

# A DISCRIMINANT ANALYSIS APPROACH TO CLASSIFYING ADOPTERS AND NON-ADOPTERS OF INTERNET-BANKING SERVICES

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## **Abstract**

Several technology acceptance theories have been proposed and used to study the adoption of IB services world over. However, TAM has gained wide popularity compared to other behavioral theories. This study uses some constructs from TAM and IDT to investigate the factors that distinguish between IBA in Gaborone. Multivariate techniques such as factor and discriminant analyses were used in this study. The results indicate that, trust, awareness and compatibility proved to have more discriminatory power in IB. The groups tend not to differ much in relation to PEOU and PU. However, IB awareness can be improved in order to increase IB usage in Botswana. The authorities are also urged to entice customers into using internet in order to help improve their PEOU and PU. Training on the use of this service can be provided to the 62.7% or more who have shown interest in using IB in the future. Authors would like to suggest an exploratory study using structural equation modeling as a technique. This can reveal more insights into the data. However, if this is to be done, the sample size needs to be increased. Sample size is one of the weaknesses of this study hence we cannot generalize the findings to the whole of Botswana.

**Keywords:** Discriminant analysis, Internet Banking, Gaborone, Technology Acceptance Model

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## **1 Introduction**

The financial sector especially the banking sector has seen an unprecedented increase in the adoption, diffusion and infusion of technology. While electronic business (e-business) is now ubiquitous and pervasive world over, internet banking (IB) has struggled to make its impact especially in the developing world. Botswana, a geographically vast but very sparsely populated Southern African country is one such country that has seen very little uptake of IB. IB is but only one of the many examples of electronic banking (e-banking) services that can be offered in the financial sector. E-banking is defined by Daniel (1999), Mols (1998) and Sathye (1999) as several types of services through which bank customers can request information and carry out most retail banking services via computers, televisions or mobile phones. These services provide a timeless time and space less space of banking service delivery channels. When using these services, customers can do their daily banking activities without having to move from one place to the other, no queuing on the line or calling a call center. Examples of such banking services are but not limited to: application for loans, paying bills,

transfer of funds, balance enquiries, obtaining information about one's account and trading. IB as one of the distribution channels has benefited both the banks and their customers and has also become one of the most profitable distribution channels (Karjaluo, 2002). IB has reduced drastically the costs of doing banking. Rotchanakitumnuai and Speece (2004) noted that while the financial services sector is rapidly adopting IB, not all has been going well with this distribution channel.

There are several studies that have documented issues that affect IB (Mavetera and Kesimoletse, 2007). TechWeb news (2005) ([www.techweb.com](http://www.techweb.com)) also reported on the problems encountered during the bursting of the internet bubble which took place from the mid-1990s up to 2001 which in turn affected the use of IB services. During this period, many businesses struggled for survival and some dropped electronic channels completely, but internet banking recovered quickly and has been on a steady growth in some developed countries such as Australia, Finland and the United States of America. Banks adopted internet banking to gain a competitive edge, improve distribution and delivery management, while some waited to see if the early adopters would succeed. Some of the drivers of IB are technological developments in computing and communications,

(Jayawardhena and Foley, 2000) and customer demands that have risen. Some new entrants into banking came very technologically sharpened prompting many traditional banks to adjust quickly, otherwise they were set to lose their market share.

Despite findings from all these studies, the researchers decided to investigate the adoption of internet banking in Gaborone's working class and university students. Gaborone is a capital city of Botswana, one of the smallest countries in terms of population size in Southern Africa. This country has ten banks with branches all over the country; sprout both in towns and villages. Four of the main banks, that is, Standard Chartered Bank, Stanbic Bank, First National Bank and Barclays Bank take more than 94% of the market share. The rest of the other banks are commercial and have been in operation for less than ten years. Since year 2000, Botswana has had about 15 000 internet users. This, it is noted, has increased to over 167 000 in 2011. The increase has been enabled by the government that has liberalized the internet market during the last five years. The move has given birth to too many internet service providers of which currently, 30 are licensed. Connectivity has also improved with the country's access to the international bandwidth through the optic fiber backbone network and new submarine fiber optic cables off Africa's east and west coasts. As a result, broadband internet is available in the country.

As indicated earlier, despite the availability of internet facilities in Botswana, internet banking is still in its infancy. IB services widely offered in Botswana include checking balances, obtaining statements, transfers and deposits. Some banks are tirelessly trying to encourage customers to use this facility but the adoption is at a very slow rate. In light of all these IB issues in Botswana, the study among other issues, investigated the rate at which IB is adopted in Gaborone. Six constructs were used, that is, demographics, perceived usefulness (PU), perceived ease of use (PEOU), awareness, compatibility, and trust.

The rest of the paper is as follows: related literature on IBA is discussed followed by the methodology (linear discriminant analysis) used in this study. The study findings are then discussed together with their implications for theory and practice. The paper then concludes by citing some highlights for further research.

## 2 Related literature

As stated earlier, the researchers acknowledge that many studies have been commissioned that investigated factors that affect IBA. These studies used different social behavioral theories and models such as agency theory (Ross, 1973), Theory of Planned behavior (Ajzen, 1991), TAM and IDT (Rogers, 1995). Citing an example, Lichtenstein and Williamson (2006) used Mass Media Theories (MMT)

through individual and focus group discussions to determine the attitudes of people on internet banking adoption in Australia. The results of this study showed that older people with low income in Australia lacked knowledge of IB and its advantages. Other factors that hindered the adoption of this service were reported to be a lack of internet access and confidence, inadequate knowledge and support to use the service, lack of trust as well as security and privacy issues.

In another study, Turkey *et al.* (2010) reported security and reliability issues to be among some of the major factors that influence IBA. However, other factors such as infrastructural competencies and user-friendliness, level of education and socioeconomic class influenced the level of internet access among people.

In another study, Ainin *et al.* (2005) adapted a Website Evaluation Model (WEM) by Chung and Payter (2002) in their study of issues affecting IB. Their study took into consideration the information, legal statement, order, ease of use, aesthetic effects, performance and characteristics of the bank that provide IB. The results showed that there is a negative significant relationship between age and internet banking adoption among Klang Valley adopters. It was also revealed that respondents' monthly gross income and their job satisfaction have a positive significant relationship with internet banking adoption among Klang Valley adopters. However, gender, marital status, ethnic group, level of education did not reveal a significant relationship with internet banking adoption.

The study conducted by Khalil and Pearson (2007) was based on the innovation diffusion theory (IDT) developed by Rogers (1962). This study focused on five key issues called innovation characteristics of belief (relative advantage, comparability, complexity, trial ability and observability) and trust. It is noted that all innovation characteristics except complexity were found to be positively correlated to innovation adoption. The aim of the study was to explore the intention to use IB among university students. Structural equation modeling (SEM) was also used and the results showed that trust, relative advantage and trial ability had a significant influence on attitude. Ndubisi and Sinti (2006) conducted a similar study using an online survey method. The results of this study revealed that four factors namely, importance of internet to banking needs, compatibility, complexity, trial ability and risk accounted for 38% of the variance of internet banking adoption. Comparability was the only variable found not to be a significant predictor of internet banking adoption. Other set of variables such as internet experience, education level and frequency of usage of banking services were not good predictors of internet banking adoption.

In a different study, Davis (1985) developed the Technology Acceptance Model (TAM) with the aim of understanding and predicting the process of user acceptance or adoption of information systems. This

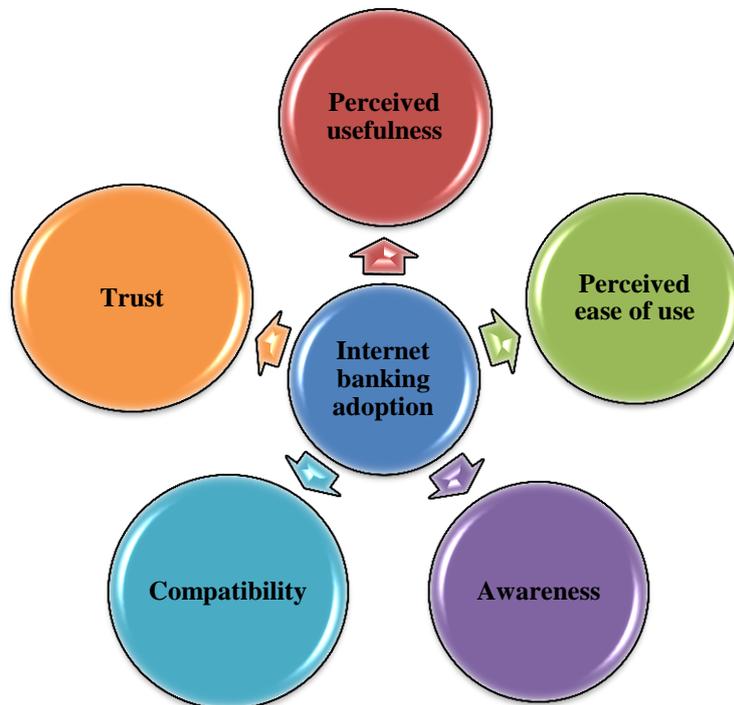
together with many of its variants, has turned out to be the most cited and adopted theoretical framework in the area of information technology (IT) adoption. Taylor and Todd (1995) noted that TAM has been evaluated and proved to be a powerful and parsimonious model for representing the determinants of system usage but also valuable tool for system planning since system designers have some degree of control over easiness and usefulness. This model hypothesizes that perceived ease of use (PEOU) and perceived usefulness (PU) of technology are predictors of user attitude towards using the technology, subsequent behavioral intentions and actual usage. PEOU is also hypothesized to affect attitudes and PU. PU is defined as the degree to which people believe that using a system will increase or improve their performance. Davis *et al.* (1989) refer to PEOU as the extent to which people believe that using a system will be free of effort. PU has a direct influence on intention to use while PEOU indirectly affect PU and attitude on the behavioral intention. Behavioral intention is a measure of the strength of a person's willingness to extent effort while performing certain behaviors. Attitude explains the person's favorable or unfavorable assessment regarding the

behavior in question. The next section discusses the research framework used and the hypotheses developed for this study.

### 3 Theoretical model

This study integrates the TAM and IDT to build the IBA model. This model was used to analyze the adoption of IB by Gaborone's working class and university students. Two constructs from TAM; PU and PEOU and three other constructs from IDT; awareness, compatibility and trust were used. All these are used as independent variables in this study. These variables are used to distinguish internet banking adopters from non-adopters among Gaborone's working class and university students. A dependent variable IBA is categorized as adopters assigned a code of (1) and non-adopters assigned (0). Attitude towards using the technology, subsequent to behavioral intentions and actual usage serve as surrogate variables for IBA. Some adjustments have been made so that the framework is more specific to Internet Banking Adoption. The model is shown graphically in Figure 1:

Figure 1. Research framework



### 3.1 Discussion of framework constructs

#### 3.1.1 Perceived ease of use

Amongst other authors, studies by Venkatesh (1999), Jackson *et al.* (1997) and Davis *et al.* (1989) are in support of the fact that PEOU has a significant effect

on behavioral intention, either directly or indirectly through PU and attitude. In this study, such effects are reviewed in the context of IBA in Gaborone's working class and university students.

**Hypothesis 1:** PEOU has significant and positive influence on IBA

### 3.1.2 Perceived usefulness

This construct has been empirically proven to have the significant effect on behavioral intention by Ozdemir and Trott (2009), Gounaris and Koritos (2008), Yiu *et al.* (2007), Eriksson *et al.* (2005) Pikkarainen *et al.* (2004), Venkatesh (1999), Jackson *et al.* (1997) and Davis *et al.* (1989). This study hypothesizes positive linkage as follows:

**Hypothesis 2:** *Perceived usefulness has significant and positive influence on Internet Banking Adoption (IBA)*

### 3.2 Compatibility

Compatibility plays a major role in the diffusion of innovation. Rogers (2003:15) stated that “compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters”. Lack of this construct in IT with individual needs may negatively affect the individual’s IT use (McKenzie 2001; Sherry, 1997). Compatibility is proven to be a determinant of technology adoption in general and IB adoption specifically (Kolodinsky *et al.* 2004; Hernandez and Mazzon, 2007; Eriksson *et al.* 2005). Hoerup (2001) and Tornatzky and Klein (1982) in their studies found that if innovation is compatible with an individual’s needs, then uncertainty will decrease and the rate of adoption of the innovation will increase. This study intends to prove the following hypothesis on compatibility:

**Hypothesis 3:** *Compatibility has significant and positive influence on IBA.*

### 3.3 Trust

Internet is an open network and there is high security risk involved with financial transactions (Han and Noh, 1999-2000). Studies conducted by Chiemeké *et al.* (2006) on adoption of e-banking in Nigeria, identified major inhibiting factors to internet banking adoption as insecurity. Security risk or perceived security issues with IB keeps coming up as the main hindrance in the adoption of innovation in general and IB in particular (Mavetera and Kesimoletse, 2007). According to Stewart (1999), the failure of the internet as a retail distribution channel has been attributed to lack of trust customers have in electronic channel and in the web merchants. Casalo *et al.* (2007) pointed out that trust is very critical in developing online banking. Chung and Paynter (2002), Black *et al.* (2002), Siu and Mou (2005), Hain *et al.* (2002) also reported fears regarding transaction security as an inhibitor to internet banking adoption. Gartner (2003) also reports that it is important for one to build trust through long term usage of internet in general. This will in turn

make it easy for one to adopt IB. Wang *et al.* (2003) reported that trust may be related to consumer judgment on security and privacy. Nevertheless, studies by Sohail and Shanmughan (2003), Eriksson *et al.* (2005), Yu and Lo (2006) and Guerrero *et al.* (2007) have found a strong relationship between trust and IBA. This prompted this study to hypothesize a positive linkage as follows:

**Hypothesis 4:** *Trust has significant and positive influence on IBA.*

### 3.4 Awareness

People need to be aware of the availability of IB services before they can start using them. This was found to be a significant factor in studies done by Sohail and Shanmughan (2003). Lack of awareness was also found to be a main factor leading to customer reluctance in using online banking (Howcroft *et al.* 2002). This study re-evaluates these findings by analyzing the effect of awareness on IB adoption in Gaborone’s working class and university students. The hypothesis is stated as follows:

**Hypothesis 5:** *Awareness has significant and positive influence on IBA*

Over and above the hypotheses stated, the study attempts to identify the constructs that best discriminate adopters and non-adopters of IB in Gaborone. Furthermore, based on the findings of the study, suggestions that may help policy makers draw informed decisions about internet usage in Gaborone are also formulated. The next section describes the research methodology employed in this study.

## 4. Methods

To help address the hypotheses stated above, this study uses Linear Discriminant Analysis (LDA). This also helps in identifying the factors that affect IBA in Gaborone’s working class and university students. LDA is discussed below.

### 4.1 Linear discriminant analysis

This study employs LDA to determine which independent variables best distinguish potential adopters from non-adopters of internet usage in Gaborone’s working class and students. This method was chosen so as to assist in generating information for policy purposes. LDA was developed by Fisher (1936). He suggested that the best way to separate two groups is to find the linear combination of independent variables which provide the maximum distance between two group means. Klecka (1980) and Norusis (1994) are also in support of this view. Therefore, using two variables, LDA function can best

be defined as a linear combination of discriminating (independent) variables, such that:

$$Y = a'X = a_1X_1 + a_2X_2 + \dots + a_nX_n.$$

where  $Y_i$  = a variable defining the groups, in this study adopters and non-adopters of internet,

$a_1, a_2, \dots, a_n$  represent the discriminant coefficients, and

$X_1, X_2, \dots, X_n$  are the independent variables.

This method is based upon the assumption of normality in data otherwise it will be advisable to use an alternative method such as logistic regression. The normality assumption is violated in this study due to the dichotomous nature of the robust dependent variable, meaning that, this method can tolerate some deviation from the normality. Violation of this assumption does not render the analysis useless though (Tabachnick and Fidell, 2012). Lachenbruch (1979) reviewed several studies that used discriminant analysis. It was found that the discriminant function performs fairly well on such non-normal data.

In assessing the importance of each independent variable to the discriminant function, this study interprets the standardised coefficients ( $a_1, a_2, \dots, a_n$ ) of the function. According to Siqueira *et al.* 2012 cited by Moroke *et al.* (2014), standardised coefficients are the product of the non-standardised coefficients by the roots of covariance. They are used in this study to assess each independent variable's unique contribution to discriminant function (George and Fernandez, 2000). A low standardised coefficient means that the groups do not differ much on that variable. This could also imply that a variable's correlation with the grouping variable is redundant with that of another variable in the model (Hassan, 2007). In other words, the larger the standardised coefficient, the greater is the contribution of the respective variable to the discrimination between groups (Klecka, 1980 and Norusis, 1994). Also as stated by Tabachnick and Fidell (2012) by convention, correlations in excess of 0.33 (10% of variance) may be considered eligible with lower correlations implying the opposite. The sign of the coefficient indicates the kind of association the independent variable has with the grouping variable.

The discriminatory power of the function is assessed using a number of statistics in this paper. To name a few, the study considers the, Wilks' Lambda and Chi-square. The Wilk's eigenvalue is used to directly measure the function's discriminating power. The larger the eigenvalue, the better the discriminating power the function has. The purpose of Wilks' Lambda is to provide a basis for verifying the statistical significance of the function. This statistic ranges between zero and one, with a value closer to zero denoting a high level of discriminating power. Furthermore, the chi-square helps in determining whether or not individual discriminating variables

contribute to the separation of adopters versus non-adopters. The observed values are compared with critical values using a significance level of 5%. High observed values indicate a high level of significance of the discriminating variables.

#### 4.2 Research sample and sample size

This study uses a population comprising of students from the three institutions of higher learning in Gaborone, namely; University of Botswana (UB), Botho College and Limkokwing University. The composition also includes people from Gaborone's working class. Only people with bank accounts aged between 18 and 65 years were considered and sampled. Both the IB users and non-users are included in the sample and are used as variable of interest in the study to help achieve the goal set. A total of 100 questionnaires were distributed to these groups of people at different locations. Stratified sampling was used to achieve the required sample. The expected sample was 30 tertiary education students and 70 people from the working class. This sampling technique is advantageous as:

- 1) it offers an easy way to obtain raw data for further analysis and
- 2) it is time and cost effective as it caters for random selection in the different strata.

Though the use of students in this study is limited, they are a good surrogate example for banking customers. Current customers have experience with traditional banking services and are likely familiar with IB. Of the 100 questionnaires handed out, a return rate of 89% was achieved. It must be noted that while the sample size is quite small, this does not in any way affect its representativeness to the Gaborone population at large.

The adequacy of the sample used is checked with Keiser-Meyer-Olkin (KMO) statistic as adopted from Pett, Lackey and Sullivan (2003). KMO can as highlighted by Field (2013) signal in advance if the sample size is large enough to reliably extract the factors (Montshiwa and Moroke, 2014). Adequacy of the sample is based on the thumb rule 0.7 as suggested by Kaiser (1974). Bartlett's test is used to check if the variables associated with the constructs have enough correlations. The observed probability associated with this test is compared with a significance level of 5%. The correlations are assumed significant if the observed probability is less than the significance level. The next section discusses the research instrument used to collect the data.

#### 4.3 Research instrument

The questionnaire used in this study consists of three parts; the first for gathering the respondents' demographic profile, the second section for collecting information about their internet and IB experience and the last section gathering the general comments from respondents in relation to internet. Part 2 of the

questionnaire measures perceived usefulness, Part 3 asks questions about PEOU and Part 4 gathers information on habits on IB. The last part collects ideas on perceptions and attitudes about IB. Most of the questionnaire items scored on a five point likert scale. Since the demographics of the respondents do not form part of the LDA, the results on this part are not interpreted. Only the responses on gender are interpreted to help get a general picture on the attitude towards internet usage with respect to this profile.

To evaluate convergent and discriminant validities, the study used principal component factor analysis. This method helped in confirming if multi-item indicators of the theorized items converge together as expected (convergent validity). Moreover, discriminant validity was assessed by checking if the

items are not loaded onto constructs other than intended.

## 5. Results and discussions

The Statistical Package for Social Sciences (SPSS) version 22 was used as the analysis tool. Results in the form of counts and percentages are presented in tables.

### 5.1 Empirical results

Table 1 displays the results of respondents in terms of their gender. Also shown are the results categorizing IB users and non-users and those intending to use it according to their gender. These responses are summarized in the form of frequencies. The chi-square statistic on this table is calculated to assess the effect of demographic variable on IBA.

**Table 1.** Gender of respondents

Variable		Responses		Use internet		Intention to use	
		n	%	% Yes	% No	% Yes	% No
Gender	Female	43	48.3	32.6	67.4	62.8	37.2
	Male	46	51.7	50.0	50.0	32.6	67.4

Source: Authors' own calculations

The results show that of the 89 respondents, males are more represented (51.7%) as opposed to females. It is also evident that of all the males who took part in this study, 50% use internet. Out of the group that is currently not using this media, 32.6% have good intentions. Though the proportion of

females who use internet is less than that of males, the majority intends using it in future. Tables 2 and 3 provide summary results with respect to sample used and rotated factor loadings on the five constructs as displayed on Figure 1.

**Table 2.** KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.782
Bartlett's Test of Sphericity	Approx. Chi-Square
	df
	Sig.
	713.721
	120
	0.000

Source: Authors' own calculations

The sample used in this study is acceptable according to Keiser (1974). This is confirmed by the measure 0.782 as shown in Table 2. The correlations between the items in a questionnaire were also enough (factorability of the correlation matrix) according to Bartlett's test. This allows the use of factor analysis as a measure of convergence validity. The observed probability (0.000) is less than the 5% significance level. The results of rotated factors obtained from the principal component method are given in Table 3. These results are in accordance with the restriction of the minimum eigenvalue one according to Keiser. Five factors explaining about 70% of total variation in the data were extracted as shown in Table 3. To help maximise the variance, factors were subjected to rotation method. Items were collected according to the theorised constructs and these are consequently used in the study as independent variables to help evaluate factors discriminating the adopters and non-adopters

(dependent variable) of IB in Gaborone. This variable was identified by analysing the responses of people who use and do not use IB. The results from the discriminant analyses are given in Table 4. These results are used to evaluate the validity of the hypotheses statements on IB. Also give is a summary statistics used for evaluating the discriminant function validity.

### 5.2 Hypotheses test results

Testing of the hypotheses is based on 5% level of significance. The criterion is to reject the null hypothesis if the observed probability is less than the level of significance ( $P < \alpha$ ). This will imply that the hypothesis does not hold. All the factors were considered simultaneously in the discriminant analysis irrespective of their discriminating power.

**Table 3.** Rotated factors

	Factor				
	1	2	3	4	5
Trust1	0.886				
Trust2	0.867				
Trust3	0.817				
Trust4	0.813				
Trust5	0.655				
Awareness1		-0.840			
Awareness2		0.766			
Awareness3		0.470			
PEOU1			0.831		
PEOU2			0.734		
PEOU3			0.518		
Compatibility2				0.824	
Compatibility1				0.656	
Compatibility3				0.409	
PU1					-0.818
PU2					0.459
Eigenvalue	5.470	1.771	1.448	1.376	1.079
% of variance	34.188	11.069	9.050	8.602	6.743
Cumulative %	34.188	45.257	54.307	62.909	69.651

Source: Authors' own calculations

**Table 4.** Standardized canonical discriminant function coefficients

Construct	Function	Hypothesized results	Support for hypothesis
Trust	0.789*	+ and significant	Full for hypothesis 4
Awareness	0.686*	+ and significant	Full for hypothesis 5
PEOU	0.042	+ and significant	Partial for hypothesis 1
Compatibility	-0.514*	+ and significant	Partial for hypothesis 3
PU	0.187	+ and significant	Partial for hypothesis 2
<b>Model statistics</b>	<b>Value</b>		
Canonical correlation	0.618		
Wilks Lambda	0.617		
Sig.	(0.000)		
Chi-square	40.625		
df	5		

\* indicates significant construct

Source: Authors' own calculations

### 5.3 Discussion of hypotheses and results

#### *Hypothesis 1: PEOU has significant influence on IBA*

The discriminant analysis results show that PEOU has a positive but insignificant effect on IBA. The standardized coefficient is found to be less than a threshold 0.33 according to Tabachnick and Fidell (2013). These results are partially in accordance with the findings from studies by Venkatesh (1999), Jackson *et al.* (1997) and Davis *et al.* (1989) who reported PEOU as having a significant effect on IBA.

#### *Hypothesis 2: PU has significant and positive influence on Internet Banking Adoption (IBA)*

PU is reported to be positively but insignificantly affecting IBA in the context of Gaborone's working class and students. These findings are partially consistent with those confirmed by the studies previously undertaken by Ozdemir and Trott (2009), Gounaris and Koritos (2008), Yiu *et al.* (2007), Eriksson *et al.* (2005) Pikkarainen *et al.* (2004), Venkatesh (1999), Jackson *et al.* (1997) and Davis *et al.* (1989).

#### *Hypothesis 3: Compatibility has significant and positive influence on IBA*

The results reveal compatibility as having negative but significant effect on IBA. These results partially concurs with the findings generated in studies

conducted by Kolodinsky and Hilgert (2004), Hernandez and Mazoon (2007), Eriksson *et al.* (2005), Hoerup (2001), and Tornatzky and Klein (1982) which proved innovation as being compatible with an individual's needs and the rate of adoption. If compatibility is defined as the degree to which innovation fits the adopters' work habits, then, it is noted that internet access times and durations are very limited in Botswana due to some negative socio-economic factors. Very few people can afford to access the internet because it is considered an unnecessary luxury item. This is not surprising as the proportion of people who use internet in this country is far less than that of non-users as reported in Table 1.

**Hypothesis 4:** Trust has significant and positive influence on IBA

This study reports trust to be the most significant and as having positive effect on customers' decision to adopt IB. These findings correspond with those from Liao *et al.* (2003), Eriksson *et al.* (2005), Yu and Lo (2007) and Guerrero *et al.* (2007) who also found that trust has a strong relationship with IBA.

**Hypothesis 5:** Awareness has significant and positive influence on IBA

The results are in full support of this hypothesis. The standardized coefficient is positive and has a correlation coefficient in excess of 0.33 as a bench mark. This study results are consistent with those obtained by Sohail and Shanmugham (2003) and Howcroft *et al.* (2002) who discovered lack of awareness as the main factor leading to customer reluctance in using online banking. There could be a factor also of many people not being quite affluent and hence they do not know whether banks are marketing the IB services or not.

The overall classification accuracy of the discriminant function was as shown in Table 5 as 79.7%. These results confirm that 86.7% of adopters and 74.6% non-adopters are correctly classified. Wilks Lambda (0.618) was significant at the 0.000 level, indicating that the two groups were significantly different from one another. Trust, awareness and compatibility in that order, have been proven to be causing most of the differences between these groups of customers. The discriminant function had a canonical correlation of 0.618 suggesting a substantive relationship between adopters and non-adopters of IB and the discriminant function.

**Table 5.** Classification results<sup>a</sup>

Internet use			Predicted Group Membership		Total
			Adopters	Non-adopters	
Original	Count	Adopters	26	4	30
		Non-adopters	15	44	59
	%	Adopters	86.7	13.3	100.0
		Non-adopters	25.4	74.6	100.0

a. 78.7% of original grouped cases correctly classified.

Source: Authors' own calculations

## 6. The Findings

The findings of this study provide some insights into main factors that influencing customers' internet adoption. The study intended to determine the constructs with more discriminatory power in adopters and non-adopters in Gaborone. The results reveal that trust and awareness have the most discriminatory in IB positively. Though compatibility has a significant power to discriminate between adopters and non-adopters, the effect this construct has is negative. Lastly, PEOU and PU have less but positive contribution in IBA in Gaborone. These findings fully support hypotheses 4 and 5 and partially support hypotheses 1, 2 and 3. Other authors such as Kolodinsky *et al.* (2004); Hernandez and Mazoon (2007), Eriksson *et al.* (2005), Hoerup (2001), Tornatzky and Klein (1982), Sohail and Shanmugham (2003) and Howcroft *et al.* (2002) are also in support of these findings. The results also confirm

classification accuracy of adopters as 86.7% with about 13.3% incorrectly positioned.

## 7 Conclusions and recommendations

This study integrated the TAM and IDT to build the IBA model. Multivariate techniques such as factor and discriminant analyses were used to estimate coefficients of this model. This model was used to analyze the adoption of IB using responses from Gaborone's working class and university students. Responses collected confirmed that half of the males who took part in the survey use this media and only 32.6% of female representatives also users. These groups were later used in the study as a discriminant variable with adopters assigned a dummy code 0 and non adopters 1. Prior discriminant analysis, principal component method was used to confirm convergent validity of the constructs which resulted as an integration of the TAM and IDT models. This method correctly collected the constructs as theory states and

the results were used as independent variables in subsequent analyses. The empirical results from discriminant analysis show that trust, awareness and compatibility have significant influence on IBA. PEOU and PU are confirmed to be measures of IBA but with caution. This implies that adopters and non-adopters of internet differ significantly on the three constructs mentioned and somehow have consensus with respect to PU and PEOU.

To lure customers into adopting IB, bank managers should direct efforts and resources in the most effective and efficient way to increase banking business hours in future and encourage them to adopt IB. To help address the problem of compatibility, banks may have to increase the number of IB terminals they have in their banking halls where customers especially those with limited or no access to internet will be able to use internet for as long as they wish. The usage will be at the cost of the client.

There are several studies that have been done in the field of IBA. However, while most of them are confirmatory type of studies like this one, the strength of our study lies in the integration of constructs from both TAM and IDT. Furthermore, there are very few studies that look at the acceptance or rejection of a hypothesis focusing entirely on the probability of occurrence ( $p$ -value) as shown in this study. Very few studies also incorporated the results of factor analysis into discriminant analysis to determine the constructs which most discriminate adopters and non-adopters.

Additionally, the study was not designed to be overly complicated, hence it can be replicated by novice researchers especially those doing their honors degrees or MBA studies. One of the strength of the study as teaching and learning tool is its ability to support every argument with some authoritative sources. Many studies are deficient in this area. Lastly, instead of taking a confirmatory approach to behavioral studies like this one, the authors would like to suggest that an exploratory study maybe more appropriate with structural equation modeling as the preferred analysis technique. This can reveal more insights into the data. However, if this is to be done, the sample size needs to be increased. Sample size is one of the weakness of this study hence we cannot generalize the findings to the whole of Botswana. In this note, an in-depth research on a much larger scale is proposed to investigate further the validity of the findings of this study. More items should also be loaded per construct to help improve the reliability of results.

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**Appendices:**

**Appendix A.** Classification function coefficients

	Internet use	
	Adopters	Non-adopters
TRUST	-.943	.479
AWARE	-.795	.404
PEOU	-.046	.023
COMP	.577	-.293
PU	-.203	.103
(Constant)	-1.287	-.847

Fisher's linear discriminant functions

**Appendix B.** Prior probabilities for groups

Internet use	Prior	Cases Used in Analysis	
		Unweighted	Weighted
1	.500	30	30.000
2	.500	59	59.000
Total	1.000	89	89.000