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User Intentions and Actions Towards Adoption of Technology Based Self-Service Banking Services: A MANOVA Analysis

Gayan Nayanajith, D. A. [1], Damunupola, K. A. [2] Ventayen, Randy Joy M. [3]
[1]Assistant Bank Manager, Sampath Bank PLC, Sri Lanka
[2]Senior Lecturer, Uwa Wellassa University, Sri Lanka
[3]Dean, College Business & Public Administration, Pangasinan State University, Philippines

Abstract *– Significance of perceived characteristics on intentions and actions towards technology-based self-service banking adoption in Sri Lankan commercial banks is being examined in this research. Students of University of Kelaniya, who are in possession of self-service banking facilities have been selected as the respondents of this study. Properly completed 268 research questionnaires were considered for data analysis. Technology acceptance model and theory of reasoned action have been adopted in conjunction for the research and constructs of the variables were measured using a five-point Lickert scale. MANOVA test, ANOVA with contrast tests and discriminant analysis for differentiation of variates were also used as analysis tools. Empirical evidence of the study supported both the hypotheses suggesting the significance of perceived characteristics and specified the importance of perceived ease of use, particularly. Restrained sample was a limitation of the current study. Nonetheless, findings of the research would be advantageous in uplifting the level of self-service banking adoption within Sri Lankan commercial banks. Multivariate analysis, incorporation of models that explains human behaviour towards technology adoption would contribute to originality of the research. In conclusion, future researches extending to different contexts by integrating similar models are necessitated in search of afresh findings.*

Keywords *– MANOVA, perceived characteristics, self-service banking, TAM, TRA.*

INTRODUCTION

Expansion of services related economic activities was recorded less than mid- single digit in 2018, in value added terms although banking services continued to dominate the financial sector, with more than two-thirds of the total assets of the financial sector (CBSL, 2018). Country's banking sector was resilience to both internal and external challenging conditions in 2018, delivering a growth of 9.5% for the first nine months in total assets which surpassed Rs.11 Tn at the end of the third quarter. Credit growth was moderated as a result of the increase in non-performing assets and due to tightening of monetary policy in the first half of 2018. However, interest income and fee-based income increased consistent with growth of international trade operations. Nevertheless, imports were vulnerable due to policy changes which hampered foreign investments and increased the cost and complexity of doing almost all businesses. Profitability of the banking sector declined slightly owing to increased impairment charges and higher amount of operating costs. Amidst these developments, CBSL has levied caps on bank lending rates which affect income and profitability significantly (Economic Research Department, CBSL, 2019). However, managing operational costs and improving other income sources could be concurrently facilitated by e-onboarding initiatives in line with promotion of technology-based self-service banking services. Perceived characteristics are one of the determinant aspects with reference to acceptance of technology-based self-service banking. Perceived ease of use, perceived usefulness and other perceived factors of customers, significantly affect accepting of state-of-the-art digital banking advancements from the perspective of customers (Gayan Nayanajith & Damunupola 2019; Gayan Nayanajith & Dissanayake, 2019).

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OBJECTIVES OF THE STUDY

Identifying the significance of users' perceived characteristics (PC) towards their intentions and actions on acceptance of technology-based self-service banking facilities (ATBSSBF) is considered as the primary objective of this research study. As the second objective, it was determined to examine the differences between three PC groups designated for the study (PC on ease of use-PCEOU, PC on usefulness-PCU and control group; other PC-PCOTH) towards intentions and actions on ATBSSBF.

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MATERIALS AND METHODS

Enabling to address the given research problem researchers have followed deductive methodology and quantitative method simultaneously (Nayanajith & Damunupola, 2019a & 2019b). Questionnaire survey was executed out of the students of University of Kelaniya, those who are possessing technology based self-servicing banking facilities of commercial banks. Respondents were selected on random sampling method in accordance with registration numbers pertaining to them. Totally, 400 number of questionnaires were distributed and 268 duly completed self-administered questionnaires were considered for the final data analysis.

Theory of reasoned action (TRA) assists in determining the affiliation between attitudes and behaviors (Fishbein, 1967). Technology acceptance model (TAM) considered as one of the most influential extensions of TRA according to the literature (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). TAM is the widely applied model on users' acceptance and usage of technology (Venkatesh, 2000). TAM was developed by two prominent researchers namely, Davis and Bagozzi (Davis 1989; Bagozzi, Davis & Warshaw 1992). TAM replaces many of TRA's attitude measures with the two technology acceptance variables '*ease of use'* and '*usefulness'*. TRA and TAM, both of which have strong behavioral elements, assume that when persons form an intention to act, they will be free to act without limitation. However, in the real world there will be many constraints, such as limited freedom to act and etc. (Bagozzi, Davis & Warshaw 1992). Another longitudinal study found unified theory (UTAUT), accounts for 7 per cent of the variance in behavioural intention towards use and about 50 per cent in the actual use (Venkatesh et al., 2003). Accordingly, following conceptual model was proposed,

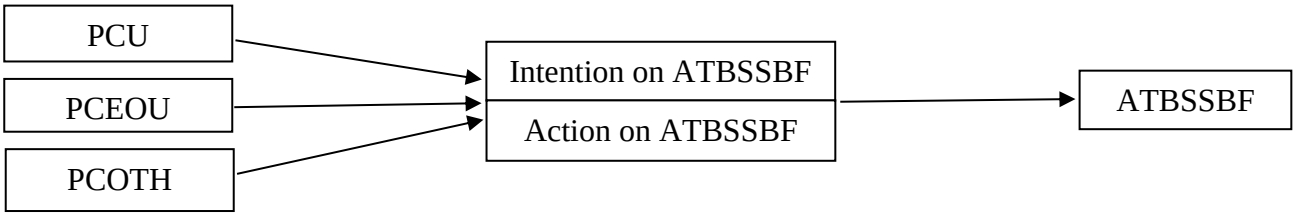

Figure 1- Conceptual model

Positive and significant effect of perceived characteristics on e-banking adoption have been identified (Gayan Nayanajith, 2019; Nayanajith & Damuupola, 2019a). Several research results shown that ease-of-use and usefulness, both have influence on innovative banking technology usage in banking (Lai, 2017; Rodrigues et al., 2016). A structural equation modelling analyses supported the impact of perceived privacy, perceived security, perceived usefulness on the customers' continued intention to use mobile banking (Baabdullah et al., 2019). Consecutively, following hypothesis is proposed,

$H_1$1- Perceived Characteristics are a significant determinant of intentions and actions towards ATBSSBF

A significant positive influence of perceived usefulness and ease of use on consumers' intention to adopt internet banking has been recognized (Chauhan et al., 2019). Behavioural intention is significantly influenced by perceived usefulness, perceived ease of use and perceived risk (Alalwan et al., 2019). Similarly, perceived usefulness, perceived ease of use, trust and perceived enjoyment are found to be immediate direct determinants of customer's attitude towards using internet banking (Bashir & Madhavaiah, 2015). The effect of perceived usefulness, trust and perceived ease-of-use on behavioral intention in mobile banking has also been identified (Gu et al., 2009). Accordingly, following hypothesis is proposed,

$H_1$2- There is a significant difference of perceived characteristics influenced by ease of use, as against usefulness

RESULTS AND DISCUSSION

Analysis of data was conducted using IBM SPSS v.20. It was noted that socio-demographic characteristics of the sample, replicates most of the characteristics of the population which qualifies the analysis to proceed, enabling to examine research questions. Descriptive

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statistics (table 1) demonstrates the overall means, group means and standard deviations for each dependent variable. Respondents possesses higher number of ATBSSBF-related intentions than adoption actions. Similarly, in comparison to control group, other 2 groups have recorded significant number of respondents demonstrating the importance of PCU and PCEOU factors.

Table 1-Descriptive Statistics

	PC	Mean	Std. Deviation	N
Action	PCU	3.2860	.27715	81
	PCEOU	3.9483	.62791	141
	PCOTH	3.6849	.58498	46
	Total	3.7022	.60896	268
Intention	PCU	3.9679	.60432	81
	PCEOU	4.5220	.43311	141
	PCOTH	4.1035	.46559	46
	Total	4.2756	.55469	268

Multivariate test statistics for the group variable are given below and partial eta squared denotes effect size (table 2). The group effects are of interest as they depict whether or not the perceived characteristics had an effect on the ATBSSBF. For these data, all the multivariate statistics namely, Pillai's trace, Wilks's lambda, Hotelling's trace and Roy's largest root, are all significant. Hence, could be noted that the type of perceived characteristics had a significant effect on ATBSSBF.

Table 2-Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
PC	Pillai's Trace	.285	22.924	4.000	552.000	.000	.142
	Wilks' Lambda	.727	23.769[b]	4.000	550.000	.000	.147
	Hotelling's Trace	.359	24.613	4.000	548.000	.000	.152
	Roy's Largest Root	.306	42.237[c]	2.000	276.000	.000	.234

a. Design: Intercept + PC

b. Exact statistic

c. The statistic is an upper bound on F that yields a lower bound on the significance level.

Table 3 contains the ANOVA summary table with figures only for PC, error and total for the dependent variables. There is a significant difference between perceived characteristics groups in terms of both ATBSSBF-related thoughts and ATBSSBF-related behaviors. These results led to conclude that the type of perceived characteristics has had a significant effect on the levels of ATBSSBF experienced by respondents. The multivariate test statistics directed to conclude that perceived characteristics has had a significant impact on ATBSSBF and the univariate results also indicated the same. Multivariate test takes account of the correlation between dependent variables and so for these data both univariate and multivariate tests had the power to detect group differences. In contrast, the univariate tests are not particularly useful in comparison to multivariate test results, for interpretation, because the groups may differ along a combination of the dependent variables as well.

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Table 3-Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
PC	Action	22.586	2	11.293	38.716	.000	.219
	Intention	17.917	2	8.958	36.566	.000	.209
Error	Action	80.506	276	.292			
	Intention	67.618	276	.245			
Total	Action	3927.167	279				
	Intention	5185.930	279				

a. R Squared = .219 (Adjusted R Squared = .213)

b. R Squared = .209 (Adjusted R Squared = .204)

Pattern of SSCP matrix as shown in the table 4, suggests that as the MANOVA is significant, it could be the relationship between dependent variables that is important, instead of the individual dependent variables.

Table 4-Between-Subjects SSCP Matrix

			Action	Intention
Hypothesis	Intercept	Action	3224.016	3718.329
		Intention	3718.329	4288.431
	PC	Action	22.586	19.091
		Intention	19.091	17.917
Error		Action	80.506	54.571
		Intention	54.571	67.618

Based on Type III Sum of Squares

The residual SSCP matrix shown below, includes the variance–covariance matrix and the correlation matrix (table 5). In this instance, the variances are quite similar; comparing .292 to .245, and the covariances (0.198) slightly different from zero.

Table 5-Residual SSCP Matrix

		Action	Intention
Sum-of-Squares and Cross-Products	Action	80.506	54.571
	Intention	54.571	67.618
Covariance	Action	.292	.198
	Intention	.198	.245
Correlation	Action	1.000	.740
	Intention	.740	1.000

Based on Type III Sum of Squares

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Table 6 presents contrasts of PCU vs. PCOTH and PCEOU vs. PCOTH, respectively. Comparing PCEOU to PCOTH notes that there are significant differences in intentions and actions, as indicated in level 2 Vs. level 3. Nevertheless, comparing PCU to PCOTH, there is no significant difference in thoughts but there is a significant difference in behaviors between the groups as per *p* values.

Table 6-Contrast Results (K Matrix)

PC Simple Contrast[a]			Dependent Variable	
			Action	Intention
Level 1 vs. Level 3	Sig.		.000	.114
	95% Confidence Interval for Difference	Lower Bound	-.583	-.304
		Upper Bound	-.215	.033
Level 2 vs. Level 3	Sig.		.002	.000
	95% Confidence Interval for Difference	Lower Bound	.096	.266
		Upper Bound	.430	.571

a. Reference category = 3

Table 7 shows the covariance matrices for separate groups indicating that intentions and actions are positively related in all three groups. Hence, as the number of intentions decreases, so does the number of actions. However, matrices don't illustrate about the substantive importance of the relationships and merely give a basic indication.

Table7-Covariance Matrices

PC		Action	Intention
PCU	Action	.077	.165
	Intention	.165	.365
PCEOU	Action	.394	.232
	Intention	.232	.188
PCOTH	Action	.342	.158
	Intention	.158	.217

Table 8 displays the discriminant function analysis statistics. Initially, shows the eigenvalues for each variate, then they are converted into percentage of variance accounted for, and the first variate accounts for a greater level of variance compared to the second variate which records only 14.8 per cent. The canonical correlation figures of .484 and .225 could be squared to use as an effect size.

Table 8-Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.306[a]	85.2	85.2	.484
2	.053[a]	14.8	100.0	.225

a. First 2 canonical discriminant functions were used in the analysis.

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Table 9 shows the significance tests of the variates. When both variates are tested in combination Wilks's lambda has the same statistics of .727 as in the MANOVA test. Note that the two variates significantly discriminate the groups in combination as per significant *p* values, and also the second variate alone is also significant. Hence, it is noted that group differences shown by the multivariate test could be explained in terms of two underlying dimensions in combination and individually by second one, as well.

Table 9-Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1 through 2	.727	87.857	4	.000
2	.949	14.293	1	.000

Following figure (Figure 2) shows group centroids as blue squares. The graph and the tabulated values of the centroids depicts that variate no.1 discriminates the PCEOU group from the PCU. The variate no. 2 differentiates the no-treatment group (PCOTH) from the two interventions, but on the other hand, this difference is not as significant as for the first variate.

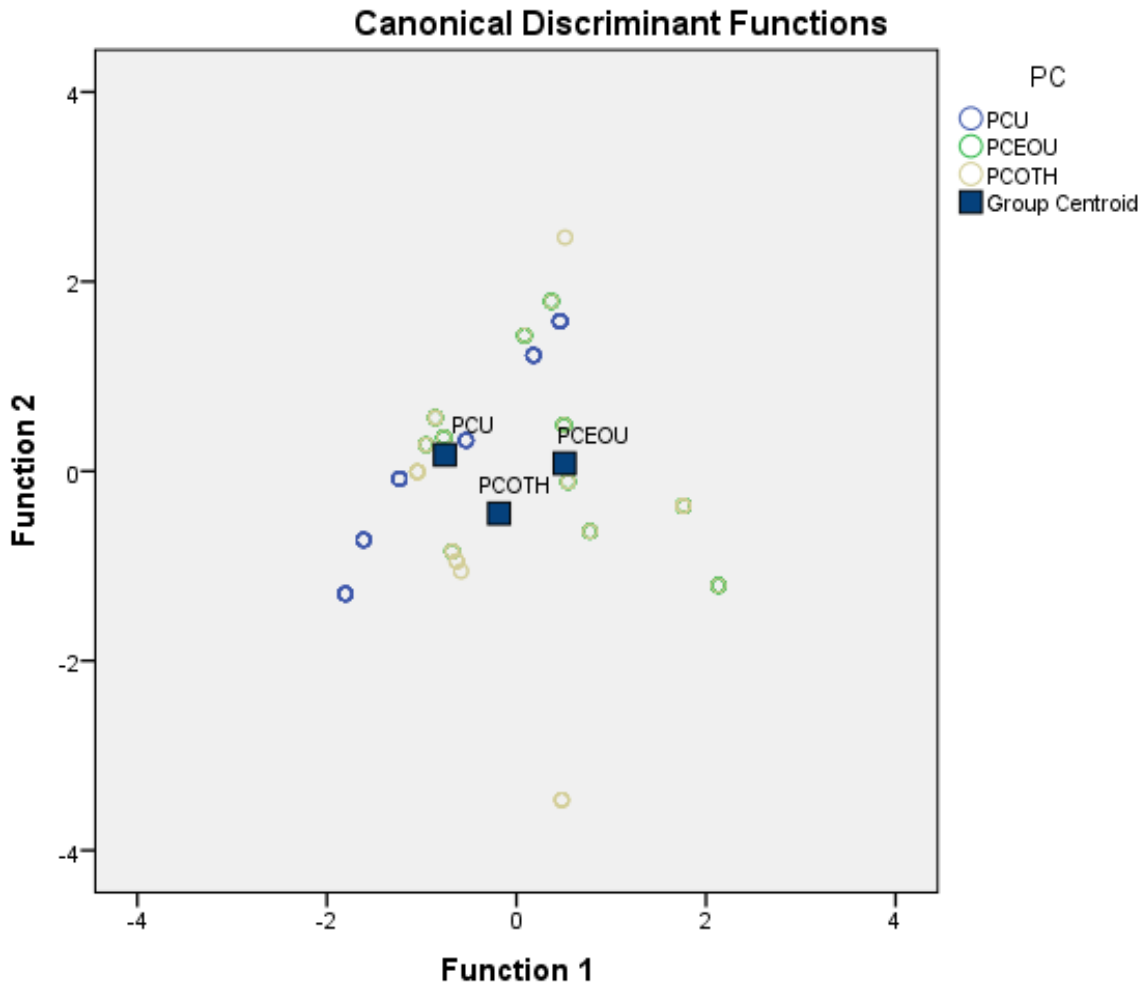

Figure 2-Combined groups plot

CONCLUSION AND RECOMMENDATION

In conclusion, data on means already given under the table 1 at the very beginning and means shown that PCEOU increases both the intentions and actions towards ATBSSBF. From the discriminant analysis it was observed that PCEOU and PCU can be differentiated from the control group based on variate 2, a variate that has a different effect on intentions and actions. Further, could be noted that PCEOU is better than PCU and no-treatment group at increasing intentions and actions related to ATBSSBF. Correspondingly, it was also discovered that PCEOU and PCU could be distinguished by variate 1, a variate that had the similar effects on intentions and actions on ATBSSBF.

MANOVA test statistics indicated that perceived characteristics have a significant effect on ATBSSBF and the univariate ANOVAs were also significant, suggesting that this might be in terms of either a combination or individual intentions or actions. Similarly, noticed that PCEOU is better at changing both actions as well as intentions on ATBSSBF. Therefore, it was noted that both the hypotheses have been supported by the empirical evidence of the research study. Thus, control group can be distinguished from the other two groups using the variate that has opposite effects on intentions and actions on ATBSSBF. Also, the PCEOU and PCU groups can be distinguished by the variate that has similar effects on intentions and actions. Further, PCEOU is better than both PCOTH and PCU, despite whether it's more important to consider intentions or actions with regard to promoting technology based self-servicing banking adoption within commercial banks.

The sample of respondents were limited only to the ATBSSBF possessing students of University of Kelaniya. Nonetheless, research findings could be applied taking into consideration of uplifting the level of digital banking adoption in Sri Lankan commercial banks. Banking institutions could pay special attention to highlight the ease of use of their self-servicing banking facilities and applications since the customers perceive this fact as an important aspect towards ATBSSBF. MANOVA analysis and incorporation of the aspect of perceived characteristics from technology acceptance model, would contribute towards originality of the research. Future researches focus attention towards different aspects of technology adoption and varied contexts on the lookout for afresh findings.

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