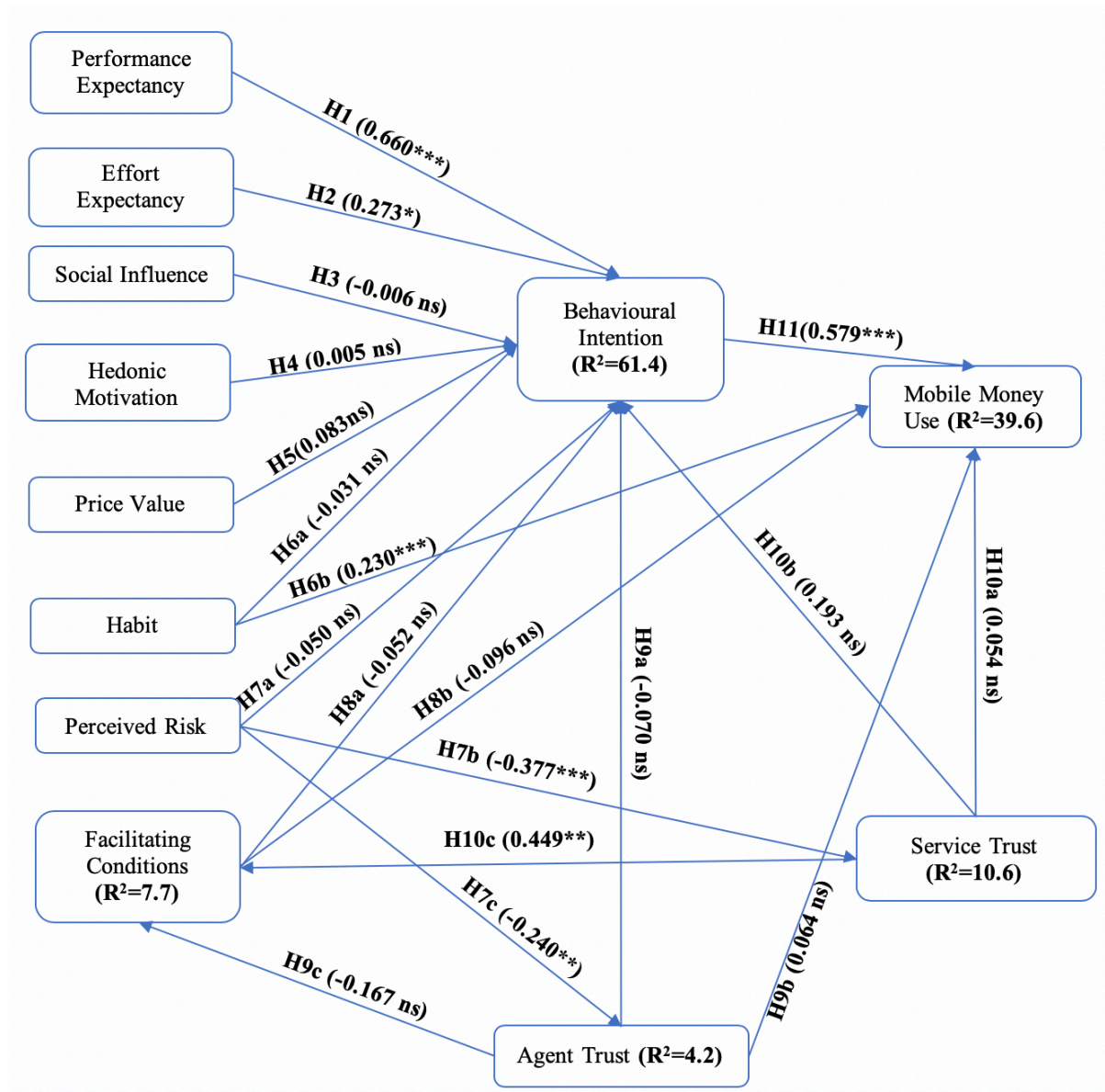
Note: *=p<0.05; **=p<0.01; ***=p<0.001; ns=not significant

Figure 2 Result of the structural model

On the contrary, hypotheses not confirmed by the model includes the relationships between social influence (β= -0.006; $p > 0.05$), habit (β= -0.031; $p > 0.05$), hedonic motivation (β= 0.005; $p > 0.05$), price value (β= 0.083; $p > 0.05$), perceived risks (β= -0.050; $p > 0.05$), agent trust (β= -0.070; $p > 0.05$), service trust (β= 0.193; $p > 0.05$), and facilitating conditions (β= -0.052; $p > 0.05$) on behavioural intention to use mobile money services. In addition, the results do not support hypotheses related to the influence of service trust (β= 0.054; $p > 0.05$), agent trust (β= 0.064; $p > 0.05$) and facilitating conditions (β= -0.096; $p > 0.05$) on actual use of

mobile money services. In sum, the structural model confirms seven and rejected twelve hypotheses as presented in Table 6.

Table 6 Hypotheses testing results

Hypotheses	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Interpretation
PE -> BI (H1)	0.660	0.679	0.116	5.664	0.000	Accepted
EE -> BI (H2)	0.273	0.267	0.105	2.586	0.010	Accepted
SI -> BI (H3)	-0.006	-0.010	0.065	0.091	0.928	Rejected
HM -> BI (H4)	0.005	-0.003	0.075	0.070	0.944	Rejected
PV -> BI (H5)	0.083	0.085	0.055	1.516	0.129	Rejected
HAB -> BI (H6a)	-0.031	-0.036	0.067	0.460	0.646	Rejected
HAB -> UB (H6b)	0.230	0.227	0.056	4.137	0.000	Accepted
PR -> BI (H7a)	-0.050	-0.051	0.059	0.840	0.401	Rejected
PR -> ST (H7b)	-0.377	-0.378	0.075	5.035	0.000	Accepted
PR -> AT (H7c)	-0.240	-0.241	0.083	2.886	0.004	Accepted
FC -> BI (H8a)	-0.052	-0.059	0.092	0.563	0.573	Rejected
FC -> UB (H8b)	-0.096	-0.095	0.079	1.211	0.226	Rejected
AT -> BI (H9a)	-0.070	-0.081	0.104	0.670	0.503	Rejected
AT -> UB (H9b)	0.064	0.063	0.113	0.567	0.570	Rejected
AT -> FC (H9c)	-0.167	-0.171	0.115	1.446	0.148	Rejected
ST -> UB (H10a)	0.054	0.053	0.131	0.409	0.683	Rejected
ST -> BI (H10b)	0.193	0.204	0.120	1.604	0.109	Rejected
ST -> FC (H10c)	0.449	0.454	0.131	3.429	0.001	Accepted
BI -> UB (H11)	0.579	0.584	0.092	6.277	0.000	Accepted

6. Discussion

In this study, we investigated antecedents to financial inclusion through mobile money services; a fintech innovation. This aim is fuelled by limited understanding and inconclusive results in the extant literature on factors that influence the use of mobile money services. Given that the mobile money technology is recognised as a critical innovation for deepening financial inclusion, especially in developing countries, it is essential to understand the antecedents to the use of mobile money services. To address these gaps, this study combined constructs from two theories, namely UTAUT2 and Prospect theory. The results show that performance expectancy significantly influences behavioural intention to use mobile money services (H1), a position consistent with previous research (e.g., Chopdar et al., 2018; Oliveira et al., 2016; Venkatesh et al., 2012). This confirmation suggests that the benefits associated with the use of mobile money services are key in driving use behaviour. Hence, the higher the benefits derived from mobile money services, the more likely it is that people will use the technology. Similarly, the

findings show that effort expectancy has a positive influence on behavioural intention to use mobile money services (H2), a result consistent with prior studies (Liébana-Cabanillas et al., 2019; Macedo, 2017). This implies that users are more inclined to use mobile money services if less effort is required to undertake processes.

Consistent with prior studies (Baudier et al., 2019; Chopdar et al., 2018), this study reveals that habit has a positive significant influence on mobile money use behaviour (H6b). This result reiterates the assumption that the more people use mobile money services, the higher the likelihood of repeated use (Venkatesh et al., 2012). In the same vein, the results show that perceived risk has a negative effect on mobile money agent (H7b) and service trust (H7c). These results suggest that the perception of risks associated with a mobile money service negatively affects trust in the service and its intermediaries (e.g. agents). As such, the higher the perception of risks the lower the level of trust in mobile money agents and services. Though the effects of perceived risks in technology has been established (Liébana-Cabanillas et al., 2019), the relationship between perceived risks and mobile money agents and services trust had not been explored prior to this study. Thus, we see this finding as a useful foundation for future research. Another revelation from the results is that mobile money service trust (H10c) has a positive relationship with facilitating conditions. This result indicates that high service trust creates an enabling environment for people to use the mobile money technology (Baganzi and Lau, 2017). As suggested by Osei-Assibey (2015), the finding confirms the importance of trust in driving technology use. In line with several research (Venkatesh et al., 2012) this study confirms the positive influence of behavioural intention on the actual use of mobile money services. This result reiterates the widely held view that people will use mobile money services if they have a favourable intention towards the technology. Among the antecedents to the use of mobile money services, performance expectancy is the most significant, followed by behavioural intention, effort expectancy and habit respectively.

On the contrary, the results suggest that social influence (H3), hedonic motivation (H4), price value (H5), habit (H6a), perceived risk (H7a), facilitating conditions (H8a), agent trust (H9a) and service trust (H10b) do not influence behavioural intention to use mobile money services. In terms of the relationship between social influence and behavioural intention to use mobile money services, our finding is inconsistent with prior studies (Macedo, 2017). Thus, we can infer that the views of significant others do not matter in the use of mobile money services.

Given that mobile money involves financial value, there is the likelihood that a decision to use the technology would be based on individual need. In the same vein, the results suggest hedonic motivation does not influence behavioural intention to use mobile money services. Again, this finding is inconsistent with some prior studies (Chopdar et al., 2018; Macedo, 2017) but is in tandem with Oliveira et al. (2016), which also investigated the use of mobile payments. Thus, we can infer that people do not see the use of financial technology innovations as fun but a serious endeavour. With regards to price value, the findings of this study is consistent with the extant research (Chopdar et al., 2018), suggesting that the advantages offered by mobile technology outweigh the cost involved in using the technology. Mobile money technology is arguably the most viable alternative to the cash system, especially in developing countries. As such, irrespective of transaction cost, people will still use mobile money services since it possesses unique characteristics such as convenience, wide-availability and quicker services that offsets transaction costs (De Kerviler et al., 2016).

Baudier et al. (2019) and Chopdar et al. (2018) suggest that habit has a significant influence on behavioural intention to use a technology, however, our study reveals the opposite that habit does not influence intention to use mobile money services. Similarly, the findings indicate that perceived risk does not influence behavioural intention to use mobile money services. For many people in developing countries, the mobile money technology is the only alternative to access financial services, as a result, they will still use the technology irrespective of associated risks. Moreover, technological development has made it difficult for people to lose money directly from the use of mobile money services, a possible reason why perceived risk does not influence behavioural intention to use mobile money services. Furthermore, the results show that facilitating conditions do not influence behavioural intention to use mobile money services, a position contrary to extant studies (e.g., Chopdar et al., 2018; Macedo, 2017). The main facilitating condition to use mobile money services is ownership of a mobile phone. Secondly, using mobile money services does not require specialised skills. Additionally, there are mobile money agents who provide assistance to users if needed. Given that there is high penetration of mobile phone ownership (GSMA, 2017a), it is not suprising that facilitating conditions do not influence behavioural intention to use mobile money services. Lastly, the result also indicate that agent and service trust do not influence behavioural intention to use mobile money services, a position, contrary to extant studies (Baganzi and Lau, 2017; Chauhan, 2015; Osei-Assibey, 2015). According to De Kerviler et al. (2016), people will still use an innovation

irrespective of associated consequences if the technology offers unique characteristics that outweigh disadvantages. In the context of mobile money services, there is a high trade-off between advantages and disadvantages. Comparably, people will view the advatanges mobile money offers such as convenience, low transaction cost, wide-availability and access to financial services (Donovan, 2012) to outweigh agent and service trust. Given that there is no viable alternative to the traditional cash system in most developing countries, people will still use mobile money irrespective of agent and service trust issues.

6.1 Theoretical implications

By addressing the research question, this study offers several theoretical contributions. First, there is a paucity of studies that apply the UTAUT2 to study mobile money services. As such, our study extends the applicability of UTAUT2 to investigating mobile money services. Though the UTAUT2 has been used to study mobile payments in general (e.g., Oliveira et al., 2016), it has not been used in the context of mobile money services. Given that our research model accounts for 61.4% predictive accuracy, this study makes a useful contribution to knowledge since the widely used TAM model often account for between 32% and 53% variance explained (Liébana-Cabanillas et al., 2019). Second, this study offers a multi-theory perspective to understanding antecedents to the use of mobile money services by combining the UTAUT2 with the Prospect theory. Since there is a significant variance between intention and actual use (Macedo, 2017; Venkatesh et al., 2012) incorporating the two theories allows us to evaluate behavioural intention and actual use behaviour comprehensively. In addition, despite the wide use of the UTAUT2 in technology adoption research (Baudier et al., 2019; Chopdar et al., 2018) such studies have focused on drivers and does not account sufficiently for risks or deterrents. Integrating the two theories also assert that the antecedents to the use of a technology depends on the behavioural intentions as well as the evaluation of risks. Through this novel process, this study uniquely demonstrates how perceived risks influences agent and service trust in the use of mobile money services. In addition, this combination enabled understanding of the effect of service trust on facilitating conditions during the adoption and use of mobile money services. Given that the extant mobile money research has mainly been conducted from TAM perspectives, this study offers further insights that advance knowledge and forge alternative debates on antecedents to the use of mobile money services. As such, this study is a good foundation for future research. Lastly, this study contributes an alternative perspective to the widely accepted position in the technology adoption literature. In particular,

the study shows that antecedents such as social influence, price value, perceive risk, hedonic motivation, facilitating conditions and service trust do not necessarily influence people's decision to use mobile money services. Thus far, these factors were identified as key antecedents in users' technology adoption and use decision making. The findings suggest that as mobile phones become widely available and affordable the antecedents of fintech innovations are becoming more nuanced. This study therefore provides an alternative perspective which marks the beginning of further research. Hence, we consider the alternative perspectives provided in this study critical contributions to research.

6.2 Practical implications

In addition to the theoretical contributions, this study offers some practical implications. The study points to the importance of performance and effort expectancy, behavioural intention and habit as antecedents to the use of mobile money services. Among these antecedents, the study identifies performance expectancy as the most significant antecedent, indicating that people will continue to use mobile money services when these services offer needed benefits. With this understanding, service providers can highlight and redesign their mobile money services to drive adoption and use. Furthermore, this study reveals that perceived risk influences people's trust in mobile money agents and services. This finding highlights the aversion within the adoption decision of users regarding trust, indicating the existence of hesitation in the use of mobile money services with respect to agent and service trust issues. Thus, actors such as regulators, service providers and intermediaries need to put in measures to reduce the level of distrust in mobile money services. Given that negative perceptions are sometimes important to users than drivers in the adoption decision making (Daniel Kahneman and Tversky, 1979), it is imperative for practitioners to address trust issues. In practice, mobile money, as a new innovation, is gaining increasing attention due largely to evident successes; particularly, as a viable innovation to drive financial inclusion (Asongu and Nwachukwu, 2016). However, to sustain and increase the gains made by mobile money technology, there is a need for favourable policy decisions.

6.3 Policy Implications

The findings highlight agent and service trust issues which can be addressed by a review of policies and regulations. Since deterrents are more important than drivers (Tversky and Kahneman, 1992) users would evaluate risks and therefore policymakers need to work with

service providers and intermediaries to ensure transparency to enhance trust. There is the need for strict policy guidelines for the approval of mobile money agents and service providers. Given that technology adoption can play an important role in reducing poverty among marginalised communities (Rahman et al., 2017), government agencies and local governments can take advantage of mobile money services to support the economic and developmental activities in poor areas, where regular banking services are scarce or non-existent.

In the same vein, mobile technology firms should be given incentives to extend their services to remote and poor areas as a means of engendering much needed financial inclusion to boost economic activities. Whilst telecommunication firms could, as a social responsibility, extend their services to remote areas, governments can support social innovation activities that promote the use of mobile money services. The key factors identified by this study calls for policies that will deepen financial inclusion. For instance, as habit is identified as a key antecedent to the use of mobile money services, policy can be made to reinforce the use of mobile money to drive and increase adoption. As a typical example, there could be a policy that encourages the use of mobile money as a preferred payment option for routine transactions such as payments for bus fares, purchase of airtime, etc. Such initiatives would increase the use of mobile money services to expand geographical financial inclusion within nations. In fact, in the Ghanaian context, where cocoa is an important export, purchases of inputs from government agencies as well as sales of cocoa beans to produce buying companies could adopt mobile money services. Such a policy could also improve transparency.

6.4 Limitations and future research

Though this study provides critical insights that advance understanding, development and deployment of mobile money services, which highlights the interaction between technology and social change, there are a few limitations. First, the study was conducted in Ghana, an emerging economy. Thus, it is possible the results may not be applicable to developed country contexts due to social idiosyncrasies (Senyo et al., 2016). Therefore, future research could investigate antecedents to mobile money services use in both developing and developed country contexts to strengthen the generalisability of the findings. Second, the study focused on end users of mobile money services. However, it will be ideal to understand the perspectives of intermediaries such as merchants and agents. Hence, future studies may explore the perceptions of intermediaries. Third, this study only investigated the effect of individual

antecedents to mobile money service use. It will be ideal to understand which configuration of antecedents drive or inhibit mobile money use.

7. Conclusion

The study sought to investigate the antecedents to the actual use of mobile money services by combining two theories, namely, the UTAUT2 and Prospect theories to develop and examine a unique research model. The study addressed the overarching research question of unearthing antecedents to mobile money use by developing and testing the research model. The results show that the research model has good explanatory power, attesting to its robustness to forecast behavioural intention and actual use of mobile money services. Moreover, this study is the first in information systems research to combine the UTAUT2 and the Prospect theories in the fintech and mobile money fields. The results confirm that performance expectancy, effort expectancy and habit and behavioural intention are antecedents to the use of mobile money services. More significantly, the results offered a new insight that perceived risk negatively influences mobile money service and agent trust. In the same vein, the results also point to the positive influence of mobile money service trust on facilitating conditions to use the technology. Furthermore, aspects of the results deviated from prior studies by pointing to the insignificant effect of price value, hedonic motivation, facilitating conditions, perceived risks, and social influence on behavioural intention and actual use of mobile money services. Through these findings, the study paved the way for better appreciation of antecedents to the use of mobile money services, a crucial knowledge significantly needed to advance the financial inclusion literature.

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Appendix A: Research Questionnaire

Constructs	Items	Questions	Sources
Effort Expectancy (EE)	EE1	I will find it easy to use mobile money services	(Venkatesh et al., 2012)
	EE2	I believe it will be easy for me to understand and use mobile money services	
	EE3	My interaction with mobile money services will be clear and understandable	
	EE4	Learning to use mobile money services is easy for me	
Behavioural Intention (BI)	BI1	I intend to use mobile money services	(Venkatesh et al., 2012)
	BI2	I will always try to use mobile money services for my transactions	
	BI3	I intend to continue using mobile money services	
	BI4	I plan to continue using mobile money services	
Performance Expectancy (PE)	PE1	I find mobile money services useful in my daily life	(Venkatesh et al., 2012)
	PE2	Using mobile money services helps me accomplish things more quickly	
	PE3	Using mobile money services increase my productivity	
Social Influence (SI)	SI1	People who are important to me think that I should use mobile money services	(Venkatesh et al., 2012)
	SI2	People who influence my behaviour think that I should use mobile money services	
	SI3	People whose opinions I value prefer that I use mobile money	
Facilitating Conditions (FC)	FC1	I have the resources necessary to use mobile money services	(Venkatesh et al., 2012)
	FC2	I have the knowledge necessary to use mobile money services	
	FC3	Mobile money technology is compatible with other technologies I use	
Hedonic Motivation (HM)	HM1	Using mobile money services is fun	(Venkatesh et al., 2012)
	HM2	Using mobile money services is enjoyable	
	HM3	Using mobile money services is very entertaining	
Price Value (PV)	PV1	Mobile money service charges are reasonable	(Venkatesh et al., 2012)
	PV2	Mobile money service charges are value for money	
	PV3	With the current charges, mobile money services provide a good value	
	PV4	I think the transaction fee for mobile money services is expensive	
Habit (HAB)	HAB1	I am addicted to using mobile money services	(Venkatesh et al., 2012)
	HAB2	I must use mobile money services	

Constructs	Items	Questions	Sources
	HAB3	The use of mobile money services has become a habit for me	
Perceived Risk (PR)	PR1	I think using mobile money services puts my privacy at risk	(Wu and Wang, 2005)
	PR2	Using mobile services involves more financial risk	
	PR3	There are too many uncertainties with mobile money services	
	PR4	Mobile money transactions are not adequately protected by law	
	PR5	I think using mobile money services has potential risk	
Agent Trust (AT)	AT1	I trust the agents facilitating mobile services	(Gefen et al., 2003; Pavlou, 2003)
	AT2	The agent providing mobile money services meet my expectation	
	AT3	The mobile money agent has more to lose by not processing my transactions	
	AT4	I find it necessary to be cautious with mobile money agents	
	AT5	Based on my previous experiences, I find mobile money agents to be honest	
Service Trust (ST)	ST1	I find mobile money services to be trustworthy	(Gefen et al., 2003; Pavlou, 2003)
	ST2	I find it necessary to be cautious with mobile money services	
	ST3	Based on my previous experiences, I trust mobile money services	
	ST4	I believe mobile money services are reliable	
Mobile Money Use Behaviour (UB)	UB1	How likely are you to use mobile money services?	(Venkatesh et al., 2012)
	UB2	I use mobile money services frequently	
	UB3	I use mobile money services a lot	