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Invasiveness, privacy concerns and mobile banking services technology adoption by millennials: Emerging economy perspective

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Purpose: This study was conceptualised to investigate the relationships of invasiveness, privacy concerns, perceived usefulness and the adoption of mobile marketing technology by millennial banking customers in an emerging market economy.

Design/methodology/approach: This was a quantitative study that targeted millennial banking service customers from an emerging market environment. The non-probability sampling approach was used, and the data were collected via a survey questionnaire. For data analysis, SPSS and SmartPLS Structural equation modeling were used.

Findings/results: The results confirmed a direct relationship between privacy, invasiveness and usefulness perception. It also confirmed a direct relationship between perceived usefulness and the intention to accept mobile-marketed banking services. In addition, the results also showed that in addition to the direct impact of perceived usefulness on intention to adopt mobile marketing usage for banking services, it acts as a mediator variable.

Practical implications: Academics can pursue a qualitative study to unpack the reasons for sensitivity around banking technology in emerging markets. The study should lead to better understanding of both the investigated market and others like it. Organisations will gain valuable insight for informed investment in such markets.

Originality/value: The article is the first empirical investigation into the adoption of mobile-marketed banking services by millennials in a developing economy context. The study adds a valuable component to academic debates by using two independent theories to gain a holistic view of the performance of advanced technology in banking business. The study adds to the literature by also proving the mediation role of perceived technology usefulness in banking.

Keywords: invasiveness; privacy; perceived usefulness; mediation, adoption.

Introduction

Mobile marketing (MM) is one of the most intrusive advertising channels that can be well received by users but can also elicit intimacy and cause effects contrary to what is desired (Guerrero-Velástegui et al., 2023). Since MM is facilitated by mobile technology (Patsiotis et al., 2019), it offers people the opportunity to transact in contactless business, the darling of the millennials (also known as Generation Y) (Kim et al., 2022). This demographic group is deemed the most diverse and is a generation that easily accepts diversity (Hamid et al., 2022). They are also, the most educated generation (Nour Aldeen et al., 2022), who are lavish with money (Saeed & Azmi, 2019). The millennials have high expectations and are easily swayed by the developments in digital information (Hamid et al., 2022). They grew up in an increasingly digital environment, are proficient in new technologies, prioritise individual personality and taste, actively use social media, and prioritise economic value (Kim et al., 2022) and convenience (Shin, 2020). According to Wood (2013), Gen Y insists on ease of use and wants a sense of safety when engaging with technology (Kim et al., 2022). The safety requirement is aggravated by the intrusive nature of some technologies (Dragiewicz et al., 2019). Different studies have attempted to address issues related to their adoption of any new technology. For instance, in developed economies, there have been studies on ease of use, usefulness, safety aspects (intrusive and invasiveness of technology) and adoption (Guerrero-Velástegui et al., 2023; Kamiya & Branisso, 2021). However, these were done in isolation and for different industries in developed economies. A holistic view of their consumption behaviour and adoption of, say, MM in an emerging economy context remains a mirage (Hamid et al., 2022). The present state of the adoption of MM in developing countries

remains attractive. The present study was conceptualised as a response to calls by Marriott et al. (2017) to further research about MM in general and smartphone marketing in particular, especially on the effect of MM on consumer shopping.

Problem statement and purpose of the study

Growth in market segments warrants a response from academics and marketing professionals. Many studies have shown how the millennial segment of consumers is increasing, especially in urban areas (Hondagneu-Sotelo et al., 2020; Palm et al., 2020). This growth takes place within the environment of growing e-commerce (mobile commerce), which goes hand in hand with M-marketing (Alzubi et al., 2018). These trends present several challenges for academics and marketers in terms of understanding MM potential and subsequently proposing or developing appropriate marketing strategies that appeal to millennials.

Studies have shown that MM supports e-commerce (Chmielarz et al., 2022). The growth of both the millennial population and the use of M-marketing technology also comes with new challenges and opportunities that necessitate a deeper understanding of the psychology of virtual consumer behaviour (Alzubi et al., 2018). The extant literature provides issues of concern to MM technology users, such as trust, intrusiveness, invasiveness (Kamiya & Branisso, 2021) of MM technology, virtual consumers' right to informational self-determination and possible breaches of privacy (Tolsdorf et al., 2021).

Despite the strength and growth of mobile commerce, studies on predicting consumers' behavioural intention and adoption of mobile shopping in developing economies have remained scarce (Muzuruse et al., 2022). Thus, the current study aimed to examine factors that influence millennial consumers' intention to adopt MM and its impact on their adoption of mobile banking services. Because of the differences in the levels of technology development and the adoption rate between developed and developing economies (Bianchi et al., 2023), Hussain and Aziz (2022) confirmed the necessity of research on M-Marketing for developing countries. Numerous studies also confirmed the scarcity of studies that investigated the adoption of this technology in these contexts (Chau et al., 2020). Most of the studies have been conducted in developed countries (Hidayati et al., 2023; Hussain & Aziz, 2022), which would make the generalisation of the research findings difficult, if not impossible, because of differences in social, cultural, economic, legal and political contexts (Maaouane et al., 2022).

There is also a lack of studies that explore MM from marketers' viewpoints and for different service contexts (Kim & Law, 2015). Additionally, MM may be more suitable for some products, and precisely the higher-involvement utilitarian ones because they may be the only ones that successfully initiate processing through a central processing route (Bart et al., 2014). In that respect, the banking sector in Botswana is used as the geographic context, considering that it would provide new empirical evidence from a developing country's (DC) perspective (Patsiotis et al., 2019). Additional factors that motivated the choice of Botswana were that as a typical growing economy, there is a poor infrastructure, computer phobia, financial illiteracy (Chiguvi, 2023) and slow adoption of e-commerce (Mota Makore et al., 2023). However, Botswana also has an open and diversified economy, a feature not unique to sub-Saharan African countries (Mogotsi et al., 2023). The combination of the characteristics of the Botswana economy and the increasing value of mobile marketing trends (Mpofu & Maraga, 2023), the gain in traction of mobile banking (Sinkala, 2023) and a close similarity of trends with other sub-Saharan African countries such as South Africa, Zimbabwe and Namibia (Svotwa et al., 2023) provided a promising context for possible generalisation prospects. Further, the millennial segment was deemed relevant because they are 'born digital' and are seen as more receptive to new technology than any other group (Nyagadza et al., 2023). This study investigated the impact of privacy concerns (PVC), banking services technology invasiveness (INV) and perceived usefulness (PU) of the technology on the intention to adopt (IU) MM in a DC, and, further, assessed whether the impact of PVC and INV on IU can also be mediated by PU in the banking industry. The study develops an integrative model that extends Ooi and Tan's (2016) mobile technology acceptance model (MTAM) with the constructs from trust commitment theory (TCT) and examines the antecedents that influence banking consumers' behavioural intentions towards the adoption of MM app usage (Huang et al., 2019).

The synergistic integration of the two theories was motivated by Guner and Acarturk (2020) who state that customers are influenced by more factors than those provided by any single theory (e.g. MTAM). The resultant model was expected to provide a more comprehensive framework to aid the understanding of the adoption of MM by emerging economies' millennials for the banking industry. The study also attempts to ascertain whether PU, in addition to its possible direct impact on the IU for the adoption of MM, also plays a role as a mediator. This topic is approached from a mobile technology perspective and focuses on users who are or might be interested in and receptive to MM. Also, the banking sector provided a useful context because, according to Bart et al. (2014), MM is more suitable for higher-involvement services (services that require a consumer to search on the advertiser's site rather than on a third-party site). By integrating two theories as lenses for the study, the proposed model acknowledges that customers' interactions with Smart technologies for banking purposes are complex. Therefore, the integration of the TCT with MTAM could enrich the understanding of the determinants of consumers' behavioural intentions in information technology contexts (Huang et al., 2019). This is also in line with Kim and Law's (2015) suggestion that MM's impact on marketing should be investigated for different service contexts. The proposed model highlights some areas that can assist business theory development and practice from an emerging economy perspective. Therefore, the study adds to existing knowledge

of our understanding of Botswana millennials' concerns regarding MM. This understanding will to some extent be easy to generalise to other developing economies' online banking services.

Lastly, the investigation of the role of PU as a mediator explains the relationship between PU and IU (Baron & David, 1986). This in itself has serious implications for theory building because theory building is enriched by combining the integration of previously empirically supported aspects of other theories with mediation analysis (Stanley & Schutte, 2023). In terms of the practical implications, the findings assist experts and management teams of banking services to provide a better online banking experience to their customers and enhance MM efforts. Specifically, we offer useful recommendations for banking services management teams in terms of how customers' interaction with mobile technologies can strengthen personalisation during online banking experiences, which in turn enhances their loyalty to the brand. The rest of the article is organised as follows: The first part presents the theoretical basis that underpins the study and extant literature on the selected constructs. This is followed by the hypotheses development stage that culminates in a theoretical framework. The research methodology and analysis are then presented. Finally, the study findings and implications are discussed, including the limitations and possible avenues for future work.

Theoretical framework and empirical model

Constructs for the study were derived from MTAM and TCT. Mobile technology acceptance model has been used to provide explanations and predictions on human behaviour (Alzubi et al., 2018). The first created MTAM included four components: Perceived ease of use (PEOU), PU and behavioural intention to use (BI) that lead to behaviour change. Liu and Han (2010) identified PU as one of the primary beliefs leading to user acceptance of information technology. However, the pillars seem to be focused on how businesses perceive possible reception or rejection of technology. Mobile technology acceptance model theory seems to be centred on computers and technology (Chiniah et al., 2019) and leaves out customer perception, which is one of the most important considerations for any business organisation (Ali et al., 2022). Technology can be enthusiastically launched by a marketing company, but result in customer mistrust and backlash (Huang et al., 2019), because of many other concerns, such as privacy and the invasiveness of technology (Sarabdeen, 2022). For this study, MTAM is the selected theoretical lens that explains the relationship between PU and the IU online banking technology. Further, to avoid the one-sided conceptualisation of technology acceptance and to get a balanced view, another theory that incorporates the other side was necessary, hence the choice of the TCT.

Trust commitment theory delivers a model that takes the safety and privacy of customers into consideration (Wang et al., 2020). It explains that trust and relationship commitment is key to the process of developing relationships between customers and online retailers (Ameen et al., 2022). The theory integrates the factors that can be applied to virtual environments, namely, privacy, trust, relationship commitment and customer–peer interaction (Ameen et al., 2022). Wang et al. (2019) assert that trust helps to build a committed relationship between customers and online retailers on social media. The authors highlight the role of privacy issues, including privacy control because consumers have a low level of control over how retailers use their data (Ameen et al., 2022). Trust commitment theory explains the theoretical relationship of the first two antecedents: PVC and INV concerns. The model that the present study proposes integrates elements of TCT which are privacy, invasiveness, and two from the MTAM theory (namely, usefulness and technology adoption).

Units of research, constructs and hypotheses development

This section examines extant literature and proposes the conceptual model.

Millennials

Different periods of birth are attributed to millennials. For example, they can be described as people who were born between 1999 and 2002 (Blair, 2017), and sometimes as people who were born in the 1980s and 1990s (Deka, 2018). It is, however, generally accepted that these people were born during a time of rapid internet and technology growth (Blair, 2017). It is the first generation to grow up surrounded by digital media – people who consider computers and mobile phones to be essential tools for many activities, and they are accustomed to transacting online (SanMiguel et al., 2018). It is also generally accepted that there is a rapid growth in the millennial population (Palm et al., 2020), especially in urban areas (Hondagneu-Sotelo et al., 2020). Some constructs define millennials. Of interest to the study is that their attitude is driven by technological drivers (Mishra et al., 2020). They have easy access to mobile technology (Wati et al., 2022) and the usage thereof (Cattapan & Pongsakornrungsilp, 2022). This generation likes customised products and services (Singh & Chauhan, 2022) and is fond of mobile apps (Derahman et al., 2023) and transactions (Akanfe, 2022). A legitimate question would be whether these special traits can also be profitably harnessed by mobile marketing of banking services, especially for a developing country. If yes, can a permutation of these constructs lead to brand preference and possible e-word-of-mouth marketing opportunities?

Mobile marketing

The consolidation of smartphones as a communication instrument has facilitated the creation of mobile marketing, a business communication tool for the dissemination of content and information (Florido-Benıtez, 2022). The ubiquitous connectivity of smartphones gives users access to the mobile store in conducting purchasing activities facilitated through wireless technology whenever and wherever they wish

(Roy & Moorthi, 2017; Zhou, 2016). It also gives companies immediate access to customers and gives customers a sense of proximity and confidence about a brand (Baena, 2016; Florido-Benıtez, 2020). Mobile marketing is multifunctional (Florido-Benıtez & del Alcazar, 2015). Using MM marketers can leverage the characteristics of mobility, portability, interactivity, multimodal and convergence (Carlson et al., 2019) to develop new perspectives on establishing brand presence and loyalty (Lazaro Florido-Benıtez, 2022). Through the interactive nature of MM, customers have an anywhere-anytime option to interact with firms (Wong et al., 2022). However, MM is also one of the most intrusive advertising channels that can also generate intimacy and cause unintended and undesirable consequences (Guerrero-Velástegui et al., 2023).

Perceived usefulness

Perceived usefulness is adopted from MTAM, the theory which proposes that individuals are willing to accept new technology if they determine it to be useful in facilitating the result in gaining a positive outcome (Pipitwanicharkarn & Wongtada, 2019), by creating value for customers (Bhullar & Gill, 2018). In this sense, the higher the PU, the higher the behavioural intention of the users to give the product, service or technology a try (Chan et al., 2022). Perceived usefulness signifies the extent to which an individual feels that the utilisation of a certain system would lead to improved performance in his or her job (Davis, 1989). Davis et al. (1989) defined PU as 'the prospective user's subjective probability that using a specific application will increase a person's job performance'. A technological application is perceived as useful if it benefits the user (Maune, 2021), and offers personalised and congruency that enhances marketing messages' relevance (Verhagen et al., 2022). It must also offer convenience (Kamiya & Branisso, 2021), advantages and overcome privacy concerns (Kini & Zhao-Serrano, 2022). Several studies found that PU has an important influence on usage behaviour (Suki & Suki, 2011; Alkailani et al., 2012). Similarly, Lee and Wong (2016) believe that the usage of new technology is pushed by how useful it will be. Previous studies indicated perceived usefulness as a purpose-oriented functionality infrastructural element of a perceived level that can impact consumers' behavioural intention towards the adoption of mobile shopping sites (Amirtha et al., 2021; Thakur & Srivastava, 2013).

Invasive, privacy concerns and perceived usefulness

Communication technology has both intrusive and invasive elements (Bandara et al., 2020), which can create privacy and security implications from a human agency perspective (Paik et al., 2022). Van Ooijen et al. (2022) consider INV and PV as digital Siamins twins. Singh (2022) sees them as a hygiene part related to crucial processes for online transactions. Some people consider privacy-invasive technology creepy (Kamiya & Branisso, 2021). Others understand privacy as a condition that enables participation without any threat of, for example, discrimination (Kovanič & Spáč, 2022). These privacy and security concerns reduce trust and purchase intention (Gong et al., 2022). Because of these considerations, people's basic rights need to be factored in when a business deploys telecommunication technology (Verma & Singh, 2022).

People have a right to control what kind of data is produced about them and how it is further distributed (Kovanič & Spáč, 2022), and the right normally referred to as informational self-determination (Tolsdorf et al., 2021). The aim of the right is the protection and cultivation of the integrity of autonomy-conducive contexts (Helm & Seubert, 2020) in a variety of social interactions within the existing technological and surveillance infrastructures. Privacy is not just an end in itself. It also serves as a means for the fulfilment of such values as autonomy, independence, creativity and freedom of thought (Solove, 2002). Consequently, the maintenance of privacy demands the management of boundaries between different contexts and audiences (Palen & Dourish, 2003). Security has direct and indirect effects on the intention to use online banking (Ramadhani et al., 2022). Discomfort can be negatively associated with the intention to use a privacy-invasive technology (Seberger et al., 2022), and perceived usefulness, information value and brand trust were key factors predicting positive attitude and purchase intention (Ngoc, M.N.T.H). Based on the discussion above, for an emerging economic country's millennial consumer context, this study proposes:

H1: Invasive mobile marketing technology negatively impacts the perceived usefulness of the mobile-marketed banking service.

H2: Privacy concerns negatively impact the perceived usefulness of mobile marketing for banking services.

Privacy, invasiveness and intention to adopt mobile marketing

Many studies have shown that security concerns have a bearing on the intention to adopt technology (Dhagarra et al., 2020; Hu et al., 2019). In particular, people have concerns about their privacy and the invasiveness of some marketing technology (Abramova et al., 2022; Li et al., 2021). On the strength of the concerns with inherent risks of technology adoption, for an emerging economy's millennials, the study proposes that:

H3: There exists a direct relationship between the invasiveness of MM technology and the intention to adopt it for banking services.

H4: There exists a direct relationship between privacy concerns in MM and the intention to adopt it for banking services.

Perceived usefulness and intention to adopt

The effectiveness of MM depends on the adoption rate of mobile devices and internet services, and the marketing activities performed through the available MM tools (Chan et al., 2022). Behavioural intention (BI) refers to the intention or willingness of an individual in performing various behaviours (Chan et al., 2022; Yuan et al., 2021) and the probability of customers in the engagement of online

shopping via mobile devices (Wu & Wang, 2005). In the context of MM, Wu and Wang (2005) described behavioural intention as the probability of customers performing online transactions through mobile devices. Previous studies identified perceived usefulness as a crucial predictor for actual purchase behaviour or adoption (Saprikis et al., 2021), examples of which include smartphones and chatboxes (Kasilingam, 2020), and the adoption of mobile wallet technology (Singh & Sinha, 2020). Thakur and Srivastava (2014) found that consumers' behavioural intention correlates with their actual behaviour of mobile shopping adoption, and Patsiotis et al. (2020) concluded that perceived usefulness is an antecedent to usage intention in the dining sector. Further, other studies have also shown that perceived usefulness has a direct bearing on the intention to use live marketing (Chan et al., 2022). On the strength of the above literature review, the present study proposes that:

H5: There is a statistical relationship between the degree of PU of MM in the emerging economy among millennials and their tendency to adopt it.

Privacy, invasiveness, intention to adopt and mediation by usefulness

Based on the argument presented above, a visual representation of the proposed direct effects of the two independent constructs (PVC and INV) would show the dependent variables (PU and IU) as the outputs (Abbas et al., 2020). However, the resultant framework is derived from theory and is, therefore, an oversimplification of the relationships (Liao & Wu, 2010). At a glance, the model might imply that the independent constructs directly influence dependent construct(s) without any systematic influences of other observable variables (Pek & Hoyle, 2016). This interpretation of the model, however, does not give the process by which the impact is transmitted, an important requirement to explain the process (Ali et al., 2019), and to authenticate the relationships (Guo et al., 2022). To close that gap, an intervening variable that mediates the two sets of variables and explains how PVC and INV impact, IU was necessary (Ali et al., 2019). Mediation is a critical procedure that provides that missing link (Abbas et al., 2020). In mediation, a mediator variable intervenes between two related constructs and partly explains the direct impact (Sarstedt et al., 2020). It clarifies the influencing process and reduces the ambiguity encompassing the proposed direct association (Hafiz Yasir Ali et al., 2019). Based on the associations between PVC and PU and IU (Chan & Saqib, 2021), and the one between INV and PU and IU, it seemed logical to quantitatively investigate whether PU can also act as a mediator variable (Guo et al., 2022). Based on these literature facts for the emerging economic country context, the following hypothesis is proposed:

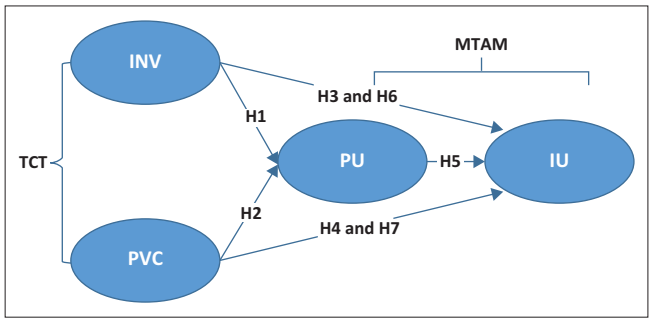
H6: Perceived usefulness of MM mediates the relationship between invasive perception and the adoption of MM for banking services.

H7: Perceived usefulness of MM mediates the relationship between privacy concerns and the intention to adopt it.

The seven hypotheses are diagrammatically represented in Figure 1.

Methodology

A quantitative research method was employed for this study, considering the availability and abundance of literature on how each of these factors impacts the other (Patsiotis et al., 2019). The population of the research was all the millennial generation in the Southeast district of Botswana who have access to mobile technology and engage or have engaged in mobile marketing or commerce. The district is composed of Gaborone with its surrounding urban villages, namely: Lobatse, Ramotswa, Otse and Tlokweng (The Botswana Information Directory, 2021). As the overall population of this study was large (Latan et al., 2020) and in consideration of the convenience and cost-effectiveness of the approach (Liu et al., 2022), the researchers used non-probability sampling for the data collection (Hamid et al., 2022). A sample size of 384 participants was targeted. However, this study only received 263 properly completed responses. The sample size was considered adequate, based on the number of relationships hypothesised and the SEM quantitative analysis requirements (Kyriazos, 2018). The study employed a survey questionnaire that is based on the available literature on MTAM and TCT (e.g. Wu et al., 2010; Alzubi et al., 2018). Data were collected by using a structured questionnaire adopted and adapted from existing literature (Shahzad et al., 2021). Therefore, the construction of the items was according to the instruments employed by other scholars (Alzubi et al., 2018). As the respondents of this study were language and computer-literate Botswana millennials, no translation was made to the original instrument from English. A five-point scale was used to evaluate each item. The scale ranged from 1 (strongly disagree) to 5 (strongly agree) (Alzubi et al., 2018). The researchers considered all known ethical concerns during the data collection and data analysis stages. Data collection took place only after ethics clearance was obtained from a Johannesburg-based university, following a sound academic practice (Mpondo et al., 2022). The ethics protocol number is H22/09/27. In the respondents' request letter, study participants were guaranteed anonymity and the protection of their details.



MTAM, mobile technology acceptance model; TCT, trust commitment theory ; H, Hypothesis; IU, intention to adopt; INV, invasiveness; PVC, privacy concerns; PU, perceived usefulness.

FIGURE 1: Proposed conceptual model.

Data analysis, discussion and implications of the study

The analysis stage was completed by doing the demographic information part before checking both the direct effects and the mediation effects, as scholarly recommended (Huang et al., 2019). The researchers used SPSS for the descriptives and structural equation modelling for the substantive analysis (Hamid et al., 2022).

Demographic analysis results

All the participants for this research were millennials residing in the South-East district of Botswana. In line with the national statistics, all the participants owned a smart personal device to potentially engage in MM for banking services (Statistics Botswana, 2019). The target population gender mix in the district is balanced with 52.3% males and 47.7% females, with female-led households that constitute only 43.5% of the users of computers and mobile cellular devices. The analysis results are displayed in Table 1.

From the table, the analysis outcome shows that the majority of the respondents were male (60.1%), followed by females (38.4%), and, lastly, a few who preferred not to disclose their gender identity (1.5%). Given the dominance of male-led households, the demographic information cannot be interpreted as a deviation from the participants' lived reality. The statistics can either be understood as representing the number of people who were willing to participate in this study or as a reflection of males' domination in the digital commerce space.

Measurement model/outer model accuracy analysis

The evaluation of the outer model included examining the reliability of each item and the internal consistency, convergent validity and discriminant validity of each construct (Yusoff et al., 2020). The analysis results are displayed in Table 2.

For the evaluation of the reliability of the outer model, Al-Fahhri et al. (2021) and Hair et al. (2011) state that both Chronbach alpha and composite reliability (CR) can be used. But, CR is better suited for PLS-SEM than the Chronbach alpha because it prioritises indicators, depending on their reliability (Iman AL-Fakhri & Alabdullah, 2021). For the present study, both indicators were used as shown in Table 1. Both CR and Chronbach alpha values for each construct were higher than the threshold value of 0.7, indicating that the constructs were internally consistent (Amini-Tehrani et al., 2020).

Convergent validity was assessed by average variance extracted (AVE) which assesses the variance recorded by the indicators with measurement error, and it must be larger than 0.50 to vindicate utilising a construct (AL-Fakhri & Alabdullah, 2021). Nasution et al. (2020) define 0.5 for the construct to have good convergent. It can be seen from Table 2 that the AVEs for the variables of the constructs in this study were between 0.719 and 0.821, indicating good convergent validity.

Discriminant validity determines that there is no correlation between tests that measure different matters and that the latent constructs used for measuring the causal relationships are truly distinct from each other and do not have multicollinearity risk (Hamid et al., 2017). Following Henseler et al. (2015), the researchers evaluated discriminant validity through heterotrait-monotrait ratios (HTMT). From Table 3, all the HTMT values between the constructs are below the 0.90 thresholds pointing out that discriminant validity has been achieved (Hamid et al., 2017).

Model fitness analysis

Fit indices assess the fit between the hypothesised model and data from a set of measurement items (the observed variables) (Maydeu-Olivares et al., 2017). Alavi et al. (2020) state that the use of multiple fit indices provides a more holistic view of the goodness of fit. Hair et al. (2006) suggest that at least two indices, namely incremental and absolute fit indices should be examined from the analysis results. From the present study analysis results, the normed fit index (NFI) (incremental) and the standardised root mean square residual (SRMR) (absolute) were ascertained. The values are displayed in Table 4. According to Hayashi et al. (2011), SRMR values of 0.08 or less are considered to indicate a good fit, with NFI in the range of 0–1. Judging from the

TABLE 1: Demographic information of participants.

Descriptive	Frequency	Valid %
Gender		
Male	158	60.1
Female	101	38.4
Prefer not to state	4	1.5
Age group		
Born between 1980 and 2000	263	100.0
Locality		
Resides in the Southeast District (Botswana)	263	100.0
Device ownership		
Smartphones, tablets and other mobile devices	263	100.0
Mobile marketing use		
Have used or do use personal devices for mobile marketing activities	263	100.0

TABLE 2: Reliability and convergent validity.

Construct	Chronbach alpha	Composite reliability	Average variance extracted
IU	0.945	0.958	0.821
INV	0.797	0.924	0.752
PVC	0.902	0.927	0.719
PU	0.900	0.926	0.716

IU, intention to adopt; INV, invasiveness; PVC, privacy concerns; PU, perceived usefulness.

TABLE 3: Heterotrait-monotrait ratios.

Variable	IU	PVC	INV	PU
IU	-	-	-	-
PVC	0.725	-	-	-
INV	0.641	0.673	-	-
PU	0.981	0.689	0.497	-

IU, intention to adopt; INV, invasiveness; PVC, privacy concerns; PU, perceived usefulness.

TABLE 4: Goodness of fit.

Index	Saturated model	Estimated model
SRMR	0.076	0.124
NFI	0.728	0.710

SRMR, Standardised root mean square residual; NFI, normed fit index.

analysis results, the structural research model exhibited satisfactory goodness of fit to observed data because all the fit indices were within the recommended cut-off values of model fit (Byrne, 2001).

Quality of the model

If the analysis results contain some collinearity problems, the results could be biased and end up with a compromised structural model (Risher et al. 2019). The researchers, therefore, first verified the absence of collinearity possibilities and determined the model's predictive power and the accuracy of exogenous variables before interpreting the hypothesised relationships (Hair et al., 2019). To achieve that, the degree of collinearity between PVC, INV and PU was assessed using the variance inflation factor (VIF). All the VIF figures for the final model were within the acceptable range. According to Daoud (2017) and Robinson and Schumacker (2009), a variance inflation factor (VIF) value of 5 or above indicates a collinearity problem. For the present study, all the VIF values were below 5.

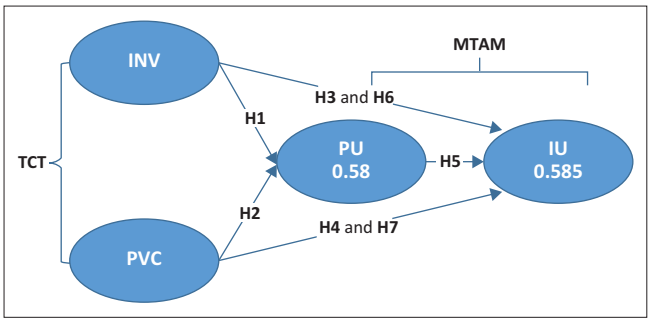
To assess the strength of the model, two issues were considered. Following Hair et al. (2016), researchers need to check the model's predictive power variance explained (R^2) and the effect size (F^2). R^2 is the variance explained value, which describes the amount of variance the model can explain (Plonsky & Ghanbar, 2018). R^2 values quantify how much the dependent variable is determined by the independent variables, in terms of the proportion of variance (Chicco et al., 2021). According to Chicco et al. (2021), the cut-off value for R^2 is 50%. The resultant study values are shown in Figure 2.

Effect size (F^2) measures the power of a variable's impact on others (Hair et al., 2016). The values are shown in Table 5.

Hypotheses testing results

After verifying the integrity of the measurement and the structural models, the researchers analysed the path coefficients for the proposed relationships. From the conceptual model, the direct relationships were PVC-PU, PVC-IU, INV-PU and INV-IU, and the indirect relationships were PVC-IU (PVC-PU-INT; indirect effect) and INV-IU (INV-PU-INT; indirect effect). Table 6 and Table 7 show the respective values (for both the direct and the mediated effects). The mediation analysis is measured by the variance explained accounted for (VAF) value (Carrión et al., 2017), which is determined by the ratio of indirect effect to the total effects (Meher et al., 2022).

For proposed direct relationships, Table 6 confirms all the hypothesised direct effects.



IU, intention to adopt; INV, invasiveness; PVC, privacy concerns; PU, perceived usefulness; MTAM, mobile technology acceptance model; TCT, trust commitment theory; H, hypothesis.

FIGURE 2: Variance explained values.

TABLE 5: The effect size values (F^2).

Variable	PVC	INV	PU	IU
PVC	-	-	0.090	0.161
INV	-	-	0.075	0.050
PU	-	-	-	3.544

Note: All mediations were tested with 5000 bootstrapped iterations.
INV, invasiveness; PVC, privacy concerns; PU, perceived usefulness; IU, intention to adopt.

TABLE 6: Direct effect.

Hypothesis	Direct effects	Coefficient	Decision based on 95% bootstrapping
H1	INV-PU	0.250	Significant and accepted
H2	PVC-PU	0.090	Significant and accepted
H3	INV-IU	0.032	Significant and accepted
H4	PVC-IU	0.175	Significant and accepted
H5	PU-IU	0.800	Significant and accepted

INV, invasiveness; PVC, privacy concerns; PU, perceived usefulness; IU, intention to adopt.

TABLE 7: Indirect effect.

Hypothesis	Indirect effect	Point estimate	VAF calculated (%)
H6	PVC-IU (PVC-PU-IU)	0.072	45
H7	INV-IU (INV-PU-INT)	0.200	86
Total indirect effect	-	0.272	25

IU, intention to adopt; INV, invasiveness; PVC, privacy concerns; PU, perceived usefulness; VAF, variance accounted for.

After investigating the indirect effects of INV and PVC on IU using the 95% confidence interval (see Table 7), all paths did not overlap with zero, which, according to Kruger et al. (2022) indicated that all indirect effects were significantly positive. From these outcomes, it can be concluded that PU plays a partial mediating role between PVC-IU and INV-IU (Wang et al., 2022). We cannot, however, assume that PU is the causally effective mediator, because of the possible situation of it being a spurious mediator (a correlate of the real mediator) (Fiedler et al., 2011). Assuming the lack of spurious correlation, it can be concluded that PU, in addition to being a cause for IU, can also explain how PVC and INV impact IU.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of the Witwatersrand Human Research Ethics Committee (Non-Medical). The clearance number is H22/09/27.

Results discussion

The purpose of this study was to hypothesise and test the relationships between PVC, INV, PU and INT, constructs

that were borrowed from MTAM and TCT. The results confirmed all the hypotheses' relationships as shown in Figure 1. The direct relationships of both PVC and INV with PU are in line with several recent studies. Firstly, invasiveness and privacy are twin concepts (Bhave et al., 2020). In an environment in which people perceive a technology to be invasive, they are more likely to be concerned about privacy control (Gironda & Korgaonkar, 2018). For that reason, similar conclusions can be inferred from the perceived usefulness of technology in a business environment. Firstly, on the PVC and INV's direct influence on PU, people always trade off the perceived usefulness of technology with the inherent risks of invasiveness and privacy concerns. Scarpi et al. (2022) state that people provide information if they obtain benefits. Also, Kumar et al. (2022) state that PVC is a powerful factor affecting PU. Secondly, it can be said that invasiveness and privacy concerns are an issue for specific contexts and the type of people who have access to and control the technology (Mays et al., 2023). Lastly, the usefulness of technology can lessen privacy concerns (Mays et al., 2023). People can still use technology despite privacy concerns (Kusyanti et al., 2022). When people evaluate any technology, they take into account the costs and benefits associated with that technology (Alalwan et al., 2016). It can, therefore, be concluded that banking technology's usefulness should be a major concern for any banking business. Promoting the usefulness of online banking services should concern both academics and banking service providers. These points are further strengthened by the relationship between PU and IU.

On the PU-IU: Perceived usefulness is a significant determinant of behavioural intentions (Geber & Friemel, 2022). This relationship has also been tested in the tourism industry (Tavitiyaman et al., 2022), online shopping (Al Amin, 2022) and education technology adoption (Granić, 2022). The confirmation of the hypothesised relationship for banking services further strengthens the importance of emphasising online banking usefulness in both advertisements and observable outcomes for customers.

PVC-IU and INV-IU: Invasiveness is a concern to consumers (Paik et al., 2022). However, it has to be stated that some technologies are inevitable (Paik et al., 2022). Based on this study's confirmation, it can be suggested that online banking service providers highlight their technology usefulness given some inherent risks.

Many studies have investigated the way PVC and INV relate to PU and IU. There have also been others that addressed the mediating role of PU in different contexts such as e-learning (Alkhawaja et al., 2022), battery swaps technology in China (Adu-Gyamfi et al., 2022) and students' use of social networking technology in Turkey (Hanif & Imran, 2022). However, the mediating influence of PU on the banking industry, especially for a developing economy has not been fully explored (Moslehpour et al., 2018). Issues of technology effectiveness and efficiency are embedded in technology usefulness perception (Chawla & Joshi, 2023). Therefore, savings on time, cost and effort will enhance benefits as perceived by users. On the strength of the present study, highlighting how online banking technology saves customers' time and how well the necessary tasks are completed is recommended. Lastly, the majority of studies on the adoption of new technology offered a one-sided perspective (supplier side) (Munim et al., 2022). The present study combines both the supplier's and the customer's views. In that context, it extends previous studies by combining the technology suppliers' viewpoints and the consumers' viewpoints. It, therefore, adds to the literature on TCT and MTAM.

Implications, limitations and future research

Firstly, this study shed light on the millennials' banking technology adoption in a developing economy context. It, therefore, complements extant research on the perceived usefulness's role both as an antecedent of technology adoption and as a mediator between adoption and invasive privacy concerns. The study's upshot is that it also lends insights into the underdeveloped area of technology adoption for other industries. Secondly, the study contributes to scarce research on the online banking industry. Although other researchers have focused on objective factors from the supplier's side such as PU, perceived ease of use (PEUSE) on technology adoption, our research emphasises the importance of other possibilities from the customers' side. In that respect, the study moves the literature on technology adoption beyond its focus on the MTAM model of technology adoption to one that also includes factors from TCT (INV and PVC) that are important to business customers. The study outcomes, therefore, can find application in both academia and the business world.

For academics, this study contributes to the MM adoption research literature by empirically investigating the effects of key MM constructs gleaned from two different theories. Firstly, the study synergistically harnessed the selected variables to propose one predictive model and quantitatively investigate their influence on MM technology adoption. The net effect of the combination of the variables from the two theories is that the adoption of MM technology for the banking industry can now be understood from both the organisation's and the consumers'/potential customers' points of view. The investigation thus extends the application of the two theories to cater to the two sides. The study can also form a basis for investigations into how online banking services can facilitate financial inclusiveness, an issue at the heart of social good. Given the sensitivity of ethical issues, the study findings can, therefore, also be enhanced by investigating permission-based online marketing. Secondly, most previous studies investigated the adoption of MM in the context of developed economies. In that sense, this study is one of the few that explores the

effect of these variables in the developing economy context. A potential avenue for further research is a qualitative investigation of the marketing and financial performance effects of using all these variables in both banking and other industries. For management practice, the study will help digital business strategists in the area of M-services, M-marketing and M-retailers to develop their future strategies in the area of MM technology, the ever-evolving and changing area, taking into consideration cross-cultural differences of MM technology users. Management can capitalise on the technology's quick service, around-the-clock accessibility, a quick update of information, savings assistance, and ability to solve problems of soil notes and exchanges in small denominations. This according to Kanchi et al. (2023), positively impact technology usefulness perceptions. Finally, this study offers foreign-based managers who contemplate investing in the developing economy, and in Botswana in particular. It will assist in how best they can target customers who have the intention to adopt mobile applications. With growing globalisation trends, the role of MM technology is expected to become increasingly more competitive and thus stimulate further interest in MM technology-related issues.

Limitations of the study

On marketing management aspects, the topic of MM adoption in the banking sector can be further pursued by expanding the theoretical understanding of the acceptance of the technology in emerging markets for both the millennials and the elderly, examining how MM marketing strategies treat the distinction between the acceptance of this technology by millennials and the elderly and introducing ideas that come from the use of MTAM and TCT theoretical lenses in the adoption of other new technological innovations in other industries (Leonidou & Leonidou, 2011). Further, the study can be developed by qualitatively interrogating the proposed theoretical model to gain an in-depth understanding of why the proposed and tested relationships hold. As with any field research, this work and its conclusions are not free of limitations. Firstly, we used a convenience sample of English and computer-literate participants, all of whom were technologically advanced. Thus, the findings may not be generalisable to the entire population which consists of older and less technology-savvy users. This provides opportunities for further studies using potential adopters of online banking services who are both English and computer illiterate. In that regard, banking technology could be further explored to identify 'social good' elements. Secondly, another avenue for further research would be the empirical investigation of the marketing and financial performance effects of organisations that adopt the study model. What makes theoretical sense can also make a powerful economic sense for business. The present study can be further improved by the use of a bigger sample in another developing economy for ease of generalisation. The findings can also be tested against others emanating from developed economies. Lastly, the targeting of only the banked portion of a developing country's citizens can pose ethical challenges, especially when done by big international businesses.

Conclusion

Competitive business environments require businesses to look for new markets. Recent trends suggest that the logical step is moving into developing economic countries. This places the findings of this study in a unique position for consideration by technology-intensive international organizations, both banking and other industries when they decide to expand into these markets. The growth in the millennial segment of consumers in these markets present attractive options for these organizations. Lastly, for academics, there is potential to further examine millennials' possible responses to other technology-based business services. What is evident is that as consumers develop their technology expertise, they seem to be more willing to give new technology a try. Organizations can Investigate the journeys consumers take when making such decisions because that would open opportunities for marketers to deepen consumer involvement and move them to these organizations' premium segments.

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Competing interests

The authors declare that they have no financial or personal relationship(s) that may have inappropriately influenced them in writing this article.

Authors' contributions

F.M.M. conceptualised the study based on a research project by S.S. F.M.M. was supervising the S.S. towards a Master's degree completion. S.S. was involved in the data collection and statistical analysis.

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Data availability

The data used for the analysis can be supplied upon request by interested parties.

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