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FINTECH AND DIGITAL BANKING: PERCEPTION AND USAGE IN MAURITIUS, A LOGISTIC REGRESSION APPROACH

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Abstract

International trends have manifested mobile banking as a success in terms of promoting financial inclusion. However, mobile banking is witnessed as escalating from its infancy stage to become a financial revolution with larger commercial banks expanding its performance from being query based to being actionable based.

The present study uses the constructs of empirical and theoretical frameworks, data was collected through primary to understand their perception towards this financial innovation and to test the influence of socio-demographic factors on its usage.

A factor analysis revealed that perceptions are shaped on 4 underlying dimensions, namely, Convenience, Perceived Ease of Use and Perceived Usefulness, being the most prominent, followed by 'Privacy, Security and Lifestyle, 'Perceived risk and Trust' and 'Traditional Banking and Financial Costs' which was ranked last. In addition, a binary logistic regression was performed to test the dynamics of socio-economic variables on mobile banking usage and the best fitted model indicated that marital status and socioeconomic group are powerful predictors of mobile banking usage.

In addition, it was necessary to understand the basis on which mobile banking users differ from non-users and a binary logistic regression was performed taking into account their respective socio-demographic characteristics. The overall results of the core model indicate that marital status and occupational group play a major role in mobile banking usage. For instance, respondents belonging to higher socioeconomic classes and who are married with no child are more likely to be users of mobile banking. Another conclusion that could be drawn from the model is that, individuals in the lower echelons of the socioeconomic ladder are less likely to be users of mobile banking. In the same line of thought, personal income was found to be significant predictor of mobile banking adoption in Kenya (Kweyu and Ngare, 2013) and in Senegal (Fall et al., 2015). Moreover, the findings of Bhatt and Bhatt (2016) also revealed that mobile banking usage were mostly common among the high income earners who were married but was more pronounced among women.

Keywords: Mobile Banking, Factor Analysis and Binary Logistic Regression

INTRODUCTION

With the proliferation of globalisation and advanced technology, the evolution of wireless internet and mobile devices have consequently transformed the lifestyle of consumers. The increased penetration of smart phones in our society demonstrates the degree to which its usage has become ingrained in modern culture, as a dominant tool for banking, payments, budgeting and shopping (Cruz, 2010). It is undeniable that financial technology (FinTech) has emerged as a revolution in the world of finance, thus, altering the way business is conducted to better servicing clients in the new era of digital financial services. FinTech companies acknowledge the paradigm shift experienced by the banking sector as millennials are increasingly migrating to digital platforms to carry out their banking activities (Meola, 2017). As a result, banks have been compelled to rethink their strategies and tailor their services to meet consumer demands with mobile friendly financial services. With mobile banking, customers are able to undertake a range of banking transactions; from checking their accounts, transferring money to paying bills and managing their finance without visiting physical branches (Sulaiman et. al., 2007). Moreover, mobile banking is identified is a key tool in contributing to financial inclusion and economic development in many countries (Daniel, 2015; Siddik et al, 2014). Worldwide, banks are prioritising financial innovation in order to achieve higher financial performance via customised banking services (Crabbe *et al.*, 2009).

Aims and Objectives

The principle aim of this study is to gain an understanding of factors influencing the adoption of mobile banking among bank customers in Mauritius. In order to achieve this aim, a series of sub-objectives were developed as follows: a) To gauge the mobile banking landscape of Mauritius i.e., to understand who are the users and non-users of mobile banking services and identify the barriers and motivators of its adoption or usage. b) Investigate the factors shaping bank users' perception towards mobile banking and contributing to their favourable or unfavourable attitudes. c) Test the influence of socioeconomic variables in mobile banking usage and develop a model to forecast usage based on the demographics of respondents.

LITERATURE REVIEW

The definition of mobile banking differs from one researcher to the other. Crabbe et.al. (2009) defines mobile banking or m-banking as "the ability to perform banking transactions online on portable mobile devices via Short Messaging Services (SMS) or Wireless Application Protocol (WAP)". A report published by the Federal Reserve System (2016) states that mobile banking encompasses services enabling consumers to obtain

account information and conduct transactions with their financial institutions, allowing customers to effect payments for goods and services or even transfer money through their phone. Furthermore, in a Guideline on Mobile Banking and Mobile Payments issued by the Bank of Mauritius (2013), mobile banking is outlined as "a bank or mobile network operator which is authorised to provide services that enable the process of money transfer and exchange of money for goods and services between two parties using a mobile communication device". Therefore, it can be understood that this new innovative service gives bank customers access to their current and/or savings account through their mobile phone, offering round-the-clock flexibility and convenience.

Empirical Reviews of Studies Relating to Mobile Banking Usage

In order to understand the drivers of mobile banking usage or adoption, a number of journal articles were consulted. As such, empirical reviews suggest that there are several factors accountable for shaping perception, attitudes and behaviours towards the mobile banking platform. This section provides an overview of those factors influencing mobile banking adoption.

Application of Conceptual Frameworks

Review of literature on mobile banking suggest that several intention-based models and theories have been developed to study factors influencing mobile banking adoption (Rezaei *et al.*, 2013; Jeong and Yoon, 2013; Aboelmaged and Gebba, 2013). The theories commonly rely on the theory of reasoned action, the theory of planned behaviour, the technology acceptance model, and the diffused theory of innovation. A brief overview is given on each theory to serve as construct and to provide illumination on how bank customers' perception are shaped and how these factors influence mobile banking usage.

Theory of Reasoned Action

The Theory of Reasoned Action (TRA) is renowned theory, developed by Ajzen and Fishbein (1980), which advocates that user acceptance or rejection of an innovation or system is influenced by attitudes, subjective norms and behavioural intention.

Subjective Norms

Subjective norms englobe perceptions that are formed based on word-of-mouth and can be expressed as social influences on behaviour of an individual. Subjective norms were identified as powerful antecedents measuring social influences on behavioural intention to adopt mobile banking (Balabanoff, 2014). Also, Agarwal and Prasal (1998) argued that perception towards an innovation and its acceptance are influenced by the individuals'

level of innovativeness. Thus, mobile banking as financial innovation is likely to be accepted by individuals who have a positive perception of it.

Attitudes

According to Balabanoff, (2014), attitudes are shaped based on one's perception of the system's usefulness pertaining to relative advantages, risk and privacy and preferred features. In other terms, attitude is referred to the extent to which one has a favourable disposition, resulting in an actual open behaviour. Shaikh and Karjaluoto (2015) who studied influential variables on mobile banking adoption revealed attitude among the most significant motivators in developed and less developed nations.

Technology Acceptance Model

The Technology Acceptance Model (TAM) was initially proposed by Davis (1985), with the aim of studying the acceptance of a new technology by an individual. The theoretical model postulates that users' acceptance or adoption of the new technology is based on their "perceived usefulness" and "perceived ease of use" of the technology.

Perceived Usefulness

Perceived usefulness is described as the extent to which individuals believe that using a particular technology would improve the efficacy of their job performance (Davis, 1985). Several studies have demonstrated that mobile banking adoption is positively correlated with perceived usefulness (Siddik et al, 2014, Jeong and Yoon, 2012). The perceived usefulness relates to the belief on how mobile banking could be beneficial to the user. Benefits may pertain to saving time as well as carrying banking transactions effectively. In another study, mobile banking adoption was mediated by the speed of banking transactions and associated low financial costs (Yang, 2009 cited in Govender and Sihlali, 2014).

Perceived Ease of Use

Conversely, another element which plays a role in mobile banking adoption is perceived ease of use. This refers to the extent to which an individual is of the opinion that the technology does not necessitate much physical or mental effort (Davis, 1985). This model has been adapted by many researchers to understand the dimensions involved in user adoption behaviour. As such, an application of the TAM in the context of developed and developing countries uncovered that the main drivers of intention to adopt mobile banking are "perceived usefulness", "attitudes" and recently "compatibility" of the device with the individual's lifestyle (Shaikh and Karjaluoto, 2015). Another study conducted by Aboelmaged and Gebba (2013) also revealed that perceived usefulness significantly influenced mobile banking adoption in Dubai. Chitungo and Munongo (2013) applied an extended version of the TAM to investigate mobile banking adoption. The

significant factors were found to be perceived ease of use, relative advantages, personal innovativeness and social influences.

Theory of Planned Behaviour

The Theory of Planned Behaviour (TBP) was also developed as an extension to the TRA (Aboelmaged and Gebba, 2013). The TBP is conceived as a model explaining that behaviour or intention to adopt a particular technology is triggered by a favourable attitude towards that technology while subject norms and behavioural control are also influential. Khatimah and Halim (2016) also decomposed the elements of the TPB in Indonesia to explore the usage of e-money, which revealed that social influences may positively impact intention to use e-money, in line with the findings of Abdulkadir *et al.* (2013) who also found social influences as impactful on mobile banking usage, along with perceived usefulness.

Theory of Diffused Innovation

The financial services sector is highly dependent on technological services. Therefore, banks attribute importance to technological innovations so as to ensure their survival against competition. "The innovation of delivering financial services through mobile devices represents a complex interaction between an intangible service and technology based service delivery", (Black *et al.*, 2001). An exploration of the literature also suggests that the TDI, developed by Rogers (1995) is widely used to explain mobile banking adoption. To the author, the process of favouring an innovation is determined by the way this innovation is communicated, by means of different sources over time or among members in a social circle. In other words, the proliferation of innovation, which is the adoption rate is influenced by a set of five factors, namely, relative advantage, compatibility, complexity, number of trials and observability of the innovation.

Perceived Benefits and Limitations of Mobile Banking

The theories expounded above offer explanations on the process by which attitudes and perceptions are shaped and how behavioural intention is determined towards mobile banking. Several themes relating to perceived benefits were encountered as contributors to mobile banking adoption.

Access and Convenience

Mobile banking is often praised for its ubiquitous bank access that surpasses geographical limitations (Laforet and Li, 2005; Laukkanen, 2010). Cited as the main factor driving the adoption of mobile banking, convenience is the most salient advantage that mobile banking offers to customers while providing them with unrestricted access to banking facilities (Chitungo and Muningo, 2013). Another study argues that mobile

banking as a means of branchless banking compensates for the lack of banking infrastructure in less developed countries (Dermish et al, 2011).

Reduced Transaction Costs

Another advantage that mobile banking provides to customers is lower transactions costs,

(Polatogulu and Ekin, 2004). It is argued that by bypassing branch channels, the workload

of branches are minimised, leading to an overall reduction in transaction costs. Thus, Kabir (2013) tested the concept of comparative advantage in the form of cost and time, more precisely airtime and bank charges and it was found to be a significant indicator of mobile banking usage.

Compatibility with Lifestyle

A pertinent factor found to propel adoption rate of mobile banking throughout literature has been its compatibility with the lifestyle and needs of the user (Shaikh and Karjaluoto, 2015; Al-Jabri and Sohail, 2012). Studies suggest that potential users of mobile banking are likely to be influenced by their technology driven lifestyle. In the same line of thought, it is argued that when a developed technology is compatible with lifestyle of people, the more likely they are to adopt it (Lee and Lee, 2010, cited in Ramdhony and Munien, 2013). The literature also provided evidence of certain limitations, influencing one's perception and attitude unfavourably and hence hindering its adoption.

Some of the limitations are discussed below.

Complexity

Complexity is another component which is similar to the perceived ease of use in the TAM. Complexity is explained as the perceived level of difficulty to use and understand the innovation (Gerrard and Cunningham, 2003). Polatoglu and Ekin (2004) discuss the level of education and perceived complexity of an innovation as being inversely correlated.

Perceived Risk

Perceived risk has emerged consistently in theory of diffused innovation as a core construct that influences adoption of mobile banking (Özdemir, 2014; Malhotra, 2011). However the element of risk has been conceptualised on different axes such as financial risk, security or privacy and social and time risk in the context of internet banking and was identified as a main barrier, impeding online banking adoption (Lee, 2008). Govender and Sihlali, (2014) also discuss risk and privacy as essential players in obstructing the acceptance of mobile banking.

Perceived Credibility

The two paramount elements contributing to perceived credibility are security and privacy (Wang et al, 2003, cited in Abdulkadir, 2013). Perceived credibility refers to the extent to which an individual believes that using a particular system or technology is not likely to incur security or privacy breach. While security encompasses the protection of the system from unauthorised access, privacy refers to the safeguarding of users' confidential information while using mobile banking.

Trust

Yao *et al.* (2013) debate on the element of trust and distrust arising with the acceptance of mobile banking. Distrust was discussed as a potential element deterring mobile banking adoption. This theme also overlapped with handling of risk and the quality of the system, playing an influential role in shaping users' attitudes and perceptions. Another study (Masrek *et al.*, 2013) purports that satisfaction with mobile banking and trust in technology are positively related. Moreover, Govender and Sihlali (2014) also identified trust which could be intertwined with fraud risk, hacking and privacy concerns.

Revelatory Studies relating to Mobile Banking Usage or Adoption

This section provides a review on studies conducted to explore possible behavioural attitudes and perception towards mobile banking and its usage in different countries.

"Factor Analysis of Customers Perception of Mobile Banking Services in Kenya", (Kweyu and Ngare, 2013)

Inspiration was drawn from this study carried out in a Kenyan context, whereby the mobile banking service, known as "m-Shwari", is extended to cater for savings, earning interest and borrowing over short lapse of time through mobile phones. The study aimed at investigating the factors that influence mobile banking. The authors have used the constructs of the TAM, along with Roger's model of diffusion of innovation to determine consumer's adoption of this financial innovation. This article discussed the sub Saharan African region as a potential and niche market for financial development with mobile banking use, also in line with arguments proposed by Bhatt and Bhatt (2016) and Medhi *et al.* (2009). The analysis was performed in different stages whereby an exploratory factor analysis was firstly used to reveal important factors playing a role in mobile banking adoption. The rationale behind using factor analysis to the researcher is to get a better understanding on how many factors are present in the set of variables. This statistical technique retained seven clusters in total, accounting for Ease of Use,

Bank product features, Relative advantages, Usefulness, Risk, Interest, Concerns and Doubts. Another study (Govender and Sihlali, 2014) also found perceived ease of use as a positive influence to use mobile banking. Furthermore, the findings of the factor analysis were used and tested for significant differences between genders using Mann-Whitney test. It was unearthed that mobile banking adoption perceived ease of use and risk of use were not different between genders. On the other hand, factors like age group, personal income and educational level are likely to influence usage of mobile banking.

"Analysing the Mobile Banking Adoption Process among Low-Income Populations: A Sequential Logit Model", (Fall *et al.*, 2015)

The primary aim of this study was to shed light on the socio-economic variables that could provide a justification for mobile banking adoption. The sample selection involved a two-stage process, whereby the population of interest were mainly residents of the suburbs of Dakar (Senegal) and included 127 households and 648 individuals. The sample was spread by age, gender, employment and sector of employment. This study exploits the different stages that an individual goes through in decision making with regards to mobile banking. Out of the 648 individuals, 620 were aware of mobile banking, 109 had the service but only 73 were found to be users of the service and a decision tree model was used to depict this behaviour. Thus, the logit model was applied in 3 phases, mainly; Awareness, Ownership and Adoption (Usage). In the first stage revealed that elder generations (above 45 year) were more likely to be unaware of mobile banking (tested at 10% significance level). In the second phase, high literacy rate, wages, having a credit and saving scheme and having a micro-enterprise were found to be significant determinants in ownership of mobile banking. Last stage results confirmed that education level and income were significant cognitive motivators of mobile banking adoption. A noteworthy observation was that income did not emerge as an explanatory variable in acquiring the service, but was found to be among the major determinants while adopting mobile banking. Education and income were also witnessed to be associated to mobile banking usage in other contexts (Kweyu & Ngare, 2013; Özdemir, 2014).

"Factors Affecting Malaysian Mobile Banking Adoption: An Empirical Analysis", (Cheah *et al.*, 2011)

This empirical study adapts the constructs of the TAM to explore factors triggering mobile banking adoption in Malaysia. Data was collected through primary sources among 400 respondents. However, it recorded as valid response of rate of only 44%. Data was analysed through statistical tools such as multiple regression and factor

analysis. The factors which were positively correlated to mobile banking adopt relate to Perceived Usefulness, Relative Advantages, Perceived Ease of Use and Personal Innovativeness. In the study, mobile banking penetration was estimated at 14.3% only and Perceived risk was identified as a major obstructer to mobile banking usage. On the other hand, social norms was found as exhibiting no influence on mobile banking adoption, constrasting with the revelations of Siddik *et al.* (2014).

METHODOLOGY

This section will demonstrate the strategies that were utilized to conduct the research such as the research design, sample size and data collection. To gather primary data a questionnaire was designed that comprised of four sections: Lifestyle and Financial Behaviour, Mobile Banking Usage, Attitudes and Perception towards Mobile Banking and the demographic and was eventually distributed to users and non- users of mobile banking through online surveys. A sample size of 300 respondent were taken into consideration. Factor analysis and a logistic regression was used for this research.

ANALYSIS

Factor Analysis

Since it was of interest to uncover the underlying patterns that contribute to the adoption or usage of mobile banking, an attribute question was asked, relating to the perceived benefits and shortcomings of mobile banking. Therefore, the factor analysis was conducted using the variables shown in the table below.

Variable Code	Mobile Banking Statements
C1	Can check account balance and perform transactions any time
C2	Can save time and effort of visiting branches
C3	Can perform daily transactions more easily
C4	Mobile banking is a financial innovation
C5	Mobile banking is very easy to learn and navigate
C6	Mobile banking is very user-friendly
C7	Mobile banking is useful to conduct banking
C8	Banking transactions are conducted more quickly
C9	Mobile banking offers more privacy
C10	Mobile banking makes banking faster and safe
C11	Mobile banking always provides accurate information
C12	Mobile banking charges lower transaction fees
C13	Mobile banking fits my lifestyle
C14	Mobile banking increases self-prestige
C15	Mobile banking is subject to hacking and spams

C16	Mobile banking is financial risky - can lose money
C17	Cannot trust mobile banking services
C18	Traditional banking is as important as mobile banking
C19	It is important to interact with bank staff
C20	Too much costs involved with mobile banking

The scale for the negative questions, such as C15 to C20 were inverted to perform the analysis.

Measure of Sampling Adequacy

The output of formal statistical tests was studied to evaluate the sampling adequacy and to verify whether the data is cohesive to the assumptions of the model. Table 1 shows a value of 0.912 given by the Kaiser-Meyer-Olkin (KMO), exceeding the benchmark of 0.5 and therefore suggests that sufficient correlation exists among the variables.

Table 11: KMO and Barlett's Test Table

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.912
Bartlett's Test of Sphericity	Approx. Chi-Square	4353.022
	df	190
	Sig.	.000

The Barlett's test of Sphericity displays a p-value of 0.000, highly significant to reject the hypothesis that the correlation matrix is an identity matrix. Thus, these measures confirm that the factor analysis is a robust model to study mobile banking perceptual dimensions.

Factor Retention

The Kaiser's rule recommends to retain factors with Eigen values exceeding 1.The first factor retained accounts for the maximum variation (30%) in the data while the subsequent factors account for lesser variation. However, the second factor explains an additional 18% of variation and cumulatively accounts for 48% of variation in total. However, each factor captures the maximum variance but remains uncorrelated with other factors. It is observed that 4 variables were retained (Eigen value > 1), accounting for 72% of total variation in the data.

Factor Rotation

It was noted that most variables' loadings were spread among the first to the third factor, while the fourth factor did not inherit any loading. Therefore, the Varimax rotation was applied. This factor rotation technique maximises the variation captured by each factor

and redistributes the total amount of variance over the newly extracted four factors. Following this re-orientation, the Rotated Factor Matrix was produced where the structure of the loadings matrix is simplified. Each variable was loaded on their corresponding factor for ease of interpretation as clusters of variables.

The Model

The table below displays the overall factor analysis results.

Factor 1: Convenience, Perceived Ease of Use and Perceived Usefulness

- C1 - Can check account balance and perform transactions any time
- C2 - Can save time and effort of visiting branches
- C3 - Can perform daily transactions more easily
- C4 - Mobile banking is a financial innovation
- C5 - Mobile banking is very easy to learn and navigate
- C6 - Mobile banking is very user-friendly
- C7 - Mobile banking is useful to conduct banking
- C8 - Banking transactions are conducted more quickly

Factor 2: Privacy, Security and Lifestyle

- C9 - Mobile banking offers more privacy
- C10 - Mobile banking makes banking faster and safe
- C11 - Mobile banking always provides accurate information
- C12 - Mobile banking charges lower transaction fees
- C13 - Mobile banking fits my lifestyle
- C14 - Mobile banking increases self-prestige

Factor 3: Perceived Risk and Trust

- C15 - Mobile banking is subject to hacking and spams
- C16 - Mobile banking is financial risky - can lose money
- C17 - Cannot trust mobile banking services

Factor 4: Traditional Banking and Financial Cost

- C18 - Traditional banking is as important as mobile banking
- C19 - It is important to interact with bank staff
- C20 - Too much costs involved with mobile banking

It can be noted that the first factor, capturing a larger share of variance, has clustered variables relating to 'Convenience', 'Perceived Ease and Use' and 'Perceived Usefulness'. Therefore, these elements are the most influential in shaping people's perception towards mobile banking. The second factor, accounting for less variation has been labelled as 'Privacy', 'Security' and 'Lifestyle' and shows that the privacy and security that mobile banking offers correspond to people's lifestyles. The third factor retained in the model groups variables relating to 'Perceived Risk' and 'Trust' while the fourth factor, explaining the least variation relates to aspects of 'Traditional Banking' and 'Financial

costs'.

Application of the Binary Logistic Regression

The core model which might enable us to gauge mobile banking adoption is developed in this sub-section. Inspiration was drawn from Fall *et al.* (2015) and Khan *et al.* (2017) to study the influence of socio-demographic variables on mobile banking adoption. The response variable being 'Usage' is based on whether an individual uses mobile banking or not. Since it accommodates binary responses (Yes/ No), it is considered to be bounded and therefore employing a generalised linear model for the purpose of analysis was suitable. As discussed in the previous chapter, such unified framework caters for studies of this nature with the binary logistic model, which is reliable in forecasting dichotomous outcomes. The explanatory variables postulated to be related to mobile banking adoption or usage (response variable) were coded as displayed in Table 2 for the analysis.

Table 2: Response variable and explanatory variables

Variables	Details	Code
Use mobile banking	Yes	1
	No	0
Gender	Male	1
	Female	2
Area of residence	Urban	1
	Rural	2
Age	Generation Z (18-20)	1
	Generation Y (21-34)	2
	Generation Z (35-49)	3
	Baby boomers (50-64)	4
Head of Household	Yes	1
	No	0
Ethnic group	Hindu	1
	Muslim	2
	General population	3
	Chinese	4
Socio Economic Group	AB - Upper class	1
	C1 - Upper middle class	2
	C2 - Lower middle class	3
	DE - Lower class	4

Marital status	Single	1
	In a relationship	2
	Married with children	3
	Married without children	4
	Divorced/ separated/ widowed	5
Education level	No formal education	1
	Primary	2
	Secondary	3
	Tertiary	4

Reduction in Deviance Test

For the purpose of this analysis, the statistical software R was used, whereby all the logistic regression were run. Table 3 summarises the results from the series of regressions. The motive of this first step analysis was to uncover the variables that had significant reduction in deviance, measured by the G-statistics (with a Chi-square distribution), along with significant p-values ($p<0.01$).

Table 3: Reduction in Deviance

Explanatory Variable	G-statistic	p-value
Gender	0.32063	0.5712
Area of residence	32.692	0.000
Age	107.66	0.000
Education level	67.264	0.000
Ethnic group	53.622	0.000
Marital status	17.899	0.001
Head of household	15.812	0.000
Socio-economic group	104.61	0.000

Surprisingly, most socio-demographic variables were found to be statistically significant ($p < 0.01$) with the exception of gender. Therefore, mobile banking usage could be explained by an individual's area of residence, age, level of education, ethnicity, marital status, his/her socio-economic group and if he or she is the head of household. Since gender had poor explanatory power (low reduction in deviance and high p-value), it was withdrawn from the model. However, age and socio-economic group were observed to have higher reduction in deviance and therefore, good explanatory power.

Multicollinearity Tests

Moreover, as a standard measure, it was important to test for multi-collinearity among variables so as to avoid spurious interpretation of possible relationships between mobile banking usage and socio-demographic variables. To test the relationship among nominal and ordinal variables, the Pearson-Chi Square was used. The correlation coefficient depicts the strength of a linear positive or negative relationship between the variables. Correlation coefficients nearing zero have a small or moderate correlation and its significance value (p-value) is compared to 0.01, whereby if p-value is greater than 0.01, it implies that there is enough evidence that correlation observed is not statistically significant. It was noted that area of residence was mildly correlated with ethnicity, marital status and head of household but on the other hand, ethnic group and marital status were found to be correlated with head of household at 1% significance level. Thus, these variables could not be considered in conjunction. However, moderate correlations were observed for marital status with education level and marital status with socio-economic group.

Ordinal variables were treated separately to study any pairwise associations using the Spearman Rank correlation coefficient. It was found that a high correlation exists among all of the variables (low p-values (<0.01), indicating that all of the ordinal variables could not be included in the model at the same time. Associations between variables such as age and education level and socio-economic group were found to be highly significant (at 1% level). Moreover, the variable age was also found to be associated with the nominal variables and therefore was to be eliminated from the model.

Choice of Model

After eliminating the correlated variables, the following model combinations were proposed:

Mobile Banking Usage = f (Residence, Ethnic Group)
Mobile Banking Usage = f (Residence, Marital status)
Mobile Banking Usage = f (Residence, Head of Household)
Mobile Banking Usage = f (Education, Marital Status)
Mobile Banking Usage = f (Socio-Economic Group, Head of Household)
Mobile Banking Usage = f (Socio-Economic Group, Marital Status)

However, after taking into consideration variables which have maximum reduction in deviance, it was desirable to consider socio-economic group and marital status in the model, where by,

Mobile Banking Usage = f (Socio-Economic Group, Marital Status)

Logit $\left(\frac{\pi_i}{1-\pi_i}\right)$ = $\alpha+\beta_1 X_1 + \beta_2 X_2$, where α is a constant

The Null Model

The first step to constructing the model was to start with a neutral model, which is known as the Null model, having maximum deviance and which is given by an intercept only model:

$$\text{Logit}\left(\frac{\pi_i}{1-\pi_i}\right) = \alpha$$

The Null model postulates that explanatory variables have zero correlation coefficients. In other words, the likelihood of adopting mobile banking would be equally spread among all socio-demographic characteristics. The null model displays a maximum deviance of 42.869 and the objective would be to study the deviations from this neutrality while adding variables to this model. To understand the behaviour of the model, the following formula was used to calculate the likelihoods.

$$\pi_i = \frac{e^{\alpha}}{1 + e^{\alpha}}$$

Where the logit is given by 0.2796 and the likelihood is calculated as $\frac{e^{0.2796}}{1+e^{0.2796}} = 0.5694$, implying that the likelihood of adopting mobile banking, irrespective of marital status and socio-economic group is 57%.

One Factor Model

The response variable 'Usage' was regressed in turn on each of the considered variable and the different models are elaborated below.

Mobile Banking Usage versus Marital Status

The variable 'Marital Status' consisted of 5 modalities, namely; Single, In a Relationship, Married with Children, Married without Children and Widowed/ Divorced/ Separated. The objective was to enquire who would be more inclined to use mobile banking. The first model is given as follows:

a. Mobile Banking Usage = constant + Marital Status

$$\text{Logit}\left(\frac{\pi_i}{1-\pi_i}\right) = \alpha + \beta_i \quad \text{, where i = 1, 2, 3, 4, 5}$$

The model posits that usage of mobile banking is a function of marital status only and the table below shows the output results from the binary logistic model.

Categories	Logits (π_i)	Probabilities
Single	0.4383	$\pi_1 = \frac{e^{0.4383}}{1 + e^{0.4383}} = 0.6079$

In a relationship	0.4383 – 0.2664 = 0.1719	$\pi_2 = \frac{e^{0.1719}}{1+e^{0.1719}} = 0.5429$
Married with children	0.4383 – 0.3512 = 0.0871	$\pi_3 = \frac{e^{0.0871}}{1+e^{0.0871}} = 0.5218$
Married with no child	0.4383 + 0.1343 = 0.5726	$\pi_4 = \frac{e^{0.5726}}{1+e^{0.5726}} = 0.6394$
Divorced/ widowed/ separated	0.4383 – 0.7006 = – 0.2623	$\pi_5 = \frac{e^{-0.2623}}{1+e^{-0.2623}} = 0.4348$

For instance, the likelihood of using mobile banking if individual is single is 0.6079 and the likelihood of using mobile banking if individual is married with no child is 0.6394. From the above table, we observe that $\pi_4 > \pi_1 > \pi_2 > \pi_3 > \pi_5$ >, which means there is a stronger likelihood that an individual adopts or uses mobile banking if he or she married with no child. The probability of mobile banking adoption among single individuals is also quite close. Alternatively, those who are divorced, widowed or separated are less likely to use this platform.

G-statistics Implication

The hypotheses tested under the first model is:

H_0: There is no relationship between mobile banking usage and marital status

H_1: There is a relationship between mobile banking usage and marital status

The critical value for χ^2 at 4 degrees of freedom and 1% level of significance is at 13.277. The G-statistic, reveals a reduction in deviance of 3.749 which is less than the critical value and therefore insignificant. Therefore, it suggests that there is not enough evidence to reject H_0 and conclude that there is a relationship between mobile banking usage and marital status. Therefore, this leads us to test the relationship with the next variable under the one factor model.

Mobile Banking Usage and Socio-Economic Group

The next step was to regress 'Usage' with the second variable of interest which is 'Socio-Economic Group'. This explanatory variable accommodated 4 responses, mainly the AB, C1, C2 and DE. It was of interest to enquire in which socio-economic group, mobile banking usage is more prominent. Therefore, the second model was given as follows:

b. Mobile Banking Usage = constant + Socio-Economic Group

Logit $\left(\frac{\pi_j}{1-\pi_j}\right) = \alpha + \gamma_j$, where j = 1, 2, 3, 4

The model postulates that mobile banking usage is a function of socio-economic group only. Hence, the output from the binary logistic results is calculated as shown below.

Categories	Logits (π_j)	Probabilities
AB – Upper Class	1.6650	$\pi_1 = \frac{e^{1.6650}}{1+e^{1.6650}} = 0.8409$
C1 – Upper Middle Class	1.6650 – 1.3337 = 0.3313	$\pi_2 = \frac{e^{0.3313}}{1+e^{1.639}} = 0.5821$
C2 – Lower Middle Class	1.6650 – 1.7295 = – 0.0645	$\pi_3 = \frac{e^{-0.0645}}{1+e^{-0.0645}} = 0.4839$
DE – Lower Class	1.6650 – 2.0899 = – 0.4249	$\pi_4 = \frac{e^{-0.4249}}{1+e^{-0.4249}} = 0.3953$

From Table 19, it can be noted that the probability of an individual using mobile banking if the latter belongs to the AB class is 0.8409. Also, the table shows that $\pi_1 > \pi_2 > \pi_3 > \pi_4$, suggesting that as we go down the socio-economic ladder, an individual is less likely to use mobile banking. Those belonging from lower working class (DE) were identified to be less likely to use mobile banking, with a usage probability of 0.3953.

G-statistics Implication

The hypotheses tested under the second model is:

H_0: There is no relationship between mobile banking usage and socio-economic group

H_1: There is a relationship between mobile banking usage and socio-economic group

The critical value for χ^2 at 3 degrees of freedom and 1% level of significance is at 11.345. Since the G-statistic or reduction in deviance of 22.035 exceeds the critical value, there is therefore enough evidence to reject H_0 and conclude that there is an association between mobile banking usage and socio-economic group. Hence, socio-economic group was found to be a powerful predictor of mobile banking usage.

Two Factor Model

Following the results obtained from the One Factor models, it was of interest to discover the dynamics of an additive model, using the variables 'Marital Status' and 'Socio-Economic Group' altogether. The logit for the two-factor model is given as follows:

c. Mobile Banking Usage = constant + Marital Status + Socio-Economic Group

$$\text{Logit}\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \alpha + \beta_i + \gamma_j \quad ,$$

The table shows the Probabilities Interpretation in Two-Factor model

π_{ij}	Characteristics	
	Marital Status	**Socio-Economic Group**
π_{11}	Single	AB – Upper Class
π_{21}	In a relationship	AB – Upper Class
π_{31}	Married with children	AB – Upper Class
π_{41}	Married with no child	AB – Upper Class
π_{51}	Divorced/ widowed/ separated	AB – Upper Class
π_{12}	Single	C1 – Upper Middle Class
π_{22}	In a relationship	C1 – Upper Middle Class
π_{32}	Married with children	C1 – Upper Middle Class
π_{42}	Married with no child	C1 – Upper Middle Class
π_{52}	Divorced/ widowed/ separated	C1 – Upper Middle Class
π_{13}	Single	C2 – Lower Middle Class
π_{23}	In a relationship	C2 – Lower Middle Class
π_{33}	Married with children	C2 – Lower Middle Class
π_{43}	Married with no child	C2 – Lower Middle Class
π_{53}	Divorced/ widowed/ separated	C2 – Lower Middle Class
π_{14}	Single	DE – Lower Class
π_{24}	In a relationship	DE – Lower Class
π_{34}	Married with children	DE – Lower Class
π_{44}	Married with no child	DE – Lower Class
π_{54}	Divorced/ widowed/ separated	DE – Lower Class

Saturated Model

The saturated model incorporates a multiplicative model and postulates that mobile banking usage is a function of both Marital Status and Socio-Economic Group and their interaction.

d. Mobile Banking Usage = constant + Marital Status + Socio-Economic Group + Marital Status*Socio-Economic Group

$$\text{Logit}\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \alpha + \beta_i + \gamma_j + (\beta\gamma)_{ij}$$

Such model is a perfect fit for the data and has zero deviance (maximum reduction in deviance), but however the principle of parsimony debates on the acceptable number of variables that can be fitted into a model.

The table below depicts the deviance of all models, starting with the null model to the saturated model.

Model	Logit (π_{ij})	Residual Deviance	Degrees of Freedom
Null model	$\boldsymbol{\alpha}$	42.869	19
One factor			
Marital Status (M)	$\boldsymbol{\alpha + \beta_i}$	39.120	4
Socio-Economic Group (S)	$\boldsymbol{\alpha + \gamma_j}$	20.834	3
Two factor			
M + S	$\boldsymbol{\alpha + \beta_i + \gamma_j}$	16.121	7
Saturated model			
M + S + M*S	$\boldsymbol{\alpha + \beta_i + \gamma_j + (\beta\gamma)_{ij}}$	0	0

Goodness of Fit

Deviance is used as a tool to measure the adequacy of a model. Thus, in order to choose the model which was best fitted for this study, the following hypotheses were tested to evaluate each model's goodness of fit.

$\mathbf{H_0}$: There is no lack of fit

$\mathbf{H_1}$: There is lack of fit

The tests were carried out at 1% significance level and the below table was produced as a result.

Goodness of Fit Table

Model	Residual Deviance	Degrees of Freedom	χ^2 at 1% significance level	Degree of fit
Null model	42.869	19	36.191	Lack of fit
One factor				
Marital Status (M)	39.120	4	13.277	Lack of fit
Socio-Economic Group (S)	20.834	3	11.345	Lack of fit
Two factor				
M + S	16.121	7	18.475	Adequate fit
Saturated model				
M + S + M*S	0	0	0	Perfect fit

Where the residual deviance was greater than the χ^2 value, the null hypothesis was rejected in favour of the alternative hypothesis. Results obtained for the null model are conclusive enough to suggest that model is not a good fit as the deviance exceeds the critical value at 19 degrees of freedom (42.869 > 36.191) at 1% significance level. Thus, this warns us that the null model is not appropriate for the study and that another model should be looked for. While introducing the variable 'Marital Status' into the model, the deviance declined to 39.120 on 4 degrees of freedom. However, high deviance exceeding the χ^2 value at 1% significance level suggests that there is not enough evidence to reject H_0 in favour of H_1. Therefore, it could be concluded that 'Marital Status' on its own in the model was not a good fit. When the variable 'Socio-Economic Group' was studied, the deviance reduced to 20.834 on 3 degrees of freedom. However, this deviance was still found to be insignificant (20.834 >15.086). Therefore, H_0 was rejected as there was enough evidence to conclude that there is a lack of fit in the model.

Even though 'Marital Status' and 'Socio-Economic Group' do not perform well in the model on their own, it was of interest to test them in conjunction to see their dynamics under a two-factor model. From the above table, we observe that the deviance declined to 16.121 on 7 degrees of freedom, in which case is smaller than the χ^2 value (i.e. 16.121 < 18.475). Thus, there was enough evidence to reject H_0 and conclude that the two factor model is an adequate fit.

Since 'Marital Status' and 'Socio-Economic Group' increase the precision of the model altogether, this was selected as the best model and is presented as follows:

$$\text{Logit}\left(\frac{\pi_{ij}}{1-\pi_{ij}}\right) = \alpha + \beta_i + \gamma_j$$

whereby,

α : logit for the reference category for Marital Status and 'Socio-Economic Group'

β_i : change in the logit of the probability associated with one unit change in the i^{th} explanatory variable (Marital Status), with other variables constant

γ_j : change in the logit of the probability associated with one unit change in the j^{th} explanatory variable (Socio-Economic Group), with other variables constant

Therefore, probability table for best model was constructed as shown below from the equation obtained for the best model which explains 'Mobile Banking Usage' in terms of marital status and socio-economic group and also calculates the probabilities for each category.

Socio-Economic Group (j)	Marital Status (i)	π_{ij}	Coefficients (ij)	Logit	Odds	Probability
AB	Single	π_{11}		1.8097	6.1086	0.8593
	In a relationship	π_{21}	-0.4506	1.3591	3.8927	0.7956
	Married with children	π_{31}	-0.5445	1.2652	3.5438	0.7799
	Married with no child	π_{41}	0.1583	1.968	7.1563	0.8774
	Divorced/ widowed/ separated	π_{51}	-0.6679	1.1418	3.1324	0.7580
C1	Single	π_{12}	-1.2488	0.5609	1.7522	0.6367
	In a relationship	π_{22}	-1.6994	0.1103	1.1166	0.5275
	Married with children	π_{32}	-1.7933	0.0164	1.0165	0.5041
	Married with no child	π_{42}	-1.0905	0.7192	2.0528	0.6724
	Divorced/ widowed/ separated	π_{52}	-1.9167	-0.107	0.8985	0.4733

C2	Single	π_{13}	-1.7835	0.0262	1.0265	0.5065
	In a relationship	π_{23}	-2.2341	-0.4244	0.6542	0.3955
	Married with children	π_{33}	-2.3280	-0.5183	0.5955	0.3732
	Married with no child	π_{43}	-1.6252	0.1845	1.2026	0.5460
	Divorced/ widowed/ separated	π_{53}	-2.4514	-0.6417	0.5264	0.3449
DE	Single	π_{14}	-2.1636	-0.3539	0.7019	0.4124
	In a relationship	π_{24}	-2.6142	-0.8045	0.4473	0.3091
	Married with children	π_{34}	-2.7081	-0.8984	0.4072	0.2894
	Married with no child	π_{44}	-2.0053	-0.1956	0.8223	0.4513
	Divorced/ widowed/ separated	π_{54}	-2.8315	-1.0218	0.3599	0.2647

The best model explained that those who are married with no child and who are from the upper social class (AB) are more likely to use mobile banking, as compared to individuals from lower social class, who are divorced/ widowed/ separated.

CONCLUSION

The study had the aim of shedding light on mobile banking usage and its perception in a Mauritian context. A survey was carried out on a national level among 300 respondents, through the combination of an online survey platform and face-to-face interviews. The results have uncovered 186 mobile banking users, who are millennial residents in the urban regions, who have completed tertiary education and mostly come from upper class families. This banking facility is mainly used to verify their account balance, account details and recharge their mobile phone credit. A daily usage is recorded among users. On the other hand, non-usage of mobile banking is mainly attributed to ostensible preference for traditional banking and non-users' indifference to the service. The security aspect of mobile banking emerged as a third barrier. Moreover, factor analysis revealed that respondents' perceptions towards mobile banking are shaped by a four

dimension criteria. These factors have been described as 'Convenience, Perceived Ease of Use and Perceived Usefulness', 'Privacy, Security and Lifestyle', 'Perceived Risk and Trust' and lastly 'Traditional Banking and Financial Costs'. In additional, a binary logistic regression which explored the demographic influences on mobile banking usage showed that socio-economic group and marital status were significant predictors. The model developed predicts that people who are married with no child, belonging from the upper working class are prone to be users of mobile banking. However, it is undeniable that banks are committed to meeting the needs of customers in this digital era, but in order to foster a culture of mobile banking, awareness should be increased and its complexities should be minimised. Banks should be more transparent while keeping the public informed about securitised exchanges and control measures to ensure the safeguard of personal financial data. Also, since mobile banking was identified as an essential ingredient for financial inclusion, banks should devise strategies to reach those from the lower socio-economic class.

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