

# IB Adoption in Sri Lanka: Analysis of Demographic Variables of Banking Customers

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**Abstract** — Contemporary concepts of information and communication technology and implementation strategies to banking services have become a significant matter to all banks in Sri Lanka. The advancement in technology has played an important role in improving service delivery standards in the banking industry. At present, Sri Lanka has a liberalized telecommunications market that has huge impacts on the economic and social development of the country. The Sri Lankan government has initiated several projects, emphasizing the need in rural areas and to provide unrestricted sources of information to all its citizens. When compared with the development of information and communication technology in the country, the demand for Internet Banking facilities is not at a significant level. Therefore, the main objective of this research study was to analyse the demographic factors of IB users and IB non-users in Sri Lanka. This study incorporates both primary and secondary data. Primary data were collected by utilizing semi-structured interviews and a customer survey of the selected banks in Sri Lanka: private bank (Sampath Bank), government bank (Bank of Ceylon) and a foreign bank in Sri Lanka (HSBC). The questionnaire was mailed and handed over to the customers of each bank along with a postage-paid return envelope and a cover letter explaining the purpose of the study. A total of 253 questionnaires were received resulting in a response rate of about forty two percent. However, only 240 questionnaires were useable as in the remaining questionnaires, substantial portions were not filled in. Therefore, the samples include 120 IB users and 120 IB non-users. The convenience sampling method was employed to select the sample of IB and IB non-customers for this study. Analyses of the ungrouped binary data were based on a binary Logistic Model and Statistical Measurements: Central Tendency, Dispersion and Skewness. Data were analyzed using Eviews version 5 application to strengthen the accuracy of results. McFadden  $R^2$  ( $R^2$ McF), P, and Likelihood Ratio (LR) Statistic tests

were utilized for testing the goodness of fit, statistical significance of the parameters and for testing the overall significance of the model. In addition, the Jarque-Bera (JB) test was used for testing Normality. The findings of this study have important implications for researchers in the field of IB, banks that are currently offering IB services as well as banks that are planning to offer such services. The outcomes of this research can be applied to developing countries in the region in general.

**Keywords**— Internet Banking, Demographic Analysis, Banking in Sri Lanka

## I. INTRODUCTION

The term Internet Banking (IB) refers to the use of Internet technology to offer banking facilities to remote clients. Pikkarainen et al (2004) defined Internet Banking as an 'Internet portal, through which customers can use different kinds of banking services ranging from bill payment to making investments'. According to the Oxford English Dictionary (2014), electronic banking is banking transactions carried out electronically without involving the physical deposit or receipt of cash or checks; maintenance of a bank account by means of computer and telecommunications equipment and software. E-banking is providing the customers their banking information via diversified delivery channels that can be accessed through different technological devices i.e. a computer or a cell phone with built in browser utility or telephone or any other digital technology. The above two definitions show that IB is a sub category of E-banking. The usage of the Internet is rapidly increasing in Sri Lanka. However, the usage of IB is very slow compared to the increase of Internet users (Weerasekara, 2011). Despite the recent improvements in IB, there are still some constraints, mainly security related issues and some other factors, which contribute to the hesitations of

individuals' IB adoption (Arslan, 2012). The main objective of this research study was to analyse the effect of demographic variables of banking customers on IB adoption in Sri Lanka.

The findings of the present study were subjected to few limitations: (i) Due to the initiation stage of Internet Banking services available in Sri Lanka, many customers are not aware of and/or do not understand the nature of Internet-based banking services. Many customers were not able to determine the level of the Internet Banking service available. (ii) The sample used for the study was from specific geographical areas of Sri Lanka. Thus, generalization of the findings of this study is limited to some extent. (iii) Some of the variables of the model were taken from the literature review and others were taken from personal reflection. It is possible, however, that other variables that were not retained could have had a significant impact on the adoption of Internet Banking. (iv) The 'Questionnaire II' was designed for respondents who had not adopted Internet Banking. Therefore, the respondents had found certain questions difficult to understand due to the lack of technical knowledge. (v) The proposed binary logistic model does not utilize interactive variables as additional variables.

## II. LITERATURE REVIEW

Kim, et al (2005) investigate determinants of Internet Banking adoption based on individuals' demographic and financial characteristics and use of other electronic banking technologies. They examined the influence of adoption of Internet Banking on the likelihood of using cheques vs. direct bill payments as payment instruments. They showed that consumers' demographic and financial characteristics and use of other electronic banking technologies play a significant role in the decision to adopt Internet Banking. Khan & Emmambokus (2011) assessed the factors that contribute to the adoption of Internet Banking in Mauritius. They concluded that factors such as age, income, service usefulness, risk factor, checking account frequency and Internet location are the main determinants for a person to adopt online banking. However, in developing countries, demographics such as gender, area of residence and marital status have been insignificant. Khan & Emmambokus (2011) suggest that banks should implement more marketing strategies to enhance Internet Banking

usage and educate the public, especially low and middle-income earners and older aged people more about the benefits of this service. The researchers used a logistic regression model based on a sample survey to analyze the factors that influence Internet Banking. By using the surveyed data of 1240 customers, the researchers concluded that six explanatory variables namely age, income, risk, usefulness of Internet Banking, frequency of checking bank accounts and Internet location are significant. Factors such as age, income, service usefulness, risk factor, checking account frequency and Internet location are the main determinants for a person to opt for online banking. Chang (2006) found that traditional demographic variables such as sex, education, marital status, personal income level, housing type and residential location are not relevant indicators of whether Internet Banking will be taken up or not with the exception of age. Demographics do provide an indication of when Internet Banking will be taken up. Males, and in particular those over 45, are more likely to be early adopters than females. The main factors affecting the adoption of IB were explored by Singhal & Padmanabhan (2008) based on respondents' perception on various Internet applications. The study tries to examine whether there is any relation with the demographic variables and respondents' perception about IB; and, whether the user and non-user perception differs. Margaret & Ngoma (2013) tested whether there is a relationship between the socio-demographic characteristics of consumers and internet banking adoption in Zimbabwe. The research highlighted that a positive relationship exists between internet banking adoption and educational level, income, age, gender and occupation. Onyia & Tagg (2011) examine the influence of seven demographic variables: age, gender, level of education, marital status, employment status, income level and area of residence on retail banking customers' behaviours toward IB adoption in Nigeria. A sample of 500 customers was surveyed. The study concludes that gender, level of education, and employment status are the major demographic affecters of Nigerian banking customers' attitudes to IB adoption.

The following hypotheses were derived from the empirical studies.

H1: Age significantly affects acceptance of IB

H2: Gender significantly affects acceptance of IB

- H3: Marital status significantly affects acceptance of IB
- H4: Educational background significantly affects the acceptance of IB
- H5: Incentives given by the bank to promote IB significantly affects acceptance of IB
- H6: Distance to the bank branch significantly affect the acceptance of IB
- H7: Income significantly affects acceptance of IB
- H8: Awareness significantly affects acceptance of IB
- H9: Trust significantly affects acceptance of IB

### III. RESEARCH METHODOLOGY

#### A. Sample and Data

This study incorporates both primary and secondary data. Primary data were collected by utilizing semi-structured interviews and a customer survey of the selected banks in Sri Lanka: private bank (Sampath Bank), government bank (Bank of Ceylon) and a foreign bank in Sri Lanka (HSBC). The convenience sampling method was employed to select the sample of IB and IB non-customers for this study. Secondary data were obtained from the various publications of the Ministries of Technology and Research, relevant banks' publications and official websites. Primary data for this research were gathered by posting and handing over the questionnaire to 600 customers of the selected three banks. The questionnaire was mailed and handed over to the customers of each bank along with a postage-paid return envelope and a cover letter explaining the purpose of the study. A total of 253 questionnaires were received resulting in a response rate of about forty two percent, which is typical for a study of this nature. However, only 240 questionnaires were useable as in the remaining questionnaires, substantial portions were not filled in. Therefore, the samples include 120 IB users and 120 IB non-users.

#### B. Analysis of Data

Analysis of the data was based on a binary Logistic Model for ungrouped binary data and statistical measurements: Central Tendency, Dispersion, Skewness, and graphs/tables. The following Logit model was utilized to analyze the demand for IB.

$$DB = f(AG, GE, MS, ED, PR, DS, IN, AW, TR)$$

Where,

DB = Demand for Internet Banking (1 = users, 0 = non-users)

- AG = Age
  - GE = Gender
  - MS = Marital status
  - ED = Educational background
  - PR = Incentives given by the bank to promote IB
  - DS = Distance to the bank branch
  - IN = Income
  - AW=Awareness
  - TR=Trust
- Thus,
- $$DB_i = L_i = \frac{P_i}{(1 - P_i)} = \alpha_1 + \beta_2 AG_i + \beta_3 GE_i + \beta_4 MS_i + \beta_5 ED_i + \beta_6 PR_i + \beta_7 DS_i + \beta_8 IN_i + \beta_9 AW_i + \beta_{10} TR_i + u_i$$

Here,  $\alpha$  is constant and  $\beta$ s are the coefficients estimated, and  $u$  is the error term. Data were analyzed using Eviews version 5 application to strengthen the accuracy of results. MS Excel software was also utilized for the purpose of analysing the collected data. McFadden  $R^2$  ( $R^2_{MCF}$ ),  $P$ , and Likelihood Ratio (LR) Statistic tests were utilized for testing the goodness of fit, statistical significance of the parameters and for testing the overall significance of the model. In addition, the Jarque-Bera (JB) test was used for testing Normality. Multicollinearity was tested by running the regression model, omitting one variable each time and observing how the coefficients and their relevant standard errors change.

### IV. DATA ANALYSIS AND FINDINGS

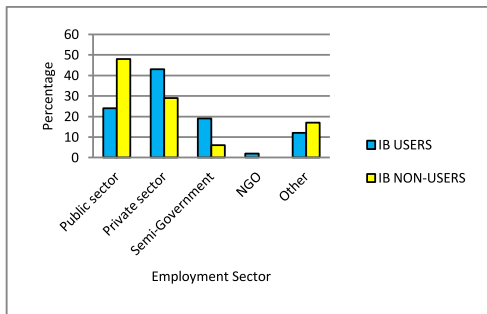
The banking sector plays a pivotal and responsible role in channelling public deposits for investment and consumption lending that ultimately assists in improving the standard of living and quality of life of the citizens of the country. Table 1 shows the development of banking sector in Sri Lanka.

**Table 1: Developments of the Banking Sector in Sri Lanka-2013**

Item	Number
Licensed Commercial Banks (LCBs)	24
Domestic banks	12
Foreign banks	12
Total no. of bank branches and other outlets	6,487
Total no. of Automated Teller Machines (ATM's)	2,538
Banking density: no. of bank branches per 100,000 persons	16.8

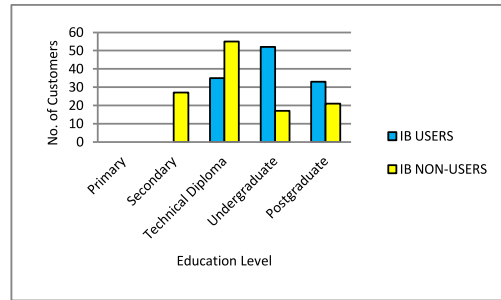
Source: Central Bank of Sri Lanka, 2013

It is often argued that there are demographic differences between IB users and IB non-users. It is also believed that the younger generations who are more computer literate and have an affinity to the web are more likely to adopt Internet Banking. Education level and income level significantly have an effect on the adoption of Internet Banking. Therefore, the demographic features of the IB users and the IB non-users in the sample respondents were analysed. Findings show that there is no significant difference between the mean ages of the two groups. The mean age of the IB non-users was 35 years while the IB users was 34 years. As per the graph 1, 43 percent of IB users are working in the private sector whereas it is 29 percent for the IB non-users.



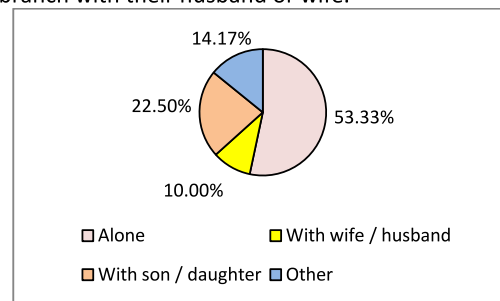
**Graph 1: Employment sector of the IB users and IB non-users**

The percentage of graduates and undergraduates in the group of IB users is 85 percent while the IB non-users is 38 percent, thus indicating that the two groups are not equal in terms of level of education. There is a significant proportion (27%) of IB non-users among those who have only secondary education. A significant difference can be seen in the average monthly income. The mean monthly income of the IB users was Rs. 59908.33 and for the IB non-users it was Rs. 40341.67. IB customers have more than one type of account. Thus, 46 percent of IB customers hold accounts in terms of saving, current and term deposits. A significant feature is that 89 percent of IB non-users have only savings accounts. Any one of both categories does not use current accounts alone. When the distance between the bank branch and the customer's residence is considered, the mean value of distance for IB non-users is 4.84 KM and that of IB users is 3.69 KM.



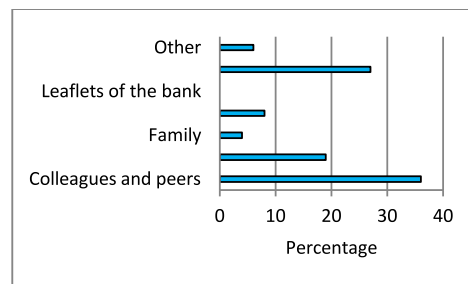
**Graph 2: Education level of IB users and IB-non users**

According to the survey, 52 percent of IB non-users have Internet access. About 69 percent of them are facilitated by Mobitel or Dialog. Also about 89 percent of IB users have Internet facilities through Mobitel or Dialog. Out of 120 IB non-users, 22.5 percent of customers visit the bank branch with their son or daughter and 10 percent visit the bank branch with their husband or wife.



**Graph 3: Visit to the bank branch by IB non-users**

Balance enquiry and payment of utility bills are the transactions that have a higher frequency among the two groups. The graph 4 exhibits that 36 percent of the customers have adopted the Internet Banking facility because of influence or recommendations by colleagues and peers. Self-awareness is at a significant level (27 percent) when compared with other influencing factors. As per the opinion of the customers, the bank leaflets had not contributed to the decision of the customers.



**Graph 4: Influencing groups on decision to adopt IB**

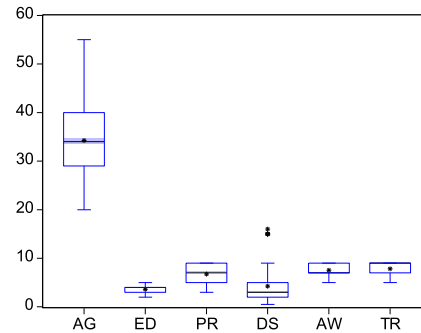
Table 2 indicates the factors that may compel people not to adopt Internet Banking services provided by their banks.

**Table 2: Factors that may compel people not to adopt Internet Banking services**

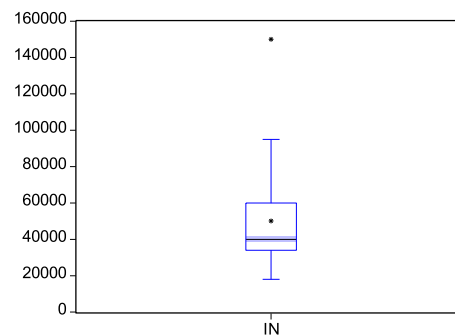
Factor	Percentage
Do not know much about Internet Banking (IB)	65.83%
Use of computer or/and Internet is difficult	19.17%
IB web pages are confusing	0.00%
Using IB can be complicated	38.33%
Using IB is difficult to understand	35.83%
IB transactions involve with complex procedures	17.50%
IB is only for computer experts	0.00%
Face to face interaction is important	32.50%
Absence of human element (people)	35.83%
Third party may be able to access my financial details	56.67%
Third party may track my bank usage patterns	28.33%
I am worried about the security of Internet Banking	71.67%
Upgrade browser software discourage Internet bank usage	0.00%

As per table 2, the most influencing factors for not adopting IB services are the security of Internet Banking (71.67%) and poor awareness on IB services (65.83%). Further, the majority of IB non-users have a fear on access for their financial details by third parties. The absence of the human element (people) and face to face interaction are also significant factors for not adopting the Internet Banking services provided by their banks.

The objective of utilizing the Logit model was to examine and analysis the impact of selected demographic and other variables on demand for Internet Banking in the selected three banks. In order to identify the outliers of the gathered data, box-plots presented in graphs 5 and 6 were used.



**Graph 5: Boxplots for Age (AG), Education (ED), Incentive (PR), Distance (DS), Awareness (AW) and Trust (TR)**



**Graph 6: Boxplot for income of the customers (IN)**

According to Graphs 5 and 6, 'distance to bank branch' and 'customer income' are shown outliers. The following summary output was derived after removing the outliers.

**Table 3: Results of the Logit Model for ungrouped binary data without outliers**

Variable	Coefficient	Std. Error	Prob.
AG	-0.262553	0.054927	0.0000
GE	-0.221880	0.438233	0.6126
MS	1.662916	0.580714	0.0042
ED	0.559911	0.282648	0.0476
PR	-0.346694	0.119885	0.0038
DS	-0.112038	0.066331	0.0912
IN	7.76E-05	1.73E-05	0.0000
AW	-0.244077	0.128693	0.0579
TR	-1.114158	0.197259	0.0000
C	15.63985	2.871321	0.0000

Mean dependent var	0.508547
S.D. dependent var	0.500999
S.E. of regression	0.331335
Akaike info criterion	0.754653
Sum squared resid	24.59143
Schwarz criterion	0.902316
Log likelihood	-78.29442
Hannan-Quinn criter.	0.814191
Restr. log likelihood	-162.1623
Avg. log likelihood	-0.334592
LR statistic (9 df)	167.7357
McFadden R-squared	0.517185
Probability (LR stat)	0.000000

Substituted Coefficients:

$$\begin{aligned}
 DB = & 1 - @LOGIT(-(-0.2625526376 * AG - \\
 & 0.2218804702 * GE + 1.662915936 * MS + \\
 & 0.559910624 * ED - 0.3466938922 * PR - \\
 & 0.1120384174 * DS + 7.757214352e-005 * IN - \\
 & 0.2440766814 * AW - 1.114158266 * TR + \\
 & 15.63984631))
 \end{aligned}$$

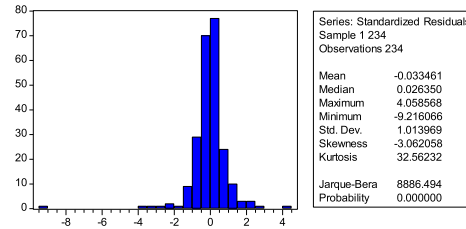
For a normally distributed variable,  $S=0$  and  $K=3$ . The Jarque-Bera (JB) test of normality is a test of the joint hypothesis that  $S$  and  $K$  are 0 and 3, respectively. The value of the JB statistics is expected to be zero. Therefore,

$H_0$ : Residuals are normally distributed

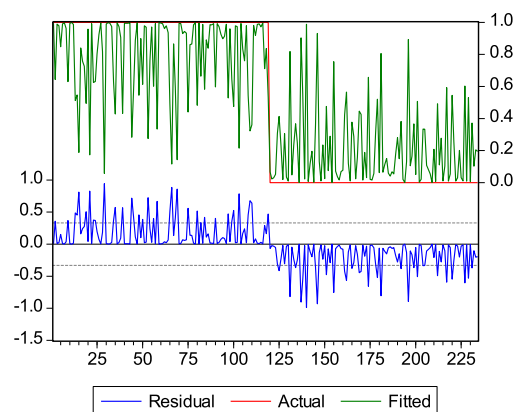
$H_1$ : Residuals are not normally distributed

Graph 7 depicts the Histogram of the residuals of the Logit Model and the Jarque-Bera statistic. Since the JB statistics of the Logit model is 8886.494 and the  $p$  value is zero, the null hypothesis is rejected. The assumption normality of  $u$  is not essential if the sample size is large. Therefore, the usual test procedures are still valid asymptotically (large sample). Value of the  $R^2_{MCF}$  in the Logit model is 0.52. Since the regressand in the logit model takes a value of 1 or zero, if the predicted probability is greater than 0.5, it is classified as 1, but if it is less than 0.5, it is classified as 0. However, in the binary

regression model, the goodness of fit is of secondary importance.



**Graph 7: Histogram of the residuals of the Logit Model**  
Graph 8 depicts the behaviour of the actual, fitted and residual of the Logit Model.



**Graph 8: Actual, fitted and residual graph of the Logit Model**

Likelihood ratio (LR) statistics with 9 degrees of freedom is 167.7357 and probability (LR stat) is 0.000000.

$H_0$ : all the coefficients are simultaneously equal to zero

$H_1$ : not all the coefficients are simultaneously equal to zero

Together all the regressors have a significant impact on the depended variable, as the LR statistics is about 167.74, whose  $p$  value is about zero and reject the null hypothesis that all the coefficients are simultaneously equal to zero. However, coefficients of GE (Gender) DS (Distance to the Bank Branch) and AW (Awareness) are not statistically significant as the  $p$  values are greater than the common alpha level of 0.05. Each slope coefficient in the estimated regression model is a *partial slope* coefficient and measures the change in the estimated logit for a unit change in the value

of the given regressor holding other regressors constant. Thus, the ED coefficient of 0.56 means, with other variables remains constant, but if ED increases by a unit, on average the estimated logit will increase by about 0.56 units suggesting a positive relationship between the two. The coefficient value of AG depicts a negative relationship between age and IB adoption. A one year increase in age (AG) decreases the odds of adopting IB by a factor of 0.769, adjusting for other explanatory variables. There is a positive relationship between education level and IB adoption. The odds of IB adoption are 1.751 times the odds of IB non-adoption for each one level increase in education (ED), adjusting for other explanatory variables. The odds ratio of 0.7070 relevant to PR indicates that the opinion of the customers on incentives given by the bank to promote IB and IB adoption are negatively related. For one unit increase in the degree of opinion on incentives, the odds of IB adoption is lower by 29.30 (=100-70.70) percent, adjusting for other explanatory variables. The odds ratio of 1.000 relevant to income (IN) indicates that one unit change in income results same probability of IB adoption and IB non-adoption, adjusting for other explanatory variables. There is a negative relationship between IB adoption and opinion on the degree of importance of trust. For one unit increase in the degree of opinion on trust, the odds of IB adoption is lower by 67.18 (=100-32.82) percent, adjusting for other explanatory variables. The antilog of the MS coefficient of 1.662916 is 5.274 ( $\approx e^{1.662916}$ ). This suggests that customers who are married are more than 5 times likely to get registered for Internet Banking services than customers who are not married, other things remains the same. Multicollinearity was tested by running the regression model, omitting one variable each time and observing how the coefficients and their relevant standard errors change. If they do not change too much, then there is no Multicollinearity problem. The test for the Multicollinearity indicates that the coefficient values of the original model do not vary with the models with omitted variables. Therefore, the estimated model does not face the problem of Multicollinearity.

#### IV. CONCLUSION

Analysis of the data was based on a binary Logistic Model for ungrouped binary data and Statistical

Measurements: Central Tendency, Dispersion, Skewness, and graphs/tables. The objective of the research was to examine the impact of selected demographic and other variables in demand for Internet Banking in the selected three banks. There appears to be a dearth of research efforts to determine the demographic factors affecting the acceptance of Internet Banking services. This gap was filled by this research effort. Coefficients of gender, distance to the bank branch and awareness are not statistically significant. Customers who are married are more than 5 times likely to get registered for the Internet Banking service than customers who are not married, other things remain the same. The opinion of the customers on incentives given by the bank to promote IB and IB adoption are negatively related. For one unit increase in the degree of opinion on trust, the odds of IB adoption is lower by 67.18 percent, adjusting for other explanatory variables. Consumers who have chosen not to adopt Internet Banking said that they were happy with their existing banking methods and expressed concerns over uncertain online security. Demographic variables such as age, education, marital status, trust are the relevant indicators of whether Internet Banking will be taken up or not with the exception of gender, distance to the bank branch and awareness. The Internet bank users appear to come from a more affluent stratum of society in Sri Lanka. This is not surprising since the more affluent are often the trendsetters and they are also less likely to be concerned with the risk of IB transactions in the light of their greater financial security and resilience. The fact that 100 percent of IB users hold executive positions tends to well establish this notion. IB customers are more educated than the IB non-customers. Most of them are at least high school graduates. However, most IB non-customers have only secondary education. It was also observed in this study that the IB users reside at the same distance from their bank branch of operation as the non-IB users reside from that of theirs. IB non-users would normally visit the bank branch with their family members, which in turn would raise their transaction cost. In Sri Lanka, banks as the Internet Banking service providers and customers as the beneficiaries are still not making real use of Internet Banking adequately. As a developing country it may be due to various problems and difficulties. Banks should implement strategies to increase IB usage and educate the public. Effective laws will vastly accelerate the development of Internet Banking in Sri Lanka.

Effective privacy protection laws considering the Internet environment will help to build trust and consumer confidence.

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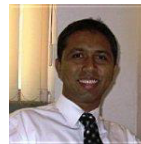
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