

Relationship of Perceived Behavioral Control and Adoption of Internet Banking in the Presence of a Moderator

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Abstract - *Internet banking is most remarkable in consumer banking segment alongside the fast-paced financial innovations. In practical scenario, internet banking is a contextual phenomenon. Hence, this research endeavored to determine the association of adoption and perceived behavioral control (PBC) variables on adoption of internet banking in the context of Sri Lankan commercial banks. Sample was drawn from the customers of three of the leading private banks. Accounts opening officials were selected as enumerators and data collected through self-administered questionnaires. Initially 450 research questionnaires were disseminated and only 307 were considered for the final data analysis. Principal factors of PBC were identified by conducting principal component analysis. TAM was extended using the PBC and constructs of the variables were measured by five-point Lickert scale. Hypothesis testing was conducted by correlation analysis afterwards, multiple regression analysis using hierarchical method along with diagnosis tests for outliers, residuals, influential cases performed while supplementary statistical tests namely, trend analysis and contrast test of ANOVA, ANCOVA and Hayes's process for moderation analysis were simultaneously used for further analysis. Empirical evidences supported two hypotheses indicating the positive relationships of PBC and adoption, towards internet banking acceptance. Additionally, it was exposed that there are significant differences between demographic variables. Third hypothesis based on the presence of differences in adoption of internet banking between low income category customers as against higher income categories was also supported accordingly. Subsequently, ANCOVA test identified that the covariate; age was not significantly related to the respondents' internet banking acceptance whilst the moderation analysis has confirmed relationship between PBC and internet banking adoption is being moderated by the age of the respondent. As a final note, researchers have forwarded several suggestions for internet banking service providers and system developers towards developing marketing strategies to enhance the adoption of internet banking.*

Keywords – Contrast tests, covariate, demographic variables, internet banking adoption, moderation effect, perceived behavioral control

INTRODUCTION

Sri Lankan banking sector continuously steers the financial sector growth, accounting for substantial 72.5% of the consolidated assets, regardless of the marginal expansion of service-based economic activities, while the country's economy being susceptible to multi-faceted disturbances as demonstrated by the macroeconomic indicators. Sri Lankan banking sector recorded acceptable capital ratios and liquidity positions over and above the stipulated

regulatory thresholds. Nonetheless, the profitability has weakened due to escalating operating expenses, inter alia. In order to address this large scale promoting of internet banking as a distribution channel is a necessity. Internet banking service could be elaborated as the enabling of consumer and corporate banking functions via banks' web site over internet media [1] [2]. Several researchers mainly focused on the examination of customers' attitude towards internet banking under four

factors (TAM with two additional factors); PEOU, PU, perceived risk (PR) and subjective norms (SN). Users' attitude towards online banking has a strong positive relationship with PEOU and PU while PR and the SN illustrate a weak positive relationship [3]. Some researchers using extended TAM with moderators shown that PU, PEOU, security aspects, social characteristics and the factor of perceived system quality were found to be the most dominant factors that explain the acceptance of internet banking (AIB) [4].

Extended TAM with a trust-based construct (perceived credibility factor) and two of the constructs that are connected to the resources (perceived self-efficacy aspect & perceived financial cost construct) also supported mobile banking adoption [5]. Indirect effect of the computer self-efficacy factor and the users' previous computer usage experience impact on the particular person's behavioral intention via PU and PEOU, was also noted by the researchers [6]. Intention of the user towards the usage of internet banking facilities, is unfavorably affected primarily by the diverse types of associated risks [7]. Self-efficiency feature was apparently the strongest antecedent of PEOU, that had both direct and indirect effects on the specific user's behavioral intention through PU in the context of services pertaining to mobile banking [8]. Furthermore, perceived self-efficacy variable segregates customers by their willingness onto the acceptance of mobile banking facilities [9]. The behavioral intentions of the user could be elucidated through the respective attitudes and the perceived behavioral control aspect (PBC) [10]. TAM is highly regarded as against both the TRA model and TPB model in illustrating the variance prevalent in actual behavior and also in terms of fit of the statistical model, explicitly in an internet banking service context. TAM has already proven outperformed both the TRA model and the TPB model and explanation that could be given is the TAM's usage of two of the specific well-known beliefs (PU and PEOU), which can be applied largely across whatever the kind of technology acceptance scenario in

different contexts alike [11]. TAM and perceived risk theory (PRT) supported for both the extended TAM research model and the specific hypotheses regarding the relationships between perceived risk aspect, PU construct, PEOU construct, user attitudes and user's behavioral intentions regarding internet banking services in Indian consumers' context [12].

OBJECTIVES OF THE STUDY

Primary objective of this research study was to analyze the effect of PBC on AIB in the context of Sri Lankan private commercial banks. Customer attitudes towards AIB, influence by family, friends and in general, societal influence, self-efficacy aspect of the customer and facilitating conditions which influence AIB are the constructs which were considered under the PBC. Identifying the influence by the TAM variables namely the PU and PEOU, is another objective of the study. Similarly, determining the effect of demographic variables on AIB is also tested during the research while specific attention was given to customers' age factor to assess its moderation impact in between PBC and AIB, in this particular research context. Moreover, differences in AIB by different income groups was also analyzed during the study.

MATERIALS AND METHODS

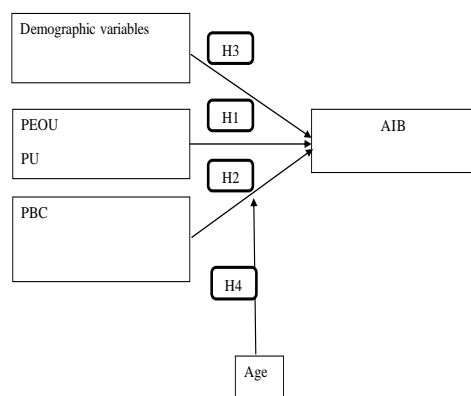
Primarily quantitative data were collected; operationalized the study in a way which enables the facts to be measured quantitatively and attempted to generalize the findings by using sufficient samples, following reductionism, structured methodology and maintaining the independency of the researcher. Considering that, deductive methodology and quantitative method has been used. Questionnaire survey was deemed suitable as the major part of the study is concerned with the respondents' perceptions of internet banking and how these perceptions impact the AIB. Questionnaires can be utilized to examine and explicate relationships in between variables [13]. Respondents were the customers of three leading Sri Lankan private commercial banks.

Respondents were selected on multi-level cluster sampling method as per provinces/districts and major cities in which these banks are in operation. Accounts opening officers attached to the banks were selected as enumerators of the data collection process. They have collected data via self-administered research questionnaires from respondents. In sum, 450 research questionnaires were circulated and only 307 questionnaires (68%) were considered for the subsequent data analysis.

CONCEPTUAL FRAMEWORK

Renowned TAM is an extended explanation of Ajzen and Fishbein's distinguished theory of reasoned action (TRA). Davis's TAM has applied broadly to understand users' adoption and usage of technology [14] [15] [16]. TAM was initially developed by well-known scholars, namely Fred Davis and Richard Bagozzi [14] [17]. TAM is an adaptation of TRA for the broad information systems subject area. TAM was originally used to examine internet banking acceptance by another researcher; Bhattacharjee [18]. Moreover, one among the few methods available for extending the TAM is to addition of predictors to the prevalent TAM predictors. Based on this discussion and review of literature, following conceptual model was proposed for the study.

Figure 1: Conceptual model



Among other factors, PEOU and PU are among two of the most influential factors that

describe AIB in Sri Lanka [4] [19] [20]. In a subsequent study experimental evidence for positive relationship in between PU, PEOU and social influence on positive attitude towards mobile banking adoption was identified [21]. Considering the aforesaid facts following hypothesis is proposed,

H₁1-There is a positive relationship with PU and PEOU on AIB

Perceived self-efficacy segregates customers by their willingness to adopt mobile banking [9]. Behavioral intention could be explicated through the attitude and perceived behavioral control [10]. Considering the aforementioned facts following hypothesis is proposed,

H₁2-There is a positive relationship with PBC and AIB

There are differences between demographic variables viz. age, income, education, occupation, banking experience and adoption of electronic banking. Further, comprehensive analysis recorded that consumer internet banking acceptance is greater for the high-profile long-standing customers with higher job positions [2] [22]. Considering the aforementioned facts following hypothesis is proposed,

H₁3-There is a difference in AIB between lower income category customers and higher income category customers

Yu (2012) identified considerable moderating effect of age between mobile banking adoption and following factors; facilitating conditions and perceived self-efficacy [23]. There is a significant moderation effect of age amongst the association of trust of e-services and online banking adoption [22]. Considering the aforementioned facts following hypothesis is proposed,

H₁4-There is a moderation effect of age on the relationship of PBC and AIB

RESULTS AND DISCUSSION

The IBM SPSS version 20 statistical package was used for data analysis of the research along with Hayes's process version 3.4 compatible for SPSS. Sample of the study

consisted of a higher proportion of male respondents (53.6 percent) than female respondents (46.4 percent). Further, majority of respondents being 61.8 percent were advanced level qualified personnel whereas others were professional and post-graduate qualification holder, respectively. In accordance with the age distribution statistics pertaining to the respondents, the vast majority of respondents (62.3 percent) were aged between 25–50 years and others were subsequently the respondents who aged above 50 years and the rest were aged below 25 years. Given the figures of the analysis 66.6 percent recorded in the income segment in between Rs.75,000/- to Rs.150,000/- being the majority. Therefore, as demonstrated, it is

evident that most of the demographic characteristics related to overall population are being replicated vastly by the designated sample chosen for the study.

In the meantime, as the PBC is a latent variable that could not be directly observed, principle component analysis (PCA) had to conduct at the very beginning of the data analysis. PCA has been conducted on the 24 items related to PBC with orthogonal rotation (varimax) [24]. Table 1 demonstrates the factor loadings subsequent to the rotation. The specific items that gather on same components suggested following factors accordingly, component one represents Attitudes, followed by subjective norms, self-efficacy and facilitating conditions.

Table 1-Summary of PCA results of PBC items (N=307)

Item	Rotated factor loading			
	Attitudes	Subjective Norms	Self Efficacy	Facilitating Conditions
Eigen values	7.12	1.97	1.34	1.26
Percentage of variance	30.89	7.81	5.89	5.81

Afterwards, a reliability analysis recorded Cronbach’s alpha values that are higher than 0.7 [25]. Furthermore, K-S test and Levene’s test performed to determine the normal distribution of respondents’ data and homoscedasticity where results were not significant for both the tests.

According to the descriptive statistics of the variables, all the composite means are at high level as the composite mean figures are all above 3.66 threshold (where 5 point Lickert scale figures starting from strongly agree, agree, neutral, disagree and strongly disagree, have been converted to high, medium and low values in the following manner, 1-2.33, low; 2.34-3.66, medium; 3.67-5, high, respectively). Composite mean of the adoption variable was 4.41 and there were two constructs namely PU and PEOU, for the main variable. There were four constructs for the PBC predictor variable and subsequently the composite mean was recorded at 3.68 whilst the dependent variable; AIB has recorded a 4.45 as the mean.

Pearson correlation analysis was performed in order to determine the relationship between AIB along with two predictor variables and correlation matrix of the variables is presented in table 2. Results of the analysis revealed that the AIB possesses a positive relationship with both PBC and adoption variables while both the relationships were significant at .01 level (1-tailed). The highest correlation coefficient figure ($r = .903$) was appeared between AIB and adoption variables which included PEOU and PU dimensions. Results denote that in order to improve the degree of AIB, it is vital to focus attention and promote PEOU, PU and PBC. Additionally, findings reinstated that both the directional hypotheses are supported by empirical evidence and could be established that AIB is positively correlated with both the adoption dimensions and PBC characteristics in the context of private commercial banks in Sri Lanka.

Table 2-Correlation matrix

	AIB	PBC	Adoption
AIB	1		
PBC	.871**	1	
Adoption	.903**	.849**	1

** Correlation is significant at the 0.01 level (1-tailed)

A multiple regression analysis was also conducted by using hierarchical method to predict the degree to which independent variables; adoption and PBC influence the AIB (Table 3a & Table 3b). In accordance with

model 1 (Table 3a), the overall variance of AIB explained by PBC is 71.5% as per the adjusted R square figure. As depicted by the significance value, model 1 is statistically significant.

Table 3a-Regression output and coefficients

	<i>t</i>	<i>Sig.</i>	β	<i>F</i>	<i>df</i>	<i>Sig. F</i>	Adj. <i>R</i> ²
				Change		Change	
Model 1				811.94	1	.000	.715
(Constant)	25.29	.000	2.301				
PBC	29.08	.000	0.693				

In accordance with model 2 (Table 3b), the overall variance of AIB explained by PBC and adoption is 85.9% as per the adjusted R square figure. According to the significance value, model 2 is also statistically significant. As implied by the beta values and t statistics, considering the strength of the influence of each independent variable on adoption of OB, the adoption dimension is the largest contributor with 15.24 t statistic and .620 standardized beta coefficient statistics, respectively. Furthermore, it is evident that both adoption and TES variables positively influence the adoption of

OB given the positive beta coefficient values and significance of same. Improvement from the model 1 to model 2 can be seen while observing the F change and R square change with the addition of adoption variable in addition to TES variable. For the model 1 F change is 881.14 and for the model 2 it is 232.27 in which both are significant. Similarly, explanation of adoption of OB only by TES was 76.6% and with the addition of adoption variable same has been increased to 87.4% reporting an R square change of 10.9%.

Table 3b-Regression output and coefficients

	<i>t</i>	<i>Sig.</i>	β	<i>F</i>	<i>df</i>	<i>Sig. F</i>	Adj. <i>R</i> ²
				Change		Change	
Model 2				232.27	1	.000	.859
(Constant)	17.99	.000	1.439				
TES	08.12	.000	0.349				
Adoption	15.84	.000	0.596				

Dependent variable: AIB

Predictors: (Constant), PBC, Adoption

For the current model the VIF and Tolerance values recorded as 3.135 and .213 which are accordingly, well below 10 and above 0.2; consequently, it could be safely concluded that there is no collinearity within the data. Even the average VIF which is also 3.135 is not substantially greater than 1 which also shows that there is no cause for concern.

With the purpose of determining the cases which are influencing the regression model, case-wise diagnostics were checked where any case (standardized residual) with Z value above/below ± 3.29 was not found which could have been an outlier. All the values of the Cook's distance also reported below 1 (case with maximum Cook's distance value is .05) indicating that there are no cases that are influencing the regression model. Also, there were no values greater than twice or three times the average leverage value (.02/.03). From the parameters for the Mahalanobis distance it was

With the aim of generalizing the model beyond the sample, analyzed the regression residuals and those were in order. Thus, it could be summarized that this particular model apparently seems to be both accurate for the specific sample and generalizable to the entire population of interest as the assumptions have already been met and could be safely assumed that this model would generalize to AIB in Sri Lankan context.

An independent t test was conducted by separating the sample into male and female

identified that if the sample is 100 with 3 predictors; crudely, values greater than 15 were problematic. However, in this study of 307 respondents with 2 predictors there were no values greater than 15 (case with maximum Mahalanobis distance value is 5.76). Further, DFBeta statistics could be scrutinized to find any case with a large influence on the regression parameters. An absolute value greater than 1 is problematic and in all the cases values lie within ± 1 , which demonstrates that these cases have no undue influence over the regression parameters. Similarly, upper and lower boundaries of covariance ratio (CVR) were calculated as 1.03 and 0.97 respectively. Cases that are outside these limits could be problematic where none of the cases have been found outside the limits; Hence, no alarms for deviations (case with lowermost CVR reported a value of 0.9795 and case with topmost CVR reported a value of 1.0258).

respondents to examine whether there are differences or similarities exist among the two gender categories of the sample. Consistent with the independent t test group statistics given in Table 4, there is a difference between AIB among males (mean = 4.5541) and female respondents (mean = 4.3374). Therefore, the mean value of AIB for males is greater than that of their female counterparts as per the results shown in the table.

Table 4-Group statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
AIB	Male	165	4.5441	.4151	.0341
	Female	142	4.3874	.4519	.0407

As demonstrated by the analysis results depicted in the Table 5, difference in the mean values of AIB is statistically significant since the *p* value is less than 0.5 (*p* value = .000). Accordingly, female customers' mean AIB is

comparatively less than males. In order to determine the effect size, coefficient correlation could be computed using the given *t* statistic and same is calculated as .28 reporting a lower size effect on AIB by males and females.

Table 5-Independent sample *t* test

	<i>t</i>	df	Sig. (2-tailed)
AIB	4.108	305	.000

Depiction of association among demographic variables and AIB is captured in Table 6a. One way analysis of variance (ANOVA) was executed with the purpose of testing whether there are differences between education, occupation, banking experience and AIB. Accordingly, it was noticed that there are significant differences exists among all the aforesaid demographic variables since the *p*

values of all the given variables are less than 0.5. Furthermore, a Turkey post-hoc test revealed that the highest occupation category (Senior managers and above) and highest in banking experience category: more than 20 years category, possesses more AIB as against other occupations and less than 5 years banking experience categories, respectively.

Table 6a-One way analysis of variance (ANOVA) results

	Sum of Squares	df	Mean Square	<i>F</i>	Sig.
Education	16.461	3	5.487	40.224	.000
Occupation	41.320	3	13.773	335.540	.000
Banking Experience	19.882	3	6.627	53.128	.000
Income	32.479	2	16.239	244.007	.000

So as to examine the specific hypothesis mentioned as, there are differences between lower income group and higher income groups, one-way ANOVA with planned contrasts was performed. Each contrast compared two ‘chunks’ of variance. The very first contrast is normally the experimental groups vs. control group (low income group; less than Rs.75,000/- vs higher income groups: middle income Rs.75,000/- to Rs.150,000/- and high income above Rs.150,000/-). To form the next contrast, took one of the chunks that contained more than one group (higher income group) and divided it into two chunks (middle income and high income). Consequently, results are as shown in the Table 6b and Table 6c.

There was a significant impact of income on AIB, $F(2, 304) = 244.007, p < .05, \omega = .80$. Secondly, there was a significant linear trend, $F(1, 304) = 459.97, p < .01, \omega = .78$, indicating that as the income increased, AIB increased proportionately. Similarly, there was a significant quadratic trend as well, $F(1, 304) = 9.66, p < .01, \omega = .12$, although the effect size is comparatively very low. Finally, planned contrasts revealed that having a higher income (middle and high income levels) significantly increased AIB compared to having a lower income, $t(304) = 21.80, p < .05$ (1-tailed), $r = .80$, and that having a high income significantly increased AIB compared to having a middle income, $t(304) = 10.53, p < .05$ (1-tailed), $r = .54$.

Table 6b- One way ANOVA-Trend analysis results

	Sum of Squares	df	Mean Sq.	F	Sig.
Between Groups (Combined)	34.479	2	17.239	244.007	.000
Linear Term Unweighted	32.497	1	32.497	459.972	.000
Weighted	33.796	1	33.796	478.353	.000
Deviation	.683	1	.683	9.661	.002
Quadratic Term Unweighted	.683	1	.683	9.661	.002
Weighted	.683	1	.683	9.661	.002
Within Groups	18.934	304	.071		
Total	53.413	306			

Table 6c- One way ANOVA-Contrast test results

Contrast	Value of Contrast	Std. Error	t	df	Sig.	
Assume equal variances	1	1.8647	.08555	21.796	304	.000
	2	.4810	.04567	10.531	304	.000
Does not assume equal variances	1	1.8647	.08314	22.429	60.925	.000
	2	.4810	.02169	22.174	174.000	.000

Analysis of covariance (ANCOVA) test also has been executed which compares several means, where it adjusts for the effect of one other variable, in this study it is particularly the age of the respondent, also known as a covariate, as in this research there were several experimental conditions and it was required to adjust for the age of the participants. Preceding to the analysis checked the independence of independent variable and covariate using ANOVA and results were not significant. Similarly, test of homogeneity of regression slopes (dependent variable and covariate) also

was checked by customizing the ANCOVA model and noticed that the independent variable and covariate interaction was not significant. Main findings of ANCOVA as depicted in Table 7, exposed that the covariate, participant's age was not significantly related to the participant's AIB, $F(1, 267) = 1.776, p > .05$, partial eta squared = .007. However, there was a significant effect of income levels on adoption of OB after controlling for the effect of participant's age, $F(2, 267) = 147.947, p < .05$, partial eta squared = .526.

Table 7- ANCOVA- Tests of between-subjects effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	P.E.S *
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Corrected Model	34.604 ^a 3	11.535	163.734	.000	.648
Intercept	277.211 1	277.211	3935.025	.000	.936
Age	.125 1	.125	1.776	.184	.007
Income	20.845 2	10.422	147.947	.000	.526
Error	18.809 303	.070			
Total	5433.694 307				
Corrected Total	53.413 306				

a. R Squared = .648 (Adjusted R Squared = .644), *Partial Eta Squared

Final output of the moderation analysis (Table 8) has shown a moderation effect pertinent to the significant interaction of PBC and age and in this study the interaction effect is highly significant, $b = -.23$, 95% confidence interval (CI) $(-.32, -.14)$, $t = -5.09$, $p < .01$, indicating that the relationship between PBC and AIB is moderated by the demographic construct, age. Enabling to interpret moderation effect it is required to examine the effect column of the output for moderation. For the relatively young customers (aged less than 25 years), there is a significant positive relationship which prevails between PBC and AIB, $b = .77$, 95% CI $(.69, .85)$, $t = 19.32$, $p < .01$. Likewise, significant

positive relationships could be observed for both the middle-aged; aged between 25 years to 50 years customers ($b = .64$, 95% CI $(.59, .69)$, $t = 25.72$, $p < .01$) and senior citizens; aged above 50 years ($b = .52$, 95% CI $(.46, .58)$, $t = 17.38$, $p < .01$) as well. These results specify that relationship of PBC and respondents AIB is similar for different age categories although senior citizens' relationship moderation effect of age is comparatively lower than that of youngsters and middle-aged customers. Particularly, for youngsters when PBC increases AIB increases to a greater extent in comparison to two other age categories.

Table 8- Moderation analysis output- as per Hayes's process version 3.4 for SPSS

	<i>b</i>	<i>SE B</i>	<i>t</i>	<i>p</i>
Constant	.53	.32	1.66	.0991
TES	1.05	.09	11.58	.0000
Age	.88	.17	5.21	.0000
TESxAge	-.23	.05	-5.09	.0000

CONCLUSION AND RECOMMENDATION

In keeping with the results of PCA, the items that gather around the same components noted that components represent; attitudes, subjective norms, self-efficacy and facilitating conditions factors, respectively based on the author's own labeling of the factors. In line with that, it could be arrived for composite figure to determine the PBC variable. Supportive to the empirical results given in preceding section, AIB

has been reinforced by adoption dimensions and PBC factors in the context of Sri Lankan largest private commercial banks. Furthermore, results of correlation analysis outcome noted that two above-mentioned predictor variables were positively associated with AIB. Additionally, there are empirical evidences supporting the positive relationship between adoption and PBC variables on AIB [2]. Consequently, the findings of present research study follow the previous

findings. Hence, norms on AIB, are applicable to the given context the same. Besides, main contributors towards AIB are PEOU and PU constructs. As per the regression analysis using hierarchical method, though adoption and PBC constructs are governing variables, there are other factors which were not discussed here that impacts the AIB. Concurring with previous research studies, independent *t* test showed that mean AIB of male customers is greater comparatively [19]. Nevertheless, present study revealed that there are significant differences are noticeable within most of the demographic factors. Additionally, this study revealed that long-term banking customers and customers who are holding higher level occupations adopt to a larger extent as against customers with comparatively short-term banking tenure and those with relatively low-level professions. Also, planned contrasts revealed that having a higher monthly income significantly increased AIB in comparison to having a lower income and that having a high income significantly improved

AIB compared to having a middle income. Another study identified that the covariate; age was not significantly related to the participant's AIB in this specific research context whilst the moderation analysis has established relationship between PBC and AIB is being moderated by age of the respondent which is in line with empirical evidences [23] [26].

Future researches could be designed by increasing the representation of the overall population to validate the research findings towards wide-ranging country contexts which encompasses both different cultural and societal perspectives. Correspondingly, varied research approaches, perspectives in conjunction with different adoption models combining different mediators, moderators will certainly add value for afresh researches [27]. Moreover, technology adoption could be further expanded to health care, hospitality and other numerous online service delivery industries alike, to better comprehend the acceptance of innovative technology in respective industries.

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