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Mobile Banking Adoption among the Ghanaian Youth

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ABSTRACT

This paper examines the behavioral intentions of Ghanaian youth toward mobile banking as a service delivery channel. Relying on the Technology Acceptance Model (TAM) and Innovation Diffusion Theory (IDT), the study further investigates the factors that influence the intention of individuals to adopt mobile banking. A questionnaire-based survey was conducted on business students from a large public university in Ghana and a total of 517 valid responses from the respondents were used in the empirical analysis. The hypothesized relationships were analyzed using the Structural Equation Modeling technique. Results of this study demonstrate that perceived ease of use, perceived usefulness, relative advantage, and complexity are the key predictors of intentions to adopt mobile banking technology in Ghana. Moreover, the results demonstrate that complexity has a positive influence on perceived ease of use while relative advantage was also found to impact positively on perceived usefulness. Taken together, these results confirm the applicability of the TAM and IDT models in predicting technology adoption in different contexts.

KEYWORDS

Mobile banking adoption; technology acceptance model; innovation diffusion theory

Introduction

In contemporary times, mobile phones have evolved from the basic purpose of communication and social media interaction to a medium for transforming lives and conducting businesses (Deloitte, 2012). One sector within the business landscape whose activities have been shaped significantly by the evolutionary use of mobile phones is the banking sector. Many banking institutions indeed have invested substantially in mobile application-related technologies over the years and have relied on this channel as a means of providing better and efficient service to their customers in a more convenient way. While the contributions of earlier innovative delivery channels including automated teller machine (ATM), internet banking have been acknowledged in the literature, it is without doubt that advances in mobile technologies and devices have revolutionized the banking sector particularly in the area of service delivery (Safeena, Date, Kammani, & Hundewale, 2012; Schierholz & Laukkanen, 2007; Shaikh & Karjaluo, 2015).

In today's world, individuals can conduct banking transactions and gain access to a wide range of banking services including; checking account balances, management of accounts, funds transfers, payment of bills, purchasing investment products, international remittance among others at one's own convenience with a mobile phone (Gu, Lee, & Suh, 2009; Jacob, 2007; Schierholz & Laukkanen, 2007). Hitherto, these services could only be accessed upon a visit to a branch (branch banking). As a delivery channel, mobile banking has been found to offer faster and a more convenient way of rendering services than the traditional branch banking and the other delivery modes such as the ATM (Safeena et al., 2012; Schierholz & Laukkanen, 2007).

Due to its service potential as a delivery channel, significant amount of research attention has been devoted to the concept of mobile banking in recent times. A host of related issues such as the risks involved, people's attitudes toward adoption, the difficulties with the adoption, the merits that they offer to the sector (both to the client and the bank) have been explored by existing studies (Luarn & Lin, 2005; Ndubisi & Sinti, 2006). However, a major focus for most existing studies has been on users' willingness to adopt the mobile banking technology and the factors that influence mobile banking adoption (Glavee-Geo et al., 2017; Lin, 2011; Karjaluoto et al., 2010; Shaikh & Karjaluoto, 2015). The surge in research interest in this area in part has been motivated by the fact that despite its perceived benefits as a delivery channel and notwithstanding the growth in mobile phone subscription base globally, the adoption of mobile banking technology is not as widespread as expected (Munoz-Leiva, Climent-Climent, & Liébana-Cabanillas, 2017; Shaikh & Karjaluoto, 2015). As argued by some studies (Afshan & Sharif, 2016; Ivatury & Mas, 2008; Shaikh & Karjaluoto, 2015) the traditional branch-based banking still remains the most preferred method to the virtual forms of banking among consumers despite its availability and convenience.

From the literature, several factors including, ease of use, perceived usefulness, trust, social influence, perceived risk, compatibility, cost, etc., have been found to be associated with the mobile banking adoption decision mostly from developed countries' perspective (Chong, Chan, & Ooi, 2012; Kim, Shin, & Lee, 2009; Laforet & Li, 2005; Mortimer, Neale, Hasan, & Dunphy, 2015). However, it has been argued that the adoption of a mobile technology does not follow a universal pattern (Bankole, Bankole, & Brown, 2011) and that cultural differences may affect the use and adoption decision. As Sheng, Wang, and Yu (2011) point out, the culture of a people is very crucial in the adoption of any technology or innovation which presupposes that context matters in the adoption of a technology. Thus, the factors that drive mobile banking adoption may differ based on context. This view provides a motivating basis to investigate mobile banking within a different cultural context although it has been investigated in other parts of the world.

The present study offers some perspective on the mobile banking adoption discourse from the Ghanaian setting by investigating the intentions of some Ghanaians toward mobile banking adoption and the factors that drive such intentions. The evidence we provide is relevant to the mobile banking literature in several ways. First, notwithstanding the fact that mobile phone penetration rate in Africa is one of the highest in the world and the most widely used in terms of communication technology (ITU, 2007), empirical studies on mobile banking adoption is scant compared with other jurisdictions. Second, this study unlike some of the existing studies from the African setting (Bankole et al., 2011; Baptista & Oliveira, 2015) focused on the behavioral intentions of the youth toward

mobile banking technology. Given that the younger generation has been described as extensive users of mobile devices and internet as well as early adopters of mobile-related technologies (Fife & Pereira, 2003; Kumar & Lim, 2008), an exploration of their intentions toward mobile banking adoption may be useful in contextualizing some of the findings in prior studies. Compared with the youth, it is believed that matured consumers are usually laggards in the adoption of new technologies and hence, may have preference for face-to-face banking services (Mattila, Karjaluoto, & Pentto, 2003). The youth therefore represents an ideal population group for studies on the adoption of new technological innovations such as mobile banking.

Third, the country Ghana provides an interesting setting for a study of this nature in some respect. Internet usage in Ghana has increased over the years with an increase in the number of users who access the internet with their phones. A survey by Mobile Africa (2015) reveals that 51% of Ghanaians have access to the internet through their phones (<http://blog.geopoll.com/mobile-usage-africa>). Notwithstanding the fact that a large proportion of the population have access to internet on their mobile phones, mobile banking technology is highly underutilized in Ghana (Woldie, Hinson, Iddrisu, & Boateng, 2008). There is therefore a heavy reliance on branch banking as compared to other virtual forms of banking (like mobile banking) resulting in long tiring queues in most banking halls. Findings of this study will therefore contribute substantially to literature on why consumers do not patronize virtual forms of banking as frequently as the traditional delivery channels.

The remaining sections of the paper are organized as follows: the next section contains the literature review and hypotheses development followed by the methodology section. The subsequent section discusses results based on the research framework followed by concluding remarks.

Literature review

Evolution of delivery channels in banking services

The prime concern for banks is to serve their customer base efficiently whilst increasing profits and maintaining a competitive advantage. In a bid to remain competitive, service delivery in the banking sector has undergone major structural changes and has evolved over time with a motive of quality service improvement. Information technologies have been used to further this agenda of banks and which has resulted in the introduction of new and improved delivery channels that are more user-friendly to better serve the clientele base (Akinci, Aksoy, & Atilgan, 2004).

In the past, branch banking was predominantly the primary distribution channel in the delivery of banking services. Plagued by challenges including long tiring queues, inconvenience in service consumption and high transaction costs, there was an incentive to revolutionize the service delivery channels for the development of more effective distribution channels (Mols, Bukh, & Nielsen, 1999). Notwithstanding the challenges mentioned, branch banking remains an important means of serving many segments of the clientele base (Devlin, 1995). However, the pursuit of a more effective distribution channel has led to the reliance on technological infrastructure in banking service delivery innovations (Sohail & Shanmugham, 2003).

As a means of improving service delivery, electronic banking premised on technological infrastructure was developed and introduced. Defined as the provision of information or services by a bank to its customers, via an electronic platform (Daniel, 1999), its purpose was among others to provide convenience, security, privacy, time and effort savings, and easy access to financial transactions in the banking industry (Schierholz & Laukkanen, 2007). The evolution of electronic banking began in the early 1970s with the introduction of the credit/debit card, Automatic Teller Machine (ATM) networks, etc. Subsequently, telephone and Personal Computer banking emerged followed by the introduction of Internet banking which provided clients the opportunity to gain access to their bank account in the comfort of their homes or office.

While the introduction of electronic banking has been of enormous benefit to the banking sector, concerns have been raised especially about the associated cost in accessing the service. The usage of the ATM and Internet banking, for instance, has been found to be expensive in terms of transaction cost to the customer and maintenance fees by the banks (Giannakoudi, 1999). The introduction of mobile banking was therefore recognized as a useful attempt not only to address some of the afore-mentioned challenges but also to provide a more convenient platform to serve the masses.

The concept of mobile banking

Mobile banking has been defined as “a channel whereby the customer interacts with a bank via a mobile device such as a smartphone or a personal digital assistant” (Barnes & Corbitt, 2003, pg 275). It is simply known by many as a platform for conducting banking transactions through a mobile device. It is therefore as an extension of internet banking through a mobile device with some peculiar features for its usage (Brown, Cajee, Davies, & Stroebel, 2003). As a service delivery channel, mobile banking offers a convenient way of conducting a wide array of services including checking of account balances, monitoring account and the usage of credit and debit cards, invoice payment (both domestic and international), buying and selling orders for the stock exchange as well as price information (Laukkanen & Pasanen, 2008). It has provided a means for individuals to be in full control of their bank accounts thereby improving customer satisfaction while minimizing the cost of services to the banks (Koksal, 2016).

Despite its perceived benefits to the financial sector and the potential to bring banking services to the doorsteps of customers, mobile banking technology is yet to receive the much needed acceptance as a delivery channel in many parts of the world especially in Africa. Thus, notwithstanding the fact that mobile phone penetration rate in Africa is one of the highest in the world (ITU, 2007), the adoption of mobile banking technology is not as widespread as expected. While the unwilling nature of consumers to switch to newer technologies is largely associated with mobile-related technologies like mobile banking, Rouse (2017) argues that context plays a key role in the adoption decision of individuals when it comes to mobile banking. For instance, most Sub-Saharan African countries turn to be averse toward a cashless economy and usually would prefer to conduct transaction with physical cash and hence, would naturally oppose technologies that promote a cashless system (Lin, 2011). This is in sharp contrast with most developed countries where the usage and adoption rate of mobile-related technology is very high (Porteous, 2006).

Determinants of mobile banking adoption

Rogers (2003) defines adoption as a decision to make full use of an innovation. Studies on the determinants of technology adoption are vast and have often been based on theories on technology and innovation. The next section discusses some of the dominant theories that have been applied to technology adoption studies in general and mobile banking technology in particular.

Theoretical review

Among the several theoretical frameworks that have been used in investigating the adoption of technology or innovation, the Technology Acceptance Model (TAM), Innovation Diffusion Theory (IDT), Unified Acceptance Theory and Use of Technology (UTAUT) have been the most widely used. Within the context of mobile banking literature, however, most existing studies have often employed the TAM framework in explaining the dominant factors that predict users' intention to adopt mobile banking (Luarn & Lin, 2005; Karjaluoto et al., 2010, Koenig-Lewis, Palmer, & Moll, 2010; Tobbin, 2012). Developed by Fred Davis (Davis, 1989), TAM traces its roots from the Theory of Reasoned Action (TRA) and The Theory of Planned Behavior and basically posits that the intention to accept and use an innovation or technology is explained by two beliefs: "perceived usefulness" and "perceived ease of use" (Davis, 1989). Thus, from the perspective of the TAM, consumers' intention to use and adopt an innovation or technology is dependent on the ease of use of that innovation and the usefulness thereof.

Despite its strengths, TAM has been criticized for being too narrow a model in explaining users' attitude and behavioral intentions toward mobile banking adoption (Venkatesh & Davis, 2000). As argued by Nysveen et al., (2005), TAM completely ignores the relevance of cost in explaining technology adoption. For an innovation that requires internet accessibility for its use, users or potential users will incur some cost in some shape or form; hence, cost consideration cannot be completely ignored. Despite the criticisms of TAM, it has been used in many empirical studies and has been tested to be reliable and produces statistical results of good quality (Legris, Ingham, & Collette, 2003).

Closely related to the TAM framework is IDT which postulates that users' adoption of a technology is determined by relative advantage, observability, trialability, compatibility, and complexity (Rogers, 2003). Studies that have used this model in their investigations include (Kim et al., 2009; Lin, 2011; Ramdhony & Munien, 2013; Saeed, 2011). Among the five constructs that define the IDT, empirical studies have found relative advantage and complexity to be the most relevant in predicting the adoption of an innovation on a consistent basis (Al-Jabri & Sohail, 2012; Karjaluoto, Riquelme, & Rios, 2010; Lin, 2011; Mattila et al., 2003; Pikkarainen, Pikkarainen, Karjaluoto, & Pahlila, 2004; Venkatesh & Davis, 2000).

It has been suggested that TAM and IDT complement each other. For instance, relative advantage has an important association with the factor "perceived usefulness" whereas complexity is also believed to impact negatively on "perceived ease of use" (Moore & Benbasat, 1991). Again like the TAM, IDT considers the behavioral process in explaining factors that influence adoption of a technology or innovation

(Bhattacharjee, 2000). Therefore, this study relies on both the TAM and IDT as the theoretical foundation in developing the research model and the main hypotheses for the study. Additionally, two external factors: perceived cost and perceived risk are added since prior studies have found them to be particularly useful in enhancing the prediction of adoption and usage of an innovation (Lucas & Spitler, 2000; Szajna, 1996). The proposed framework for the study is shown in Figure 1.

Hypothesis development

Based on the framework, eight major hypotheses are developed as follows:

Perceived ease of use (PEOU)

PEOU refers to “the degree to which a user believes that using a particular service would be free of effort” (Davis, 1989). Effort according to Radner and Rothschild (1975) refers to a finite resource that an individual may allocate to various activities for which he/she exercises oversight responsibility. From the perspective of users’ acceptance and adoption of technology literature, PEOU describes the extent to which a user believes using a particular technology system would be without serious difficulties. The general view is that the extent of adoption of a particular technology is likely to be high among users when it is easier to use that technology compared with another. Thus, the likelihood of acceptance of a technology is high when users perceive it to be easier to use than another.

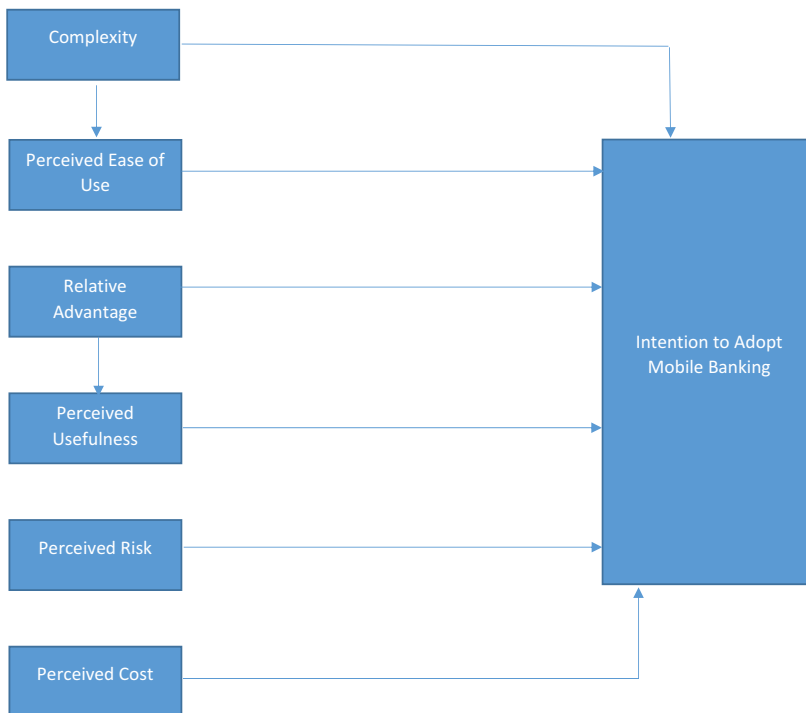


FIGURE 1. Proposed Framework.

Specific to the mobile banking adoption literature, empirical studies (Gu et al., 2009; Hanafizadeh, Behboudi, Koshksaray, & Tabar, 2014; Karjaluoto et al., 2010) have found the ease of use to be important predictor of users' intention to adopt mobile banking. As surmised by Hanafizadeh et al. (2014) the relevance of ease of use is not limited only to the adoption of technology but most importantly, it also affects the long-term usage of a technology as well.

This study therefore hypothesizes that

H1: Perceived ease of use will lead to higher behavioral intention to adopt mobile banking

Perceived usefulness (PU)

The perception of users regarding the usefulness of a technology is also believed to be a relevant factor that influences the adoption decision of users. PU measures the extent to which an individual perceives that using a particular system or technology would enhance his/her job performance (Liu & Li, 2010). From the perspective of TAM framework, PU is explained to mean the prospective user's subjective probability that adopting a specific application system will enhance his/her job performance within an organizational context (Davis, 1989). Aldás-Manzano, Lassala-Navarré, Ruiz-Mafé, and Sanz-Blas (2009) accordingly explain PU within the mobile banking context to mean the perceived benefits that mobile banking provides to users in performing financial transactions. The argument is that the extent to which an individual perceives something to be useful directly influences the attitude toward its use and subsequently the intention to use. Extant literature provides empirical support that PU plays a major role in mobile banking adoption decisions of people. Gu et al., (2009) for instance found PU to be the most important factor that influences the behavioral intention of people toward mobile banking adoption. Many other existing studies have shown that perceived usefulness have a direct significant influence on behavioral intention to use a particular online technology (Karjaluoto et al., 2010; Mohammadi, 2015). This study therefore proposes that

H2: Perceived usefulness has a positive effect on intention to adopt mobile banking

Perceived complexity

Rogers (1995) defined complexity as the extent to which an innovation is perceived as relatively difficult to understand and use. In terms of the adoption decision of individuals of any innovation, the conventional wisdom is that the intention to adopt is high when such innovations come with user-friendly interfaces. Complexity is therefore believed to be inversely related to an individual's intention to adopt new technologies. Studies on mobile banking adoption suggest user's intention to adopt mobile banking could be negatively affected if they find the application to be very technical, time-consuming, and unfriendly (Lee, McGoldrick, Keeling, & Doherty, 2003). Complexity, however, has been found to be related to the construct "perceived ease of use." Karjaluoto et al. (2010) for instance argue that the level of complexity of mobile banking applications will be lower for users who are well versed with mobile phones and suggest that such users will

experience minimal difficulties in using mobile banking. Invariably when the perception of complexity is low the perception of ease of use is likely to be high. Thus, we hypothesize that

H3: Complexity will lead to a lower behavioral intention to adopt mobile banking.

H4: Complexity will lead to a lower perceived ease of use.

Perceived relative advantage (RA)

Relative advantage refers to whether the innovation is perceived to be superior to the product or service from which it evolves (Karjaluoto, Laukkanen, & Kiviniemi, 2010). It is a measure of the extent to which a particular innovation is perceived to be more beneficial than its precursor and usually manifested in a form of improved efficiency, enhanced status, and improved economic benefits (Lin, 2011). As argued by Ram and Sheth (1989) if the performance of an innovation does not have competitive advantage over substitutes, then there will be no motivation to switch to the innovation. Again, Lee et al. (2003) affirm that users are more prone to adopt a new technology when they perceive that it offers a relative advantage over an existing one. Compared with other delivery channels, mobile banking offers more convenient and quicker means of banking than the traditional offline banking. According to Lin (2011) when customers can perceive the advantages offered by mobile banking the intention to adopt is usually high. While Liu and Li (2010) found relative advantage to be very influential in predicting the intention to adopt and use a particular innovation, they further argue that relative advantage may also influence the “perceived usefulness” factor. Based on the above arguments we hypothesize that:

H5: Relative Advantage will lead to a higher behavioral intention to adopt mobile banking

H6: Relative Advantage will lead to a higher perceived usefulness.

Perceived risk (PR)

An individual’s perception of risk plays a key role in the adoption of a new technology. Featherman and Pavlou (2003) consider perceived risk as the potential for loss in the pursuit of a desired outcome of using an e-service. Aldás-Manzano et al. (2009) argue that new products in their nature contain risks that increase resistance to adoption. It has been acknowledged in the literature that the risk factor is critical to applications that utilize mobile services partly due to the fact that mobility increases the threat to security (Hanafizadeh et al., 2014). From the perspective of banking, the risks associated with online and mobile banking are perceived to be higher than conventional banking channels (Yousafzai, Pallister, & Foxall, 2003). Where the perception of risk is high the motivation to adopt a mobile banking technology is expected to be low. Perceived risk may therefore be negatively associated individual’s behavioral intention to adopt mobile banking. As pointed out by Hanafizadeh et al. (2014), the higher the risk of using a new

technology the lower the willingness to adopt that technology for use. We therefore propose that

H7: Perceived Risk has a negative influence on behavioral intention to adopt mobile banking:

Perceived cost (PC)

The cost associated with the adoption and usage of a new technology may also be an important predictor of users' intentions to adopt the technology. These costs may include subscription charges, transactional cost, switching cost, etc., which must be borne by the user of the new technology. The adoption of mobile banking technology like all forms of mobile technologies usually come with some associated costs such as usage charges. When individuals perceive the cost associated with adopting mobile banking services to be high compared with the traditional system of banking, the willingness to switch to mobile banking will be low. Many studies attest to the fact that perceived costs could be a barrier to the adoption of mobile banking (Dahlberg, Mallat, Ondrus, & Zmijewska, 2008; Hanafizadeh et al., 2014; Luarn & Lin, 2005). Hence, this study proposes that:

H8: Perceived cost will lead to lower behavioral intention to adopt mobile banking.

Mobile banking in Ghana

Mobile banking was introduced in Ghana by one of the telecommunication giants in Ghana MTN (Tobbin, 2012). As a concept, mobile banking has evolved over the years from an unfamiliar mode of banking to one of the contemporary means of banking available to serve clients. Notwithstanding the spike in exposure, the usage is still confined to particular groups of people or geographical locations. With increasing mobile phone penetration and internet usage within the country, the expectation is that mobile banking adoption would have been widespread due to its numerous advantages. However, the unfortunate reality is that mobile banking technology is highly underused in Ghana (Woldie et al., 2008).

A few studies have investigated the concept of mobile banking within the Ghanaian context. Crabbe et al., (2009), for instance, found perceived usefulness as the most important factor that affects user adoption of mobile banking amongst non-users in Ghana. This study, however, found an insignificant relationship between perceived ease of use and adoption decision. It was interestingly not a factor that influenced adoption. Other predictors of adoption include perceived credibility, individual differences, previous banking experience, and sustained usefulness.

Tobbin (2012) assessed the level of awareness of mobile banking among a section of rural dwellers in Ghana and also sought to ascertain if mobile banking was the way out in bringing financial services to the unbanked. While the level of awareness of mobile banking was found to be very low among the participants, the study concludes that it provides a useful platform to extend financial services to bank the unbanked. Additionally, this study found perceived usefulness and perceived ease of use, economic factors, and trust as the main predictors of mobile banking adoption. Perkins and Annan

(2013) also found government support, trust, and security to be relevant to mobile banking adoption decision in addition to perceived ease of use and perceived usefulness. A notable trend amongst the papers that have investigated mobile banking adoption within the Ghanaian setting is that most studies found perceived ease of use and perceived usefulness to be important predictors of mobile banking adoption.

Methodology

Research design and instrument

A quantitative survey approach was employed for this study and for data collection purposes, a questionnaire was used to elicit responses from the respondent group. The questionnaire was divided into two sections. Section one consisted of questions on the demographic characteristics of the respondents. The second part of the questionnaire sought respondent's views on their intention to adopt mobile banking and the factors that drive mobile banking adoption among the youth. A Likert scale with anchors ranging from 1 (strongly disagree) to 7 (strongly agree) was used to determine responses from the respondents and the questions used closely correspond with that employed in many existing studies (Davis, 1989; Hanafizadeh et al., 2014; Karjaluoto et al., 2010; Luarn & Lin, 2005). Details of the specific questions used to assess respondents' views on the factors that influence adoption of mobile banking as well as the intention to adopt mobile banking are provided in the appendix.

Respondents

Respondents for this study were chosen from a business school in a large public university in Ghana. The study focused on undergraduate students as the younger generation are known to be early adopters of mobile technologies (Karjaluoto et al., 2010). A total of 600 questionnaires were administered at classroom sessions during the first semester of the 2017/2018 academic year. However, 517 valid responses were used for data analysis purposes. Profile details of the respondents can be found in [Table 1](#).

Data analysis

Demographics

The sample population was fairly distributed in terms of gender though slightly dominated by the males in proportion. Majority of the respondents were accounting students followed by finance, marketing, and Human Resource. This follows the natural pattern of student population size for the various departments within the Business school, an indication that the sample size is a true representation of the population. With respect to bank Account Holder Status, over two-thirds of the students had bank accounts while majority of the students (92.1%) are smartphone users. This is an indication that majority of the students who have bank accounts also have smartphones and hence, are good samples for studies on mobile banking adoption.

TABLE 1. Profile of the Respondents.

| Measure | Item | Frequency | Percentage (%) |
|------------------------|-----------------------|-----------|----------------|
| Gender | Male | 283 | 54.7 |
| | Female | 234 | 45.3 |
| Age | 17–20 | 297 | 57.4 |
| | 21–25 | 211 | 40.8 |
| | 26–30 | 5 | 1.0 |
| | 31–35 | 4 | 0.8 |
| | | | |
| Major | Accounting | 223 | 37.2 |
| | Finance | 191 | 31.9 |
| | Human Resource | 29 | 4.8 |
| | Public Administration | 17 | 2.8 |
| | Marketing | 57 | 9.5 |
| Level | First Year | 65 | 12.6 |
| | Second Year | 133 | 25.7 |
| | Third Year | 193 | 37.3 |
| | Final Year | 126 | 24.4 |
| Account Holder Status | Account-Holder | 455 | 88.0 |
| | Non-Account Holder | 62 | 12.0 |
| Smartphone User Status | Smartphone User | 475 | 91.9 |
| | Not a smartphone User | 42 | 8.1 |

Descriptive statistics on constructs

An analysis of the respondents' views on the various constructs for this study is presented in Table 2. The overall mean for the construct Behavioral Intention was 5.00 an indication that the willingness to adopt mobile banking by the students is high. Also, 'perceived ease of use' and 'perceived usefulness' had mean scores of 5.30 and 5.56, respectively. These results demonstrate that the respondents highly rated the indicators that described mobile banking technology as not too difficult to use and also agreed that mobile banking provides some benefits to users. These findings are also supported by the respondents' ratings of the relative advantage construct (mean = 5.20) and 'complexity (mean = 3.54). Thus, not only do the respondents view mobile banking to be important in their life as compared to other delivery channels but also believe mobile technology is not too complex to use. The overall mean for the construct 'perceived cost' was 3.42 which suggests the respondents do not generally view the adoption of mobile banking to be costly. With a mean score of 4.43 for the construct 'perceived risk,' it could be concluded that most respondents generally believe there could be some risks associated with mobile banking technology. Results of the skewness and kurtosis tests generally suggest the data is normally distributed as the values for all the indicators of the various constructs fall within the recommended ± 2 threshold (George & Mallery, 2010).

Statistical analysis technique

The Structural Equation Modeling (SEM) technique was employed to examine the relationship among the constructs. SEM provides a platform to test and validate relationship and enables researchers to more effectively evaluate measurement models and structural paths involving multiple dependent variables and latent constructs with multi-item indicator variables (Astrachan, Patel, & Wanzenried, 2014). The Covariance Based SEM (CB-SEM) was used in the study and the structure model was tested using version 21 of Analysis of Moment Structures (AMOS) software. A two-stage approach involving

TABLE 2. Mean, Standard Deviation, Kurtosis, and Skewness Statistics.

| Construct | Mean | Standard Deviation | Kurtosis | Skewness |
|--|-------------|--------------------|----------|----------|
| Behavioral Intention | 5.00 | | | |
| When I have banking to do, it is likely I would use mobile banking | 4.39 | 2.095 | -1.222 | -.285 |
| To the extent possible, I would take advantage of Mobile banking for my banking activities | 5.00 | 1.873 | -.658 | -.691 |
| Perceived Ease of Use | 5.30 | | | |
| Learning to use Mobile banking would be easy | 5.29 | 1.737 | .271 | -1.042 |
| I think it would be simple for me to become skilled at using Mobile banking | 5.35 | 1.743 | .369 | -1.088 |
| I find my interaction with Mobile banking clear and understandable | 5.26 | 1.7175 | .015 | -.901 |
| Perceived Usefulness | 5.56 | | | |
| Mobile banking would be useful for conducting banking transactions | 5.58 | 1.646 | 1.179 | -1.347 |
| Mobile banking would improve my performance in conducting banking transactions | 5.39 | 1.668 | .364 | -1.073 |
| Mobile banking would make it easier to conduct banking transactions | 5.60 | 1.591 | 1.267 | -1.354 |
| Using Mobile banking would enable me accomplish tasks more quickly | 5.66 | 1.626 | 1.173 | -1.377 |
| Perceived Cost | 3.42 | | | |
| It would cost a lot to use mobile phone banking | 3.21 | 1.901 | -.820 | .554 |
| I think that the internet access cost of using mobile phone banking would be high | 3.62 | 1.813 | -.952 | .258 |
| Perceived Risk | 4.43 | | | |
| I feel that conducting my banking business on my mobile phone would be secured | 4.41 | 1.820 | -.905 | -.290 |
| I know that mobile phone banking will handle my business correctly | 4.44 | 1.659 | -.695 | -.272 |
| I feel that conducting my banking business on my mobile phone would be safe | 4.44 | 1.770 | -.870 | -.276 |
| Relative Advantage | 5.20 | | | |
| Use of mobile banking can increase the effectiveness of my work/study/ life tasks | 5.14 | 1.636 | .198 | -.926 |
| Overall, I find mobile phone banking useful in my daily life | 5.22 | 1.657 | .111 | -.893 |
| Overall, I find using mobile banking to be advantageous in my life | 5.23 | 1.669 | .195 | -.962 |
| Complexity | 3.54 | | | |
| Mobile Banking requires a lot of mental effort | 3.39 | 1.857 | -.991 | .342 |
| Mobile Banking requires a lot of technical skills | 3.69 | 1.875 | -1.020 | .178 |

Measurement model and Structural Model as recommended by many existing studies (Gu et al., 2009; Hanafizadeh et al., 2014; Karjaluoto et al., 2010) was adopted.

Measurement model

The measurement model represents the first stage in the CB-SEM analysis process. Being the preliminary stage, the model was subjected to a Confirmatory factor analysis (CFA) to check the overall fitness of the research instrument by validating the respective factor loadings, model fit, reliability, validity, and normality. The CFA results are presented in Tables 3 and 4. Except for three indicators (PEOU2, COMP2 & PC3) which loaded poorly on their respective constructs¹ all the indicators met the recommended threshold. By relying on the fit indices: RMSEA, TLI, CFI, TLI, NFI, and CMIN/df as recommended by Byrne (2010) and Hair et al., (1998), the results as shown in Table 3 confirm that the overall model fit for the measurement model was appropriate and within the recommended ranges.

¹These indicators had factor loadings below 0.5 and hence were deleted from the model.

TABLE 3. Model Fit Indices for Measurement Model.

| Fit Indices | Accepted Values | Model Results | Remarks |
|---|--------------------------------|---------------|---------|
| Parsimony Normed Fit Index (PNFI) | > 0.5 Mulaik et al., (1989) | 0.674 | Good |
| Root Mean Square of Approximation (RMSEA) | < 0.08 Byrne (2001) | 0.054 | Good |
| Normed Fit Index (NFI) | >.90 Bentler and Bonett (1980) | 0.926 | Good |
| Comparative Fit Index (CFI) | > 0.90 Bentler (1990) | 0.951 | Good |
| Goodness of fit Index (GFI) | > 0.90 Chau (1997) | 0.952 | Good |
| CMIN/DF | < 5.0 Bentler (1990) | 2.746 | Good |

TABLE 4. Confirmatory Factor Analysis.

| Construct | Factor Loadings | AVE | CR | Cronbach Alpha |
|--|-----------------|-------|-------|----------------|
| Behavioral Intention | | 0.716 | 0.831 | 0.809 |
| When I have banking to do, it is likely I would use mobile banking | 0.707 | | | |
| To the extent possible, I would take advantage of Mobile banking for my banking activities | 0.966 | | | |
| Perceived Ease of Use | | 0.543 | 0.781 | 0.782 |
| Learning to use Mobile banking would be easy | 0.71 | | | |
| I think it would be simple for me to become skilled at using Mobile banking | 0.723 | | | |
| I find my interaction with Mobile banking clear and understandable | 0.776 | | | |
| Perceived Usefulness | | 0.762 | 0.927 | 0.927 |
| Mobile banking would be useful for conducting banking transactions | 0.873 | | | |
| Mobile banking would improve my performance in conducting banking transactions | 0.852 | | | |
| Mobile banking would make it easier to conduct banking transactions | 0.901 | | | |
| Using Mobile banking would enable me accomplish tasks more quickly | 0.866 | | | |
| Perceived Cost | | 0.548 | 0.706 | 0.700 |
| It would cost a lot to use mobile phone banking | 0.653 | | | |
| I think that the internet access cost of using mobile phone banking would be high | 0.828 | | | |
| Perceived Risk | | 0.704 | 0.877 | 0.876 |
| I feel that conducting my banking business on my mobile phone would be secure | 0.797 | | | |
| I know that mobile phone banking will handle my business correctly | 0.849 | | | |
| I feel that conducting my banking business on my mobile phone would be safe | 0.870 | | | |
| Relative Advantage | | 0.718 | 0.884 | 0.879 |
| Use of mobile banking can increase the effectiveness of my work/study/ life tasks | 0.764 | | | |
| Overall, I find mobile phone banking useful in my daily life | 0.885 | | | |
| Overall, I find using mobile banking to be advantageous in my life | 0.888 | | | |
| Complexity | | 0.594 | 0.745 | 0.744 |
| Mobile Banking requires a lot of mental effort | 0.769 | | | |
| Mobile Banking requires a lot of technical skills | 0.782 | | | |

Reliability and validity tests

Test for reliability of each construct was assessed using the composite reliability (CR) and Cronbach Alpha scores. For a construct to be considered reliable in a model, it must have a CR score and Cronbach alpha value of above 0.7 (Fornell & Larcker, 1981; Nunally, 1978). Results of these tests as shown in Table 4 indicate that the CR and alpha score for each construct is above 0.70, which falls within the acceptable reliability range. Convergent validity test was conducted using the average variance extracted (AVE). Using the formula proposed by Hair et al. (1998), the AVE was computed by dividing the sum of the squared standard loadings by the sum of the squared standard loadings plus the sum of indicator measurement errors. Results as shown in Table 4 indicate that

convergent validity is assured as the AVE scores for all the constructs were above the recommended threshold of 0.50 (Fornell & Larcker, 1981). An AVE score above 0.5 suggests that the latent variables explain more than half of its indicators' variances (Asyraf & Afthanorhan, 2013).

Further, discriminant validity test was done to ascertain how distinct and uncorrelated the constructs are. The Fornell–Larcker criterion (Fornell & Larcker, 1981) prescribes that all AVEs should be higher than the squared inter-construct correlations. Results of this test as presented in Table 5 demonstrate that discriminant validity is satisfactory as the AVE scores for the constructs were greater than the squared cross-correlations of the constructs.

Structural model

Having confirmed the reliability and validity of the constructs, the structural model was assessed to test for the study hypotheses. The results for the structural model are shown in Table 6. Except for hypotheses H3, H7 & H8, all the hypotheses for the study yielded satisfactory results in line with the prediction of this study. The results suggest that perceived ease of use, perceived usefulness, and relative advantage are the factors that significantly influence the intention of the respondents to adopt mobile banking. An analysis of the path coefficient shows that the most influential factor that drives behavioral intention to adopt mobile banking is relative advantage (standard co-efficient of 0.432) followed by perceived usefulness (co-efficient = 0.172) and perceived ease of use (co-efficient = 0.232). Complexity and perceived Cost are the least influential factors with a co-efficient of 0.031 and -0.020 , respectively. The results also demonstrate that perceived risk, cost, and complexity have no significant association with intention to adopt mobile banking. Also, a significant positive relationship exists between relative advantage and perceived usefulness whilst complexity also has a negative influence on ease of use.

TABLE 5. Correlation and Correlation Square Matrix of Latent Variables.

| | PU | PEOU | RA | PR | PC | INTENT | COMP |
|--------|--------|--------|--------|-------|--------|--------|-------|
| PU | 1 | 0.560 | 0.441 | 0.210 | 0.028 | 0.317 | 0.039 |
| PEOU | 0.748 | 1 | 0.540 | 0.189 | 0.018 | 0.379 | 0.075 |
| RA | 0.664 | 0.735 | 1 | 0.241 | 0.008 | 0.408 | 0.018 |
| PR | 0.458 | 0.435 | 0.491 | 1 | 0.002 | 0.123 | 0.004 |
| PC | -0.166 | -0.135 | -0.091 | 0.044 | 1 | 0.010 | 0.168 |
| INTENT | 0.563 | 0.616 | 0.639 | 0.351 | -0.099 | 1 | 0.018 |
| COMP | -0.198 | -0.273 | -0.134 | 0.063 | 0.410 | -0.134 | 1 |

TABLE 6. Standard Coefficients and Significance Values for Hypotheses.

| Hypothesis | Path | Standard Co-efficient | P Value | Result |
|------------|---|-----------------------|---------|----------|
| H1 | Perceived Ease of Use → Behavioral Intention to Adopt | 0.232 | *** | Accepted |
| H2 | Perceived Usefulness → Behavioral Intention to Adopt | 0.172 | 0.03 | Accepted |
| H3 | Complexity → Behavioral Intention to Adopt | 0.031 | 0.573 | Rejected |
| H4 | Complexity → Ease of Use | -0.319 | *** | Accepted |
| H5 | Relative Advantage → Behavioral Intention to Adopt | 0.438 | *** | Accepted |
| H6 | Relative Advantage → Perceived Usefulness | 0.681 | *** | Accepted |
| H7 | Perceived Risk → Behavioral Intention to Adopt | 0.00 | 0.998 | Rejected |
| H8 | Perceived Cost → Behavioral Intention to Adopt | -0.020 | 0.706 | Rejected |

Note: ***P Value < 0.01.

Discussion results

The overall purpose of this study was to examine the intention of students toward mobile banking application. Relying on two predominant theories: TAM and IDT as the theoretical basis, the current study examined the factors that influence student's intention to adopt mobile banking. Findings of this study support prior literature on the validity of the TAM model. From the results, both perceived usefulness and ease of use have significant and a positive relationship with intentions to adopt mobile banking. These findings thus suggest that when individuals perceive a technology to be useful and find its application relatively easier to use, the intention to adopt the technology is usually higher. Empirically, several studies (Karjaluoto et al., 2010; Lin, 2011; Luarn & Lin, 2005) support the finding that perceived usefulness and ease of use have positive influence behavioral intention to adopt mobile banking. Within the Ghanaian context, however, the relevance of perceived usefulness and ease of use on mobile banking adoption cannot be overemphasized. The preference for face to face transactions is so prevalent in this part of the world that despite the provision of ATMs by most commercial banks in the country, customers continue to queue at banks for reasons such as checking account balance and other services that can easily be done via ATM. Giving this background, any technology in the banking space aimed at reducing branch banking in Ghana should not just offer real-time benefits but must be user-friendly in order to encourage usage. The motivation to rely on a technological innovation for banking needs will be spurred on once it appears user-friendly, has an easy functionality system, and beneficial to their everyday banking needs.

Mindful of the known criticisms of the TAM framework, the study further ascertained the effect of relative advantage and complexity on intentions to adopt mobile banking by drawing on the IDT. In line with the prediction of this study and consistent with some empirical studies (Karjaluoto et al., 2010; Lin, 2011), a positive and highly significant relationship was found between relative advantage and intentions to adopt mobile banking. This gives an indication that when customers find mobile banking to be more advantageous than other delivery channels (traditional banking channels), they will have greater intention to adopt mobile banking. Giving the huge preference for branch banking in Ghana notwithstanding its inconveniences such as long queues and waiting periods (Agyei, Asare-Darko, & Odilon, 2015), convincing customers to switch to mobile banking technology as a delivery mode will depend substantially on the relative benefits it presents. To this end, an effective communication strategy that highlights the benefits of mobile banking technology will be key in effecting any change in behavior among the client base, most of whom would prefer to conduct business physically at the banking hall.

However, unlike the findings in most prior studies (Davis, 1989; Mattila et al., 2003; Pikkarainen et al., 2004; Venkatesh & Davis, 2000), the relationship between complexity and intentions yielded an insignificant result.

The two external factors (perceived risk and cost) though appropriately signed had an insignificant relationship with intentions to adopt mobile banking. Perceived Risk was found to be negatively related to intentions but not statistically significant (p -value = 0.998). Thus, contrary to findings in some existing studies (Brown et al., 2003; Wu & Wang, 2005), the perceived risk associated with technology adoption does

not affect the intentions of students to adopt mobile banking in a significant manner within the context of Ghana. While this might appear strange, it also raises some questions about the level of awareness of the respondents of the risks that are plagued with technological innovations like identity theft, security issues including malware, etc. Similarly, though the coefficient of perceived cost was negative, in line with findings in empirical literature (Luarn & Lin, 2005; Rogers, 2003), the relationship was not statistically significant. Thus, perception of cost does not affect the intention to adopt mobile banking in any significant manner. This result is somehow expected given that mobile internet charges in Ghana appear low with time due to intense competition among players in the telecommunication industry. Most telecommunication companies in recent times have introduced data bundle packages and other special offers aimed at making internet access affordable to their clients. The relatively cheaper cost of mobile data therefore limits the expected impact of the cost factor on the intention to adopt mobile banking technology in Ghana. Moreover, compared with the benefits associated with conducting banking services via mobile phones the perceived cost may not be too much to offset such benefits.

Results of the test of association between complexity and perceived ease of use clearly confirm the hypothesis that complexity acts as an antecedent to perceived ease of use. Consistent with findings in some existing studies (Moore & Benbasat, 1991; Wu & Wang, 2005), a negative and highly significant association (p -value < 0.001) was found between complexity and perceived ease of use. Thus, perception of ease of use of a mobile banking technology is inversely related to the nature of its complexity. By implication, users may find mobile banking technology easier to use if the application is less complex. Given that complexity affects ease of use and the fact that perception of ease of use has important implications on adoption intent, banks should consider developing applications that are very user-friendly as a means of promoting the adoption of mobile banking technology particularly in a setting like Ghana where the average customer prefers to conduct business often visiting a branch.

Lastly, the results also demonstrate that relative advantage is an important predictor of users' perception of the usefulness of mobile banking technology. As the results indicate, there is a positive and highly significant association between relative advantage and perceived usefulness (p -value < 0.01). This implies that when users find more premium in subscribing to mobile banking services than with other banking delivery channels, their perception about its usefulness increases. Bearing in mind the conclusion established on the relationship between perceived usefulness and intention to adopt mobile banking, it would be needful for banks to be rigorous in their approach to ensure that mobile banking services are more advantageous to the user than other delivery channels. This evidence is consistent with literature that affirms the association between relative advantage and perceived usefulness (Moore & Benbasat, 1991; Wu & Wang, 2005).

Taken together, the findings of this study demonstrate the usefulness of TAM and IDT models in predicting technology adoption in different contexts. This study finds both theories to be particularly useful in explaining the intention to adopt mobile banking technology among the Ghanaian youth as predicted. With results being consistent with findings in most existing studies that employed TAM and IDT, in other settings, it could be concluded that both theories are reliable in predicting technology usage which to

a large extent explains why they have been the most dominant theories in technological adoption studies.

Conclusions and implications

One important innovation that has ‘revolutionized’ the banking sector in terms of service delivery in recent times is the shift from the traditional face-to-face encounter (branch banking) to other virtual forms of banking, with mobile banking being the most recent addition. Despite the numerous benefits that mobile banking offers to clients, preference for face-to-face transactions is still high in most developing countries (Ivatury & Mas, 2008; Juniper Research, 2013). The rate of mobile banking usage is generally believed to be low in most developing countries even in the presence of high mobile phone penetration rate and availability of the internet.

The objective of this paper was in two folds. First, the study sought to explore the behavioral intentions of people towards mobile banking adoption from a developing country perspective. Second, the dominant factors that drive individuals’ intention to adopt mobile banking was also investigated. Given that prior studies consider the older generation to be laggards in the adoption of new technology (Oumlil & Williams, 2000), coupled with the fact that mobile phone usage remains an integral part of the life of the younger generation (Fife & Pereira, 2003), this study exclusively focused on the intentions of the younger generations toward mobile banking.

By employing the Technology Acceptance Model and the Innovation Diffusion Theory, the study documents that the willingness to adopt mobile banking by the youth is high and that factors such as perceived ease of use, perceived usefulness, and relative advantage are important predictors of the intention to adopt mobile banking in Ghana. The results of this study have important implications for Ghanaian banks and other financial institutions providing mobile banking services as well as those planning to offer them. For instance, given that ease of use is positively associated with adoption intentions, the design of mobile banking apps for consumer banks should consider features that consumers can easily identify with and operate with minimal difficulty. For banks that are already providing the service, it will be useful to roll out user-friendly marketing strategies such as ads and brochures, demonstrating tips on how to set up the platform needed to effectively conduct mobile banking. Related to the above, the positive association between relative advantage and mobile banking adoption also suggests that mobile banking should not be a mere alternative to branch banking if banking institutions want to increase the rate of adoption. One way of promoting its use is for banks to make it comparatively more expensive to execute certain transactions at the banking hall than via virtual forms like mobile banking. Given that the results are generally consistent with studies in other jurisdictions, the findings and recommendations of this study may also be relevant to banks in developing countries in the formulation and implementation of their mobile banking strategies aimed at attracting the younger generation to adopt the technology.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

| Construct | Item | Source |
|-----------------------|---|----------------------------|
| Behavioral Intention | When I have banking to do, it is likely I would use mobile banking To the extent possible, I would take advantage of Mobile banking for my banking activities | Hanafizadeh et al. (2014) |
| Perceived Ease of Use | Learning to use Mobile banking would be easy I think it would be simple for me to become skilled at using Mobile banking I find my interaction with Mobile banking clear and understandable | Lin (2011) |
| Perceived Usefulness | Mobile banking would be useful for conducting banking transactions Mobile banking would improve my performance in conducting banking transactions Mobile banking would make it easier to conduct banking transactions Using Mobile banking would enable me accomplish tasks more quickly | Karjaluoto et al. (2010) |
| Perceived Risk | I feel that conducting my banking business on my mobile phone would be secure I know that mobile phone banking will handle my business correctly I feel that conducting my banking business on my mobile phone would be safe | Hanafizadeh et al. (2014) |
| Complexity | Mobile Banking requires a lot of mental effort Mobile Banking requires a lot of technical skills | Al-Jabri and Sohail (2012) |
| Perceived Cost | It would cost a lot to use mobile phone banking I think that the internet access cost of using mobile phone banking would be high | Hanafizadeh et al. (2014) |
| Relative Advantage | Use of mobile banking can increase the effectiveness of my work/study/life tasks Overall, I find mobile phone banking useful in my daily life Overall, I find using mobile banking to be advantageous in my life | Liu and Li (2010) |