Kelly and Palaniappan
*Journal of Innovation and Entrepreneurship* (2023) 12:34
https://doi.org/10.1186/s13731-023-00301-3

Journal of Innovation and Entrepreneurship

RESEARCH Open Access

# Using a technology acceptance model to determine factors influencing continued usage of mobile money service transactions in Ghana

Afful Ekow Kelly[1*] and Sellappan Palaniappan[2]

*Correspondence:
ekowkelly@gmail.com

[1] Faculty of Computing, Engineering and Mathematical Sciences, Catholic University of Ghana, Fiapre-Sunyani, Ghana
[2] Malaysia University of Science and Technology, School of Science and Engineering, Petaling Jaya, Malaysia

**Abstract**

Investigating and exploring factors influencing the continued usage and acceptance of mobile money transaction services in Ghana. The study employed the Technology Acceptance Model (TAM) with 406 mobile money users from Ghana's Savannah and Bono regions. According to the study, perceived risk perceived cost, social influence, perceived usefulness and ease of use had repercussions on users' attitudes which influenced users' final decision to continue to use mobile money services in Ghana. The social influence positively impacted users through social networking in pushing the adoption and continued usage of mobile money services in the study area. However, the construct of Perceived trust had a positive impact on users' decisions resulting in their negative attitude to mobile money services.

**Keywords:** Adoption, Continuous usage, Digital money, Mobile banking, Mobile money

## Background and motivation for the study

Mobile money services are becoming increasingly popular around the world as a safe and convenient way to transfer money (Luna et al., 2019) These services allow users to make payments and transfer funds electronically, often via a mobile phone. Mobile money services have been used for a wide variety of purposes ranging from paying bills, transferring money across borders, and making purchases online (Phuong et al., 2020).

Mobile money banking solutions in Ghana have been around for almost 20 years and can be considered vital in fintech industry (Ekow Kelly & Palaniappan, 2022b; Leong & Sung, 2018). The number of registered mobile money customers as of the end of 2022 stood at 55.3 million, at that same period there were 20.4 million active mobile money accounts. This account for 122 billion Ghana cedis over the same period. There were more than, 2600 million total transaction values between mobile money network operators using the interoperability platform from 12 million transactions (Bank of Ghana

report, 2021). Against this backdrop, the study is scoping on the mobile money adoption and continued usage of mobile money services in Ghana.

Continued usage of mobile money services can be encouraged by providing incentives and rewards, increasing convenience and security. Incentives and rewards could include discounts, loyalty points, or cashback when customers use the services. Improving user experience could involve developing an easier and faster payment process, a more intuitive user interface, and better customer service. Increasing convenience and security could mean offering more payment methods and verifying customer identities to protect against fraud. The World Bank and International Finance Corporation (IFC) have both issued guidelines on the use of mobile money services, which provide guidance to ensure that the services are used safely and securely. These guidelines include data protection, consumer protection, and anti-money laundering measures (IFC, 2020; World Bank Group, 2020).

The IFC has also issued a report on the potential of mobile money services to reduce poverty. The report highlights how mobile money services can facilitate financial inclusion by providing access to financial services to those who would otherwise not have access to them (IFC, 2020). The use of mobile money services has been growing steadily in recent years, and more and more people are taking advantage of the convenience and security they offer. As the use of mobile money services continues to grow, it is important to ensure that the services are used safely and securely and that the guidelines issued by the World Bank and IFC are adhered to (IFC, 2020; World Bank Group, 2020). Mobile money services continue to be used by individuals, businesses, and governments around the world. In addition to the convenience and security of mobile money services, they also offer a number of opportunities, allowing users to make payments and transfers in a matter of minutes. Also accessible, as they are available to people who do not have access to traditional banking services.

In order to ensure that mobile money services continue to be used, it is important to ensure that they are secure and reliable. Additionally, mobile money operators should also continue to offer incentives for using mobile money services, such as discounts or rewards. Finally, governments should continue to support the use of mobile money services by providing regulatory frameworks and making them more accessible to all.

### Motivation and purpose

The study examines mobile money and the upsurge in growth, factors accounting for such growth and continuous usage of mobile money services, using the Technology Acceptance Model (TAM). The number of unbanked citizens is very high in Ghana as has been the case in most developing countries (Abidin et al., 2017; Dupas et al., 2018) as a result, when there is a system that is making citizens or users develop a keen interest in the banking system at both the micro and macro levels, it is worth to examine such a phenomenon. To this, the following study questions were posed:

(a) What are the determinant factors influencing mobile money banking in Ghana?
(b) What effect do these variables have on the financial ecology of mobile money services?

## Literature review

The Technology Acceptance Model (TAM) is a widely used theoretical framework that helps to understand user acceptance of technology also in relation to understanding mobile money services acceptance and use. It has been used to examine the adoption of many technologies, such as mobile money services (Ekow Kelly & Palaniappan, 2022b; Gefen et al., 2003). TAM suggests that the attitudes of potential users towards the technology are the most important determinants of acceptance. TAM posit that users' behavioural intentions to use technology are determined by their belief of how useful the technology is and how easy it is to use (Ajzen & Fishbein, 1980).

Using TAM help mobile money service providers to understand their users' technology acceptance and usage behaviour. Measuring users' perceived usefulness and ease of use, mobile money service providers should design better products and services that meet the needs of their users (Gefen et al., 2003). Additionally, TAM help mobile money service providers to identify factors that influence the adoption and use of the services. This helps to identify any barriers to adoption and use, such as lack of trust security, and privacy also play a major role in determining users' acceptance (Ekow Kelly & Palaniappan, 2022b; Lim & Lee, 2014).

### Technology acceptance model (TAM)

Davis (1989) proposed the "TAM" as something of an offshoot Theory of Reason Action (TRA) that was also introduced by Ajzen and Fishbein (1980). Davis' idea sought to provide much more light on the problem of human conduct as in the acceptance of technology by people. The model has four major factors, "perceived usefulness, perceived ease of use, attitude towards using and Behavioural intention to use". In the field of Information Science (IS), "Perceived ease of use and Perceived usefulness" are considered as most influential factors in user's acceptance of technology which then leads to the adoption of that particular technology (Bose et al., 2017; Chen & Aklikokou, 2020).

Perceived usefulness, as seen by Davis et al. (1989), relates towards the potential individual's subjective norms that the use of an explicit system to enhance their work performance in a particular area, meanwhile "perceived ease of use" exemplifies the extent whereby the eligible user believe the system itself is effortless. The construct of the variable used from the TAM with respect to the study is demonstrated

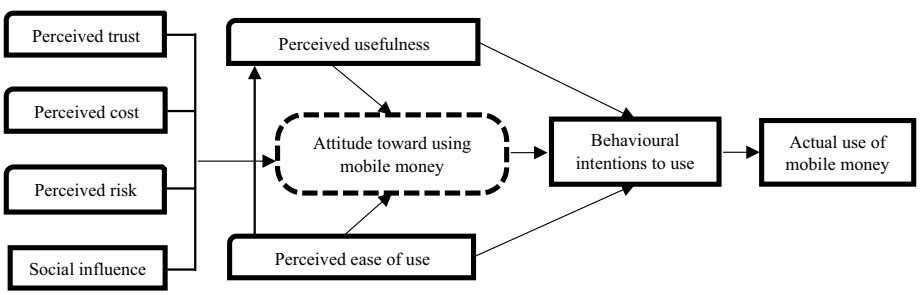


**Fig. 1** Research model from literature

in Fig. 1; this was further explained in the study. According to TAM theory, human behavioural intents to include a particular technology influence realistic human usage of that technology; in other words, behavioural intents determine the actual use of the same technology (Davis et al., 1989).

The TAM has gained widespread acceptance in the field of study for Information Science and Information Technology. However, this has been extended with another antecedent apart from the "Perceived ease of use and perceived usefulness" associated with TAM with other constructs, thus, Social influence and cognitive. To take on its name as an "extension of the TAM", this extension improved the prediction associated with perceived usefulness.

However, this study was limited in respect of not using all the constructs associated with TAM. Moreover, the use of TAM in its extended form included trust and risk, this was achieved in the study including Featherman and Pavlou (2003) and in recent times with other scholars (Hansen et al., 2018; Namahoot & Laohavichien, 2018) this has aided other researchers to advance on this model by using trust and risk in the study of technology adoption in several different fields of study.

The research model is considered from the perspective of the literature. Using Fig. 1 helps to buttress the composition of the study literature which depicts the understanding of the study literature outcome.

#### *Perceived usefulness*

This is among the most influential components of TAM theory (Davis et al., 1989). The user's attitude is right on perceived usefulness can lead to the adoption of the technology, in this case, mobile banking. Humans have a very reluctant attitude towards a change of behaviour, and they would cling to their former way of doing things, as long as that work for them. However, when there is an innovation of technology, and it is perceived to be useful in terms of its convenience and speed, Chen and Hsu (2006), in meeting the user's need, that attitude turns to skew in favour of the technology and subsequently to its adoption. A higher and positive rate for perceived usefulness turns to speed and facilitates a system's adoption.

TAM to be used in an information system within an organisational setting; this focus has not necessarily departed from its original use but has been improved to be used in other fields of Information Science despite the fact that using Information Technology (IT) has witnessed rapid growth and widespread use over the past couple of decades (Bolton and Saxena-Iyer 2009; Ekow Kelly & Palaniappan, 2022b). In addition, individual consumers use technology platforms for personal advantage, something that differs from the initial work environment in which these two concepts were employed.

#### *Perceived ease of use*

The "perceived ease of use" is yet another equally essential construct in the model of TAM, which goes hand in hand with perceived usefulness (Ekow Kelly & Palaniappan, 2022a). This has the same edge of influence on users' desire in adopting the technology. Users adopt Mobile banking not based on any experience of using or what it used to be, but the desire to choose such a level of banking based on their current need and the immediate solution available to meet that requirement (Venkatesh & Davies, 2000).

The medium of operation to meet the need for adoption is valuable. However, this study considers mobile as that intermediary, the choice of such technology must be influenced by the size of the screen, the keys to users' details, the log-in page and even how to move from one screen to the other detail as a matter of concern to the developer, as a matter fact most developers have been an edge to consider these factors seriously (Akter et al., 2019; Al-Qudah et al., 2020).

People do have a poor opinion of computer systems, the Internet, and technological devices, as per Fain and Roberts (1997), because many believe it is challenging to use. This unfavourable impression can sometimes be attributed to individual users' concern around technology, which is a relative part of life, while these studies (Bose et al., 2017) argue that it is the consequence of a user's negative attitude regarding technology and its applications.

#### *Perceived trust*

The disposition of trust in TAM was first used in the study of psychology and economics. The introduction of trust in technology has aided to understand the human perspective. The concept of trust showed that in the environment where uncertainty is either known to exist or will happen in any such ecology this was affirmed by the study of Gefen et al. (2003) to show that the Web business was influenced by the construct of trust in the transaction (Hansen et al., 2018; Singh & Sinha, 2020).

Trust, in summary, has quite a favourable effect on individual attitudes and behaviours; eventually, from other research perspectives, trust has an influence on behavioural intention, irrespective of age, academic, gender and culture, to use mobile banking (Merhi et al., 2019; Shareef et al., 2018; Sigurdsson et al., 2018). Trust is the principal factor in understanding human behaviour, trust has been studied in different fields, relating from e-commerce, information technology, and information science (Singh & Sinha, 2020; Sharma, 2019; Hansen et al., 2018). There are more than 29 types of trust identified according to Soderstrom (2009); he did categorise trust into three-set, thus; technology, organisation and person.

The perceived trust associated with organisations providing mobile banking services improves or increases the users' adoption of that service given (Namahoot & Laohavichien, 2018). This trust is to the operator and all agents associated with that operator and the service provided. User trust in a system, inclusive of a mobile bank, is not only on the trust of the device, but also the user trust extends to the trust of those who develop and manage the mobile banking system too, that their data and information which are flooded with personal data, should be guarded for the interest of the user. It is incumbent on the platform holder from which the user keeps all information and not take advantage of the user (Foroughi et al., 2019).

Trust in mobile banking services is very broad; however, it is mostly limited to the devices, applications, operators (Telecos), regulation and network infrastructure (Zhang et al., 2018). Trust encapsulates the fact that the user strongly expects that their personal data and transaction information that is primarily handled by the operators and the banks are not misused or trade-off but is kept safe (Shareef et al., 2018; Sharma & Sharma, 2019). This could be done when all the players mentioned put in appropriate measures to ensure and assume the trust needed.

#### *Perceived cost*

The cost of using mobile money services has a significant effect on users' overall adoption and usage. Users are more likely to use mobile money if the cost of transactions is transparent and predictable (Ozili et al., 2019). Individuals are more likely to use mobile money services if they perceive the cost of using the service to be low (Akhtar et al., 2020; Falk, 2020). Studies have also identified that users are more likely to use mobile money services if they perceive the cost of transactions to be lower than alternative means of financial transaction services (Akhtar et al., 2020; Ozili et al., 2019). However, higher perceived costs are likely to deter potential users (Kumar & Srivastava, 2020).

#### *Perceived risk*

A user's risk about a subject matter has a correlated effect in adopting or rejecting that technology or service (Hassan & Wood, 2020), in this instance, mobile This was first expressed by Cummingham (1967), where suggested risk is a hinge of these two factors "uncertainty and consequences" when a consumer is unsure or have no immediate and future desire or use for a product or service, that renders or determine that product cost, which was referred to as the "consequence". It is, therefore, necessary to decide on or appreciate at any point in time why a consumer will use a particular product. It is also critical to understand what factors influence a consumer's decision to carry out transactions.

There are sufficient studies on the type of risk to the determination of choice by a consumer preference; this study considered Mitchell's (1992) management decision on understanding consumer behaviour. He classified perceived risk into five categories, thus "social risk, financial risk, physical risk, performance risk, time risk, and psychological risk".

According to Ozili (2018), financial inclusion will lead to an underestimation of the risk in association with mobile payment, even in the field of aquaculture adoption of technology, increased financial risk rather than increase the price of fingerling. Physical "risk refers to the possibility" that the service delivery may endanger a user's well-being; "performance risk refers to the possibility" that perhaps the resource ordered would never be accomplished in a way that would lead to greater satisfaction, limiting potential usage of mobile payment (Mitchell, 1992). Johnson et al. (2018) have shown there is an impact on the adoption of mobile payment as applied in the areas of management control. Psychological risk is a potential real risk that the producer's decision or behaviour could have a detrimental impact on the user's sense of security or conscience. Khwaja and Zaman (2020) also asset this in their consumer information adoption research, through the domain involving mobile banking kind of an emerging economy psychological risk is also perceived to impact users' choices.

Finally, according to Wang et al. (2019), risk could be at the aggregate or disaggregate level, where aggregate categories are more risk-averse. As a result, it could be less likely to adopt as compared to the disaggregated level.

#### *Social influence*

There have been numerous studies that suggest that social influence is perceived to influence an individual's behavioural intentions to get or consume any new product or service, including mobile money banking (Park et al., 2019; Singh & Srivastava, 2020). It perceived that social influence serves as a hiding motivator to influence users in adapting to technology (Vahdat et al., 2020). This has occasioned others to see their friends and family adapt to technology as a trusted service or technology and risk-free to be associated with. This established the notion and reason behind the use of social influence in the adoption of technology. However, some studies contributed contrary to the fact that social influence does not suggest influencing other users to decide to adopt (Basri, 2018).

## The study conceptual framework and hypothesis

A conceptual framework is a research tool used to analyse and explain a particular phenomenon of interest. It is typically composed of a set of concepts, variables, and relationships that help to organise and explain the relationships between different variables. It also identifies potential areas of intervention to address a particular issue, as well as to generate hypotheses and identify potential areas of further investigation (Edwards, 2020).

Using Fig. 2, the study adopted this final model as the scope for a conceptual framework and the hypothesis is structured based on the framework.

### Users' attitudes about mobile money impact the actual use of mobile money services

The attitudes of users towards mobile money have a significant impact on their actual use of the technology. Users' attitudes can shape their willingness to adopt and use mobile money services. According to Kibrom and Gebresenbet (2015), users have a positive attitude towards mobile money, and they are more likely to use it on a regular basis. On the other hand, if users have a negative attitude towards mobile money, they may be less likely to use it.

Users' attitudes towards mobile money are often shaped by their perceptions of its security, convenience and cost-effectiveness. According to Zou et al. (2018), users who believe that mobile money is secure and convenient are more likely to use it than those who do not. Similarly, users who perceive it to be cost-effective are more likely to use it compared to those who do not. Moreover, users' attitudes towards mobile money can

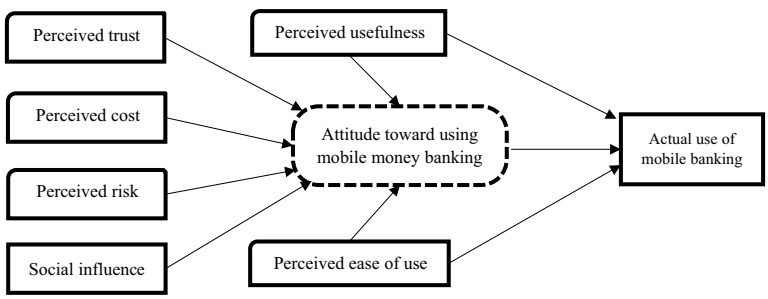


**Fig. 2** The adopted model for the study

also be influenced by their past experiences. Users who have had positive experiences with mobile money services in the past are more likely to use them in the future. On the other hand, if users have had negative experiences with mobile money services in the past, they are less likely to use them in the future (Zou et al., 2018). Users' attitudes towards mobile money can have a significant impact on their actual use of the technology. It is important for mobile money providers to understand how users perceive their services so that they can create positive experiences and ensure widespread adoption.

***Study proposition 1*** Users' attitudes about mobile money negatively impact the actual use of mobile money services.

#### The perceived ease of use impacts on actual use of mobile money services

Users of mobile money services perceived ease of use as the most important factor influencing their actual use of the services. A study, conducted in India, found that 'perceived ease of use' had a positive impact on actual use and was significantly correlated with the intention to use mobile money services (Bose et al., 2017). This was similar to those conducted in Jordan, which found that the perceived ease of use of mobile money services was a significant predictor of the actual use of the services (Al-Qudah et al., 2020). The study concluded that users who perceived the mobile money services to be easy to use were more likely to use them than those who did not.

***Study proposition 2*** Perceived ease of use positively impacts on actual use of mobile money services.

#### The perceived ease of use impact attitude of use towards mobile money

Perceived ease of use is one most determinant factors in defining the acceptance or the rejection of a technology, according to Davis (1989). Perceived ease of use is an important factor influencing the attitude of users towards using mobile money services. Studies have shown that individuals' perception of the ease of a product or service affects their attitude and acceptance of that technology (Alam et al., 2018; Qiu et al., 2018; Zhang et al., 2018). Users who perceive mobile money services as easy to use exhibit a more positive attitude towards mobile money services (Alam et al., 2018; Qiu et al., 2018). On the other hand, users who perceive mobile money services as difficult to use exhibit a more negative attitude towards mobile money services (Zhang et al., 2018).

The study by Bose et al. (2017) found that perceived ease of use positively affected users' attitudes towards mobile money in Uganda. Similarly, a study by Akter et al. (2019) found that perceived ease of use had a positive impact on users' attitudes towards mobile money in Bangladesh. Moreover, a study by Al-Qudah et al. (2020) found that perceived ease of use had a significant positive effect on users' attitudes towards mobile money in Jordan. The literature suggests that perceived ease of use has a significant positive effect on users' attitudes towards mobile money services. Consequently, it is important for service providers to ensure that their mobile money services are easy to use in order to improve user attitudes.

***Study proposition 3*** User attitudes regarding the use of mobile money services are positively influenced by the perceived ease of use of mobile money services.

#### The perceived cost impact on users' attitude towards mobile money services

The cost of mobile money services can also have an effect on user loyalty. Studies have shown that users who perceive mobile money services as expensive are less likely to stick with the same service provider than those who perceive them to be affordable (Kamau et al., 2017). In other words, users may be more inclined to switch to other providers if they perceive the cost of the service to be too high (Ozili et al., 2019).

The cost of mobile money services can have a significant effect on user attitudes and behaviours. Studies have shown that people are willing to pay a premium for the convenience of using mobile money services (Bonney et al., 2014; Mwaura et al., 2017). However, when the cost of using the service is too high, it can discourage users from using the service or make them switch to other cheaper alternatives (Akhtar et al., 2020; Ozili et al., 2019). Government policy also influences the cost of charges to be adopted by the operators in the mobile banking industries (Ekow Kelly & Palaniappan, 2022a).

***Study proposition 4*** The perceived cost of mobile banking negatively impacts users' attitudes towards the use of mobile banking services.

#### The perceptions of perceived risk impact on user attitude towards using mobile money services

The perceived risk associated with mobile money can affect the attitude of users toward this service. According to the Bank of Ghana in 2017, the most commonly reported perceived risks of mobile money include the risk of fraud, the lack of security and privacy, and the risk of losing money (Mensah et al., 2017). Similarly, other studies found that mobile money's most common perceived risks include security, privacy, and reliability (Johnson et al., 2018).

These perceived risks can lead to negative attitudes among users toward mobile money (Cummingham 1967). If a user perceives the risk of fraud or the lack of security associated with mobile money, they may be less likely to use the service. Additionally, if a user perceives the risk of losing money, they may be more hesitant to use the service and may not trust the system.

The perceived risks associated with mobile money can have a significant impact on the attitude of users toward the service. Users who perceive high levels of risk are less likely to use the service, while those who perceive low levels of risk are more likely to use it (Khwaja & Zaman, 2020).

***Study proposition 5*** The perceptions of perceived risk about mobile banking ecology positively impact user attitudes towards mobile money banking.

#### The perceived trust impact on their attitude towards mobile money services

Different studies have incorporated perceived trust as an important element towards the TAM (Al-Qudah et al., 2020; Bose et al., 2017; Qiu et al., 2018). Tseng (1999) defined the concept as a rational position regarding the perceived trust as well as assurance in an individual or system. The reason to assume the need to trust arises when there is uncertainty, risk, and fear (Singh & Sinha, 2020). The first of a bank's key tenets is the efficient flow of money across involved individuals depending on individual financial considerations (Agolla et al., 2018). This includes both extrinsic and intrinsic elements, such as customer trust with bankers plus identity verification, payment, and claims handling.

User trust in a system, inclusive of mobile banking, is not only on the trust of the device, but also the user trust extends to the trust of those who develop and manage the mobile banking system too, that their data and information and personal data, should be guarded for the interest of the user. It is incumbent on the holder of the platform from which the user is to keep all information and not take advantage of the user (Al-Tamimi et al., 2016; Casonato et al., 2018). The understanding of trust in mobile banking will influence the use, understanding, and acceptance of mobile money banking; it is shown that trust reduces the customer's need to understand, control and facilitate transaction time to complete the task to be carried out by the user (Featherman & Pavlou, 2003). According to Namahoot and Laohavichien, (2018), customers will still have behavioural intentions and take the risk of system usage when they trust the service providers.

***Study proposition 6*** The perceived trust in mobile banking services has a negative impact on users' attitudes towards using mobile banking services.

#### The perceived usefulness impact on a user's actual use

The perceived usefulness of mobile money can significantly impact users' attitudes towards it. Studies have shown a strong correlation between perceived usefulness and user attitudes. According to Ball et al. (2018) perceived usefulness of mobile money was positively associated with user attitudes, with higher perceived usefulness leading to more positive attitudes. Similarly, Castronovo and Huang (2012) found that perceived usefulness was a significant predictor of user attitudes towards mobile money, the study concluded that users with higher perceived usefulness of mobile money tend to have a more positive attitude towards it. Additionally, Lim and Lee (2014) found that perceived usefulness is a key determinant of user attitudes towards mobile money.

***Study proposition 7*** Perceived usefulness in the mobile banking ecology positively impact users' attitudes towards mobile money services.

#### The perceived usefulness positively impacts a user's attitude

When a user perceives the technology to be useful, they are more likely to have a positive attitude towards it. This is because they can see the benefits of using the technology and how it will make their lives easier. They are likely to be more motivated to use the

technology and be more likely to adopt it into their daily lives. On the other hand, if a user perceives the technology to be not useful, they are more likely to have a negative attitude towards it. They are less likely to want to use the technology and may even be resistant to using it. This can lead to a lack of adoption of the technology and can prevent its widespread use.

Therefore, it is important for technology developers and marketers to understand the importance of perceived usefulness when it comes to influencing a user's attitude towards technology. They should strive to make the technology as useful and beneficial as possible in order to get users to adopt it and have a positive attitude towards it.

***Study proposition 8*** The perceived usefulness positively impacts user's attitudes towards mobile money services.

#### Social influence impact on users' attitude toward using mobile money services

According to studies, social influence is perceived to influence a user's behavioural intentions to use or consume a new service or product from a technology perspective. It is perceived that social influence serves as a hinging motivator to influence users to adopt a technology (Park et al., 2019; Singh & Srivastava, 2020). This is an occasion as others see their friends and family adopt technology; they in turn see that as a trusted service or technology and risk-free to be associated with. This established the notion and reason behind the use of social influence in adopting technology.

***Study proposition 9*** Users' attitudes about mobile money banking services are positively influenced by social influence.

## Research methodology

The study used a quantitative method, as a result, suitable data collection and analysis strategies were used to augment its reliability. The study used Microsoft Excel to organise the data collected for this study and saved the data as comma-separated value (CSV), which was then analysed using SmartPLS of the structural equation model (SEM).

### Research approach

The study provides an in-depth exploration of the impact of mobile money banking on consumer continue usage behaviour, as well as its potential implications for the banking industry. The study also aids to uncover the social and cultural aspects behind mobile money adoption. Additionally, questionnaires were distributed to a larger sample of users to collect quantitative data related to usage patterns and preferences. Descriptive and inferential statistical analysis was used to examine the data and draw conclusions about usage patterns and preferences. Finally, a review of existing literature on mobile money banking provides additional context for the study on the continued usage of mobile money services.

### Target population

The users targeted for the study were all users of mobile money service in the regions of the Northern belt of Ghana, specifically in the regions of Tamale in the northern region and Sunyani in the Bono Region. The principal reason for selecting these regions was for demography, accessibility, cost and personnel to collect the field data for the study.

The study target population ensured that research results are accurate, reliable, and applicable to the real world. That also helps to ensure that the results are relevant to the study population, stakeholders and decision-makers. There are 20.4 million active users in the whole country; the study used a proportional percentage from the total population since the study did not get regional active users for the study regions. Using the absolute proportion from the total population, thus, $s = \frac{N}{n} =$, where N (is the total active mobile money users),n (is the total regions in Ghana) $N = 20,400,000$, $n = 16 =$ therefore $\left(\frac{20,400,000}{16}\right) = 1,275,000.$

Since, the study will be within two regions total study population will be 2,550,000. Using the sample size formula: Sample size $= \frac{\frac{Z^2XP(1-P)}{e^2}}{1+\left(\frac{Z^2XP(1-P)}{e^2N}\right)}$,

where $N =$ population size; $Z = Z-$score; $e =$ margin of error; $P =$ standard of deviation, where $N = 2,550,000$; $Z = 1.96$; $e = 0.05$; $P = 1.96$.

The final computation gives the sample size as 369 with 10% margin of error, edging the total sample size used for the study as 406.

### Data collection methods

A survey was used to randomly collect data from mobile money users in the study areas. The data were experimented with to test hypotheses and measure the impact of continued usage of mobile money services to unveil the impact and understanding of the fintech services in Ghana.

### Data analysis

The analysis of data gives the reader a clear understanding of the data from the survey perspective, and how it was analysed using SEM. The study consented to inferential analysis to buttress the essence of data on mobile money services. The study conclusions from the data, including testing for significant differences between construct and visualisation of the data to create pictorial overview and understanding of the data and study outcomes.

### Reliability and validity of study data measurement

The analysis was performed using the SmartPLS data analysis tools of SEM. There are two main constructs of variables for the subject test element considered, endogenous and exogenous variables (148). The exogenous variables for the study are "perceived ease of use, perceived cost, perceived trust, social influence, perceived usefulness and perceived risk". The endogenous factors associated with the study are attitude toward and actual use of mobile money. The analysis of the data using SmartPLS was based on the

reliability (Cronbach's Alpha, AVE, composite reliability, and rho_*A*) and the construct validity ("Fornell–Larcker criterion, Heterotrait–Monotrait Ratio (HTMT"), *R*-square ($R^2$) and *Q*-square ($Q^2$).

## Result analysis

The demography of data respondents was summarised as well as determined the internal consistency for reliability and validity of the data associated with the study model.

### Demography

The study respondent shows there was more female participant than male, representing 52.7% and 47.3%, respectively. The age group most engaged in the study were (18–27 years) representing 37.4%. Again, 72.2% of the respondents were employed. The implication of the demography indicates that mobile money services are much integrated within the social class thus; the educated community, which could be attributed to social influence and network in the adoption and continued usage of mobile money services.

Table 1 is the outcome of respondents the study depended on in the data collection.

### Internal consistency

The reliability of the study was demonstrated to positively influence users' continuous usage of mobile money services. This was achieved by verifying the factor loading on the latent values and they were greater than 0.70. This then strongly demonstrates that the convergence of the study construct was achieved to uphold the reliability of the model on the users who continue to use mobile money services. This was supported by the data consistency reliability of Average Variance Extracted (AVE) being greater than 0.50 for all constructs, also, composite reliability, Cronbach's Alpha, and rho-*A* were greater

**Table 1** Study demography

| Variable ($n = 406$) | | Frequency | Percentage (%) |
|---|---|---|---|
| Gender | Male | 192 | 47.3 |
| | Female | 214 | 52.7 |
| Age | 18–27 years | 152 | 37.4 |
| | 28–37 years | 124 | 30.5 |
| | 38–47 years | 102 | 25.1 |
| | 48–57 years | 22 | 5.4 |
| | 58 years and above | 6 | 1.5 |
| Occupation | Student | 55 | 13.5 |
| | Employed | 293 | 72.2 |
| | Unemployed | 56 | 13.8 |
| | Retirement | 2 | 0.5 |
| Academic | No formal education | 64 | 15.8 |
| | Certificate | 12 | 3.0 |
| | Diploma | 101 | 24.9 |
| | Bachelor's degree | 226 | 55.7 |
| | Master's degree | 3 | 0.7 |

**Table 2** Convergent reliability

| | Factor loadings | Cronbach's Alpha | rho_A | Composite reliability | Average variance extracted (AVE) |
|---|---|---|---|---|---|
| Actual use (ACU) | | | | | |
| ACU1 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Attitude (ATT) | | | | | |
| ATT1 | 0.965 | | | | |
| ATT3 | 0.937 | 0.923 | 0.973 | 0.944 | 0.811 |
| ATT4 | 0.939 | | | | |
| ATT5 | 0.744 | | | | |
| Perceived ease of use (PEOU) | | | | | |
| PEOU2 | 0.783 | | | | |
| PEOU3 | 0.816 | 0.788 | 0.837 | 0.850 | 0.535 |
| PEOU4 | 0.773 | | | | |
| PEOU5 | 0.847 | | | | |
| Perceived cost (PRC) | | | | | |
| PRC1 | 0.968 | | | | |
| PRC2 | 0.859 | 0.909 | 0.989 | 0.939 | 0.837 |
| PRC3 | 0.914 | | | | |
| Perceived risk (PRR) | | | | | |
| PRR1 | 0.759 | | | | |
| PRR2 | 0.876 | | | | |
| PRR3 | 0.897 | 0.854 | 0.865 | 0.901 | 0.697 |
| PRR4 | 0.800 | | | | |
| Perceived trust (PRT) | | | | | |
| PRT1 | 0.743 | | | | |
| PRT2 | 0.764 | | | | |
| PRT3 | 0.843 | 0.835 | 0.867 | 0.882 | 0.601 |
| PRT4 | 0.712 | | | | |
| PRT5 | 0.806 | | | | |
| Perceived usefulness (PEU) | | | | | |
| PEU2 | 0.824 | 0.815 | 0.892 | 0.865 | 0.566 |
| PEU3 | 0.740 | | | | |
| PEU4 | 0.719 | | | | |
| PEU5 | 0.784 | | | | |
| Social influence (SCI) | | | | | |
| SCI1 | 0.861 | | | | |
| SCI2 | 0.856 | 0.868 | 0.969 | 0.916 | 0.785 |
| SCI3 | 0.939 | | | | |

*ATT* attitude of user, *PEOU* perceived ease of use, *PEU* perceived usefulness, *PEOU* perceived ease of use, *PRC* perceived cost, *PRR* perceived risk, *PRT* perceived trust, *SCI* social influence, *ACU* actual use

than, 0.80, 0.70 and 0.80, respectively. Table 2 summarises how the various construct used for the study performed in determine the consistency and reliability of the mode used for the study.

**Table 3** Heterotrait–Monotrait correlation ratio

| | ACU | ATT | PEU | PRC | PRR | PRT | PRU | SCI |
|---|---|---|---|---|---|---|---|---|
| ACU | | | | | | | | |
| ATT | 0.345 | | | | | | | |
| PEU | 0.580 | 0.555 | | | | | | |
| PRC | 0.451 | 0.299 | 0.549 | | | | | |
| PRR | 0.694 | 0.729 | 0.590 | 0.571 | | | | |
| PRT | 0.508 | 0.614 | 0.832 | 0.539 | 0.578 | | | |
| PRU | 0.506 | 0.612 | 0.847 | 0.541 | 0.565 | 1.203 | | |
| SCI | 0.519 | 0.258 | 0.317 | 0.255 | 0.193 | 0.262 | 0.273 | |

**Table 4** Fornell–Larcker criterion

| | ACU | ATT | PEU | PRC | PRR | PRT | PRU | SCI |
|---|---|---|---|---|---|---|---|---|
| ACU | **1.000** | | | | | | | |
| ATT | 0.346 | **0.901** | | | | | | |
| PEU | 0.576 | 0.550 | **0.732** | | | | | |
| PRC | − 0.413 | − 0.278 | − 0.475 | **0.915** | | | | |
| PRR | 0.628 | 0.691 | 0.521 | − 0.508 | **0.835** | | | |
| PRT | 0.491 | 0.569 | 0.659 | − 0.473 | 0.507 | **0.775** | | |
| PRU | 0.545 | 0.569 | 0.659 | − 0.482 | 0.523 | 0.992 | **0.752** | |
| SCI | − 0.475 | 0.197 | − 0.281 | 0.190 | − 0.115 | 0.118 | 0.062 | **0.886** |

The bold values are the score root of AVE

### The validity of data

The section considers how accurately the data reflect the true or expected value. The validity of data through internal and external validity tests. It also ensures that the data are free from errors, are properly collected, and are accurately represented.

#### *The HTMT*

The demonstration of how well each construct measured variable performed in the data analysis was shown to have achieved a favourable outcome. The study is also able to compare the validity of each paired construct to determine and evaluate the convergent and discriminant validity of the measured construct to be positively correlated.

The outcome of the analysis from Table 3 the correlation between measures of the same construct should be higher than the correlation between measures of different traits. Apart from PRT and PRU all other constructs were achieved successfully and valid for study constructs. This also demonstrates the accuracy of the model used for the study and the choice of the construct. Table 3 demonstrates the HTMT for the study construct validity of the competing variables.

#### *Fornell–Larcker criterion*

The Fornell–Larcker criterion measurement was used to assess the validity of a structural equation model (SEM). It helped to identify the relevance of the construct in the

**Table 5** Endogenous construct validity using $R^2$ and $Q^2$

| | $R^2$ | $Q^2$ |
|---|---|---|
| ACU | 0.360 | 0.342 |
| ATT | 0.645 | 0.503 |

**Table 6** Direct relationship results

| Hypothesis path | β | STDEV | T-Statistics | *P* values | Results |
|---|---|---|---|---|---|
| H01: ATT → ACU | − 0.061 | 0.057 | 2.868 | 0.009 | Supported |
| H02: PEU → ACU | 0.386 | 0.115 | 3.462 | 0.000 | Supported |
| H03: PEU → ATT | 0.378 | 0.068 | 4.999 | 0.000 | Supported |
| H04: PRC → ATT | − 0.008 | 0.084 | 1.918 | 0.025 | Supported |
| H05: PRR → ATT | 0.157 | 0.107 | 5.322 | 0.000 | Supported |
| H06: PRT → ATT | − 0.032 | 0.558 | 0.433 | 0.317 | Not supported |
| H07: PRU → ACU | 0.567 | 0.140 | 2.211 | 0.014 | Supported |
| H08: PRU → ATT | 0.024 | 0.552 | 4.635 | 0.000 | Supported |
| H09: SCI → ATT | 0.344 | 0.108 | 3.172 | 0.001 | Supported |

model by examining the factor loadings of the observed variables associated with the construct.

To determine the validity of the model using the Fornell–Larcker, the average variance of the observed variables associated with the construct should be significantly greater than the average variance of the observed variables associated with other constructs. From the data analysis, as shown in Table 4, the Fornell–Larcker demonstrate that all the constructs were much needed and constructive in the model.

#### *The $R^2$ and $Q^2$*

The study used $R^2$ and $Q^2$ to determine how well the model fits the data used for the analysis and its predicted outcomes. The outcome of $R^2$ and $Q^2$ from Table 5 indicates that the model performance was achieved and the best fit in relation to the dependent construct for the study.

### The structural model

The structural model was used to show the relationships between the different constructs' functionality and impact in the study. It also shows the logical connections and interactions and the flow of information between constructs and helps analyse the stability, reliability, and performance of the study model.

To achieve the best of the study structural model, the study excluded (ATT2, PEOU1, and PEU1) as part of the measurement evaluation due to their poor performance of the factor loading (< 0.700, Henseler et al. (2016). Also, the T-statistic and *p*-values are used to evaluate the model's quality. Table 6 demonstrates the direct relationship between the various construct used for the study.

*H01* Evaluate whether user Attitude significantly impacts the actual use of mobile money. The outcome shows that users' attitude significantly impacts actual use ($\beta = 0.061$, $t = 2.868$, $p < 0.001$). Hence, H01 was supported.

*H02* Evaluate whether Perceived Usefulness positively impacts users' actual use. The outcome shows that Perceived Usefulness significantly positively impacts users' actual use ($\beta = 0.386$, $t = 3.462$, $p < 0.001$). However, H02 was supported.

*H03* Evaluate whether Perceived Usefulness has a significant impact on user Attitude. The outcome shows that Perceived Usefulness significantly impacts user Attitude ($\beta = 0.378$, $t = 4.999$, $p < 0.001$). Hence, H03 was supported.

*H04* Evaluate whether Perceived cost negatively impacts Users' Attitude. The outcome shows that Perceived cost negatively impacts user Behavioural intentions, ($\beta = 0.008$, $t = 1.918$, $p < 0.001$). Hence, H04 was supported.

*H05* Evaluate whether the Perceived risk has a significant impact on Users' Attitude. The outcome shows that Perceived risk has a positive impact on user Attitude ($\beta = 0.157$, $t = 5.322$, $p < 0.001$). Hence, H05 was supported.

*H06* Evaluate whether Perceived Trust negatively impacts Perceived usefulness. The outcome shows that Perceived Trust has significant negative impacts on Users' Attitudes ($\beta = 0.032$, $t = 0.433$, $p > 0.001$). Consequently, H06 was not supported.

*H07* Evaluate whether perceived usefulness positively impacts actual use. The outcome shows that Perceived Usefulness has a positive impact on Actual use ($\beta = 0.567$, $t = 2.211$, $p < 0.001$). Consequently, H07 was supported.

*H08* Evaluate whether there is a significant positive impact of perceived usefulness on Users' Attitude. The outcome shows that there is a significant positive impact of Perceived Usefulness on Users' Attitudes ($\beta = 0.024$, $t = 4.635$, $p < 0.001$). Hence, H08 was supported.

*H09* Was to evaluate whether Social Influences to use mobile money services positively impact Users' Attitudes. The result shows that there is a significant positive impact of Social Influence on Users' Attitudes ($\beta = 0.344$, $t = 3.172$, $p < 0.001$). Hence, H09 was supported.

## Study discussion

Mobile money services are provided by a variety of financial services providers, including banks, telecom companies, and non-bank financial institutions. The study focus was on telecom companies, thus, Vodaphone cash, MTN mobile money and Airtel/Tigo cash.

Mobile money has been shown to benefit users in a variety of ways. It has helped to increase financial inclusion, as it makes it easier for people to access financial services and make payments. It also reduces the costs associated with making payments, as compared to users supposed to physically be at a bank or other financial institution in order to make a transaction.

The study outcome shows that apart from the perceived trust which was not supported in the study, all other constructs were supported. Thus, perceived usefulness, perceived cost, perceived risk, perceived ease of use and social influence were the most contributing factors in users' continued usage of mobile money services in Ghana.

Other studies support the current study outcome but not the current composition of the study. The factor of perceived trust was an important factor in the study (Al-Qudah et al., 2020; Bose et al., 2017) which was also supported in the study. The contribution of perceived ease of use and perceived usefulness were fundamental in contributing to mobile money services. In the study of Mwape et al. (2018), perceived usefulness influenced users trust in adopting mobile money which is not the case in this study. However, perceived trust negatively influenced users attitude leading the negative continuous use of mobile money services.

#### Factors influencing mobile money acceptance from research proposition

This section considers the research proposition set for the study and how that relates to the data gathered and its effects on the proposition, with consideration from a graphical overview of the research model in Fig. 3.

The consideration under this section is to reiterate the factors that influence mobile money banking acceptance. The literature indicated that the construct attributed to users adopting mobile banking varies from country to country, and on the other hand, is different in developed and developing countries. The research model depends on the theoretical framework proposed for the study. The framework depends on the research proposition which was used to design the model. The model unveils the construct from TAM, which enhances the understanding of how users accept mobile money and their continued usage of the services, considering government policy and some security implementation to improve the services for users (Ekow Kelly & Palaniappan, 2022a).

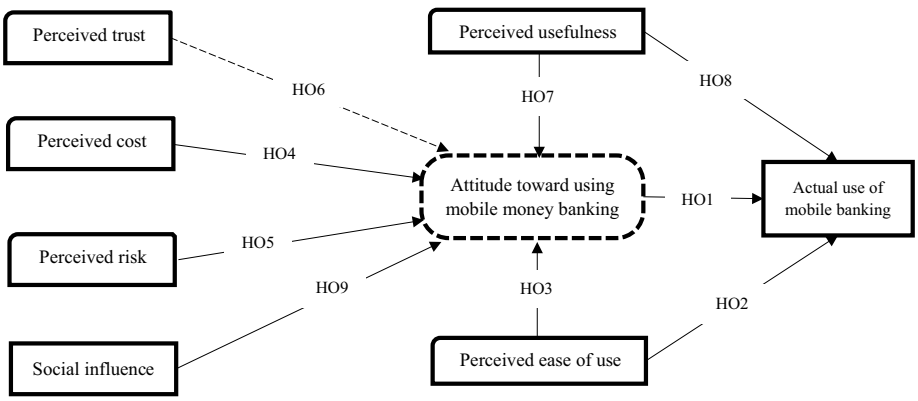


**Fig. 3** The study hypothesis outcome

#### Impact on actual use of mobile money banking

The concept of adopting and acquiring technology varies; the latter depends on the user's beliefs, and the former depends somewhat on the user's attitude regarding technology. Subsequently, these two perceptions may change with time and purpose within the consideration of the individual's interests.

User attitude significantly impacts the actual use of mobile money, as it directly affects the acceptance and adoption of this technology. According to Nandwa et al. (2019), attitudes towards mobile money services have been found to be a major determinant in the adoption of mobile money services. Specifically, the study found that perceived ease of use, perceived usefulness, perceived trust, and perceived risk all influence user attitude, and thus, mobile money adoption. Furthermore, Mwape et al. (2018) found that user attitude, including trust in the mobile money system and perceived usefulness, significantly influences the use of mobile money services. The study also found that perceived cost is a significant factor in the use of mobile money services. These findings demonstrate the importance of user attitude in the use of mobile money services and suggest that interventions aimed at improving user attitude could potentially improve the use of mobile money services and their continued usage.

The positive impact of perceived usefulness on users' actual use and perceived usefulness on user attitude has been widely established in the literature. Studies have found that when users perceive a system as being useful, they are more likely to use it (Venkatesh & Bala, 2008; Venkatesh & Davis, 2000). Venkatesh and Davis (2000) found that perceived usefulness positively influenced users' actual system use. In addition, Chen and Hsu (2006) demonstrated that the perceived usefulness of a system had a direct effect on users' actual system use.

Perceived Usefulness positively impacts Users' actual use, a study conducted by Venkatesh and Davis (2000) found that Perceived Usefulness is an important factor in predicting user acceptance and users' attitudes towards technology. The study concluded that "Perceived Usefulness is the single most important factor influencing user intentions to use a system". Additionally, according to Castronovo and Huang (2012) Perceived Usefulness significantly influenced user acceptance and continue usage. These results suggest that Perceived Usefulness is a key factor in driving user adoption and usage of digital technologies.

There is a great deal of evidence that suggests that perceived usefulness has a positive effect on users' actual use. It is likely that this positive effect stems from the fact that when users perceive a system as being useful, they are more likely to use it in order to accomplish their goals.

#### Impacts on users' attitude towards mobile money services

Perceived cost can have a negative impact on users' attitudes. When users perceive the cost of a product or service to be high, it can lead to feelings of anxiety and frustration, which can have a negative effect on their attitudes (Chaturvedi & Chaturvedi, 2018). Additionally, high perceived costs can lead to feelings of unfairness, which can also lead to negative attitudes towards a service (Li & Lim, 2018). According to the findings of Liao and Liu (2019) study conducted at the University of East Anglia, people had a more negative attitude toward a service when they perceived it to be more expensive than they

expected. These studies demonstrate that perceived cost has a negative effect on user attitudes. Perceived cost does have a negative impact on users' attitudes. This is likely due to the fact that higher prices are often associated with higher expectations and can lead to disappointment and dissatisfaction when these expectations are not met.

Perceived risk is the subjective assessment of the likelihood of risk or loss associated with a certain action (Gefen et al., 2003). It is a psychological concept defined as "the probability of experiencing a negative consequence or an undesirable outcome" (Ajzen & Fishbein, 1980). Perceived risk has a significant impact on a user's attitudes and behaviour towards a product or service (Dickson et al., 1994; Gefen et al., 2003). The perceived risk of service is too high, which could lead to negative attitudes and behaviour. Users with higher perceived risk have a more negative attitude (Gefen et al., 2003). This is because they are more risk-averse and are more likely to be concerned with security and privacy issues. This determination suggests that perceived risk can be an important factor in the decision-making process when using a service. It is therefore an important factor to consider when designing and marketing a service.

Trust does indeed have a favourable effect on a user's attitude. Trust influences attitude, irrespective of age, academic, gender and culture, to use mobile money banking (Merhi et al., 2019; Namahoot & Laohavichien, 2018; Shareef et al., 2018; Sigurdsson et al., 2018). According to Castronovo and Huang (2012), lower levels of perceived trust led to lower perceived usefulness. This effect was found to be more pronounced for products requiring a high degree of trust. From that perspective, the current study concluded that organisations should focus on increasing customer trust in order to increase perceived usefulness leading to the actual use of mobile money services. This could attribute to why it was not supported in the study.

Perceived usefulness within TAM demonstrates how the technology or system used could aid a user's performance in achieving a positive job outcome as much as necessary (Foroughi et al., 2019; Lim & Lee, 2014;). According to the current study, it is equally true that perceived usefulness has an impact on the user's attitude in the kind of decision they arrived at in adoption to technology. Countless matters interest a user in the choice of technology, one of such is the timely service rendered in response to service needed, which mobile money banking service is given to their users. However, it is also undeniable that perceived usefulness does not always have a favourable impact on user attitudes when the risks of the technology are in dispute; it may dissuade the user from approving or rejecting that technology. The study has found that the greater the perceived usefulness of the mobile money service, the more likely users are to have a favourable attitude towards it. Thus, it can be concluded that perceived usefulness has a significant impact on users' attitudes towards mobile money services.

Perceived ease of use is an important factor that influences users' attitudes towards mobile money services. The higher perceived ease of use is associated with positive attitudes towards the service, more frequent usage and more trust in the service (Mensah et al., 2017; Chen & Aklikokou, 2020; Zhu et al., 2017). Mensah et al. (2017) studied the PEOU of mobile money services in Uganda and found that users with higher PEOU had higher trust in the service, increased usage, and more positive attitudes towards it.

Similarly, Zhu et al. (2017) indicated that higher PEOU in China was associated with increased trust in the service, more frequent usage, and more positive attitudes towards it. The current study, consistently found that higher perceived ease of use is associated with more positive attitudes towards mobile money services and more frequent usage.

The study has found that individuals and businesses are more likely to use these services if the cost of use is perceived to be low. Users are less likely to use mobile money services when the cost of use is perceived to be high.

Finally, the study has shown that the use of mobile money services is increasingly being driven by social influence (Singh & Srivastava, 2020; Vahdat et al., 2020), rather than traditional financial incentives. This has been attributed to the increased availability of mobile devices, the proliferation of mobile banking and payment services, and the resulting increase in social networks.

## Conclusion

The study conclusion was cemented on the study's preliminary objectives, thus what are the factors influencing mobile money banking in Ghana and the effect these variables have on the financial ecology of mobile money services.

The study has shown that perceived usefulness is an important factor in predicting the adoption and usage of mobile money services. People who find mobile money services useful tend to be more satisfied with their experience, which in turn leads to increased loyalty and continued usage.

Users who perceive mobile money services to be easy to use are more likely to use them and become repeat customers. These users tend to have higher levels of trust in the service, as well as a better overall experience. This can be accomplished by having a clear and intuitive user interface, providing clear instructions on how to use the service, and providing customer support when needed.

Social influence plays an important role in the adoption and usage of mobile money services. Users are more likely to use mobile money if their peers, family members or close friends are already using it. This suggests that companies should leverage social influence when marketing and promoting their mobile money services in order to increase adoption and usage.

The perceived risk of using mobile money services is a major obstacle for users to adopt them. These include the potential for fraud, privacy and data security issues, user experience, and the lack of trust in the service.

The conclusion of the study of the continued usage of mobile money is that it is a beneficial payment method for both consumers and businesses. By providing and ensuring the user's confidence in perceived ease of use and usefulness and also improving on perceived risk, and cost to harmonise the social influence on using mobile money services as a convenient payment method. Mobile money has the potential to improve financial inclusion and enable access to a range of services and products. Furthermore, the use of mobile money is becoming increasingly popular, as it can be used for a variety of transactions, from shopping to bill payments. The continued usage of mobile money is an important factor in boosting the economic development of both individuals and businesses.

## Future scope of the study

Mobile money services are becoming increasingly popular and are likely to become even more widespread in the future. For purpose of the future scope of this study, we recommend other studies focusing on the use of mobile money in an investment, where users could use mobile money for stocks and bonds purchasing.

### Abbreviations

| | |
|---|---|
| ACU | Actual use |
| ATT | Attitude of users |
| AVE | Average variance extracted |
| CSV | Comma separated value |
| HTMT | Heterotrait–monotrait ratio |
| IFC | International Finance Corporation |
| IT | Information Technology |
| PEOU | Perceived ease of use |
| PEOU | Perceived ease of use |
| PEU | Perceived usefulness |
| PRC | Perceived cost |
| PRR | Perceived risk |
| PRT | Perceived trust |
| SCI | Social influence |
| SEM | Structural equation model |
| TAM | Technology Acceptance Model |
| TRA | Theory of reasoned action |

### Acknowledgements

Not applicable.

### Author contributions

AEK supervised the collection of data, analysed and interpretation of the result for the continued usage of mobile money services in Ghana. SP approved the format of the questionnaire administered, the choice of research tools and the method. Both authors read and approved the final manuscript.

### Funding

No funding supports.

### Availability of data and materials

Yes.

## Declarations

### Competing interests

The authors declare that there is no competing interest.

Received: 3 May 2022 Accepted: 16 May 2023
Published online: 25 May 2023

### References

Abidin, W. Z., Rivera, O., Maarop, N., & Hassan, N. H. (2017). Mobile payment framework for the unbanked Filipinos. In *2017 International Conference on Research and Innovation in Information Systems (ICRIIS)* (pp. 1–6). IEEE.

Agolla, J. E., Makara, T., & Monametsi, G. (2018). Impact of banking innovations on customer attraction, satisfaction and retention: The case of commercial banks in Botswana. *International Journal of Electronic Banking, 1*(2), 150–170.

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Prentice-Hall.

Akhtar, M., Ahsan, A., Rehman, F., & Khan, M. M. (2020). Understanding the role of perceived cost in the adoption and usage of mobile money services: A case of mobile banking services in Pakistan. *Journal of Retailing and Consumer Services, 53*, 102105.

Akter, S., Rahman, M. M., & Haque, M. U. (2019). Impact of perceived ease of use on attitude toward mobile banking in Bangladesh. *International Journal of Mobile Communications, 17*(4), 409–433.

Alam, M. A., Choudhury, I., & Rahman, M. S. (2018). An analysis of factors affecting customer acceptance of mobile banking services in Bangladesh. *International Journal of Bank Marketing, 36*(5), 885–900.

Al-Qudah, A. M., Al-Rawashdeh, M., & Al-Hmoud, A. (2020). Impact of perceived ease of use on customers' adoption of mobile banking services in Jordan. *International Journal of Business Analytics, 8*(2), 1–8.

Al-Tamimi, H. A. H., Lafi, A. S., & Uddin, M. H. (2016). Bank image in the UAE: Comparing Islamic and conventional banks. In *Islamic Finance* (pp. 46–65). Palgrave Macmillan, Cham.

Bank of Ghana(BOG, 2021 report) https://www.bog.gov.gh/wp-content/uploads/2022/06/AnnRep-2021.pdf.

Basri, S. (2018). Determinants of adoption of mobile banking: Evidence from rural Karnataka in India. *International Journal of Trade and Global Markets, 11*(1–2), 77–86.
Bolton, R., & Saxena-Iyer, S. (2009). Interactive services: A framework, synthesis and research directions. *Journal of Interactive Marketing, 23*(1), 91–104.
Bonney, N., Madise, N. J., & Falkingham, J. (2014). Mobile money and poverty reduction: Evidence from Kenya. *World Development, 62*, 1–19.
Bose, R., Lwasa, S., & Nakakeeto, E. (2017). The influence of perceived ease of use on users' attitude towards mobile money in Uganda. *International Journal of Mobile Communications, 15*(2), 130–150.
Casonato, F., Farneti, F., & Dumay, J. (2018). Social capital and integrated reporting: Losing legitimacy when reporting talk is not supported by actions. *Journal of Intellectual Capital*.
Castronovo, C., & Huang, L. (2012). The impact of trust on the perceived usefulness of a product. *Journal of Marketing Management, 28*(9–10), 962–979.
Chaturvedi, A., & Chaturvedi, V. (2018). Impact of perceived costs on consumer attitude: A study of two-wheeler motorcycle market in India. *International Journal of Research in Business Studies and Management, 5*(1), 6–14.
Chen, L., & Aklikokou, A. K. (2020). Determinants of E-government adoption: Testing the mediating effects of perceived usefulness and perceived ease of use. *International Journal of Public Administration*, 43(10), 850–865
Chen, Y. J., & Hsu, H. C. (2006). The effects of perceived usefulness, ease of use, and perceived risk on customer adoption of internet banking. *International Journal of Service Industry Management, 17*(1), 55–75.
Cunningham, M. S. (1967). The major dimensions of perceived risk. *Risk Taking and Information Handling in Consumer Behavior*.
Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*(8), 982–1003.
Dickson, P. R., Ginter, P. L., & Ritchie, J. R. (1994). The role of perceived risk in the quality-value relationship: A study in the Industrial products sector. *Journal of Marketing, 58*(2), 28–45.
Dupas, P., Karlan, D., Robinson, J., & Ubfal, D. (2018). Banking the unbanked? Evidence from three countries. *American Economic Journal: Applied Economics, 10*(2), 257–297.
Edwards, J. (2020). What is a conceptual framework? A step-by-step guide. Retrieved from https://www.questionpro.com/blog/conceptual-framework/.
Ekow Kelly, A., & Palaniappan, S. (2022a). The contribution of government policy and financial security control in Ghana's mobile money services. *Cogent Social Sciences, 8*(1), 2138105.
Ekow Kelly, A., & Palaniappan, S. (2022b). A Conceptual Model to Determine Factors Influencing Mobile Money Banking Adoption in Ghana. *Asian Journal of Economics, Business and Accounting, 22*(22), 187–206.
Fain, D., & Roberts, M. L. (1997). Technology vs. consumer behaviour: the battle for the financial services customer. *Journal of Direct Marketing*, 11(1), 44–54.
Falk, C. (2020). The impact of transaction costs on mobile money usage: Evidence from Tanzania. *World Bank Economic Review, 34*(2), 324–343.
Featherman, M. S., & Pavlou, P. A. (2003). Predicting e-services adoption: A perceived risk facets perspective. *International Journal of Human–computer Studies, 59*(4), 451–474.
Foroughi, B., Iranmanesh, M., & Hyun, S. S. (2019). Understanding the determinants of mobile banking continuance usage intention. Journal of Enterprise Information Management.
Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly, 27*(1), 51–90.
Hansen, J. M., Saridakis, G., & Benson, V. (2018). Risk, trust, and the interaction of perceived ease of use and behavioural control in predicting consumers' use of social media for transactions. *Computers in Human Behavior, 80*, 197–206.
Hassan, H. E., & Wood, V. R. (2020). Does country culture influence consumers' perceptions toward mobile banking? A comparison between Egypt and the United States. *Telematics and Informatics*, 46, 101312.
Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modelling in new technology research: updated guidelines. *Industrial Management and Data Systems., 116*(1), 2–20.
IFC and World Bank Group Support Expansion of Mobile Money in Myanmar." International Finance Corporation, October 15, 2020. https://www.ifc.org/wps/wcm/connect/region__ext_content/ifc_external_corporate_site/east+asia+and+pacific/news/ifc-and-world-bank-group-support-expansion-of-mobile-money-in-myanmar.
Johnson, V. L. A., Kiser, R., & Washington, R. T. (2018). Limitations to the rapid adoption of M-payment services: Understanding the impact of privacy risk on M-Payment services. *Computer and Human Behaviour, 79*(2018), 111–122.
Kamau, S. W., Mutua, J. M., & Mwaura, P. (2017). Mobile money, financial inclusion and poverty reduction in Kenya. *African Development Review, 29*(3), 223–241.
Khwaja, M. G., & Zaman, U. (2020). Configuring the evolving role of ewom on the consumers information adoption. *Journal of Open Innovation Technology, Market, and Complexity, 6*(4), 125.
Kibrom, A., & Gebresenbet, G. (2015). Factors influencing mobile money adoption in developing countries: A review of literature. *Information Development, 31*(4), 386–397.
Kumar, M., & Srivastava, S. (2020). Perceived cost of use: The role of cost-related factors in mobile money adoption and use. *International Journal of Mobile Communications, 18*(1), 18–37. https://doi.org/10.1504/IJMC.2020.109011
Leong, K., & Sung, A. (2018). FinTech (Financial Technology): What is it and how to use technologies to create business value in fintech way? *International Journal of Innovation, Management and Technology, 9*(2), 74–78.
Li, Y., & Lim, H. (2018). Price fairness in service pricing: The influence of perceived cost and value. *Journal of Services Marketing, 32*(2), 180–190.
Liao, H., & Liu, P. (2019). Price fairness and its impact on customer attitude towards service. *International Journal of Bank Marketing, 37*(4), 543–563.
Lim, S., & Lee, Y. (2014). Adoption of mobile banking: The effect of trust and perceived usefulness. *International Journal of Mobile Communications, 12*(4), 370–393.

Luna, I. R., Liébana-Cabanillas, F., Sánchez-Fernández, J., & Munoz-Leiva, F. (2019). Mobile payment is not all the same: The adoption of mobile payment systems depending on the technology applied. *Technological Forecasting and Social Change, 146*, 931–944.
Mensah, P., Amoako-Gyampah, K., Boateng, A., & Donkor, E. (2017). Understanding the use of mobile money services in Ghana: An application of the technology acceptance model. *Technological Forecasting and Social Change, 123*, 47–54.
Merhi, M., Hone, K., & Tarhini, A. (2019). A cross-cultural study of the intention to use mobile banking between Lebanese and British consumers: Extending UTAUT2 with security, privacy and trust. *Technology in Society, 59*, 101151.
V-W. Mitchell, (1992),"Understanding Consumers' Behaviour: Can Perceived Risk Theory Help?". *Management Decision, 30*(3)
Mwape, H., Chinyama, B. M., & Muzinda, A. (2018). Factors influencing the use of mobile money services: The case of Zambia. *International Journal of Mobile Communications, 16*(3), 186–202.
Mwaura, P., Mutua, J., & Kamau, S. (2017). The impact of mobile money services on poverty reduction in Kenya. *Information Technology for Development, 23*(4), 470–484.
Namahoot, K. S., & Laohavichien, T. (2018). Assessing the intentions to use internet banking: The role of perceived risk and trust as mediating factors. *International Journal of Bank Marketing., 36*, 256.
Nandwa, B. M., Chacha, M. W., & Matoke, J. (2019). Factors influencing the acceptance and adoption of mobile money services: Evidence from Kenya. *International Journal of Mobile Communications, 17*(4), 437–463.
Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review, 18*(4), 329–340.
Ozili, P. K., Okafor, C., & Kinyua, M. (2019). The determinants of mobile money adoption and usage in Kenya: An empirical investigation. *Information Economics and Policy, 49*, 46–56.
Park, J., Ahn, J., Thavisay, T., & Ren, T. (2019). Examining the role of anxiety and social influence in multi-benefits of mobile payment service. *Journal of Retailing and Consumer Services, 47*, 140–149.
Phuong, N. N. D., Luan, L. T., Dong, V. V., & Khanh, N. L. N. (2020). Examining customers' continuance intentions towards E-wallet usage: The emergence of mobile payment acceptance in Vietnam. *The Journal of Asian Finance, Economics, and Business, 7*(9), 505–516.
Qiu, Y., Xu, Y., & Li, Y. (2018). Factors influencing the customer adoption of mobile banking: An empirical study from the perspective of perceived risk. *International Journal of Bank Marketing, 36*(7), 1407–1421.
Shareef, M. A., Baabdullah, A., Dutta, S., Kumar, V., & Dwivedi, Y. K. (2018). Consumer adoption of mobile banking services: An empirical examination of factors according to adoption stages. *Journal of Retailing and Consumer Services, 43*, 54–67.
Sharma, S. K., & Sharma, M. (2019). Examining the role of trust and quality dimensions in the actual usage of mobile banking services: An empirical investigation. *International Journal of Information Management., 44*, 65–75. https://doi.org/10.1016/j.ijinfomgt.2018.09.013
Sigurdsson, V., Menon, R. V., Hallgrímsson, A. G., Larsen, N. M., & Fagerstrøm, A. (2018). Factors affecting attitudes and behavioral intentions toward in-app mobile advertisements. *Journal of Promotion Management, 24*(5), 694–714.
Singh, N., & Sinha, N. (2020). How perceived trust mediates merchant's intention to use a mobile wallet technology. *Journal of Retailing and Consumer Services, 52*, 101894.
Singh, S., & Srivastava, R. K. (2020). Understanding the intention to use mobile banking by existing online banking customers: An empirical study. *Journal of Financial Services Marketing, 25*(3), 86–96.
Söderström, E. (2009). Trust types: An overview. *Discourses in Security Assurance and Privacy, 15*(16), 1–12.
Vahdat, A., Alizadeh, A., Quach, S., & Hamelin, N. (2020). Would you like to shop via mobile app technology? The technology acceptance model, social factors and purchase intention. Australasian Marketing Journal (AMJ).
Venkatesh, V., & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences, 39*(2), 273–315.
Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science, 46*(2), 186–204.
Wang, T., Bhuiyan, M. Z. A., Wang, G., Qi, L., Wu, J., & Hayajneh, T. (2019). Preserving balance between privacy and data integrity in edge-assisted Internet of Things. *IEEE Internet of Things Journal, 7*(4), 2679–2689.
Zhang, T., Lu, C., & Kizildag, M. (2018). Banking "on-the-go": examining consumers' adoption of mobile banking services. *International Journal of Quality and Service Sciences., 10*, 279.
Zhu, D. H., Lan, L. Y., & Chang, Y. P. (2017). Understanding the Intention to Continue Use of a Mobile Payment Provider: An Examination of Alipay Wallet in China. *International Journal of Business and Information*, *12*(4).
Zou, Y., Wei, M., & Li, Y. (2018). Investigating user attitudes and acceptance of mobile payment: An empirical study. *International Journal of Information Management, 38*(1), 73–82.

## Publisher's Note