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Effects of Subjective Norms and Security on Online Banking Adoption: Multilevel Linear Model Analysis

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Abstract *- Robust macroeconomic performance is essential for an economic growth and development alongside challenging technology advancements. Within the service sector of the economy, one of the broadly studied areas of technological transformation is the retail financial services which includes consumer banking activities. Online banking enables customers to experience in a vast array of financial services through e-banking websites. Nevertheless, in practice; this phenomenon varies depending on the particular context. Hence, this research addresses the significance of subjective norms and security of e-services towards adoption of consumer online banking in the specified context. Sample was drawn from the students of the Kelaniya University those who are participating for the week-end study programs. The students of the doctor of business administration attached to the university were designated as enumerators of the data collection process. Data collection has been executed by way of self-administered questionnaires which were completed by the respective respondents. Initially 400 questionnaires were distributed and 287 duly completed questionnaires were considered for the final data analysis. TAM has been extended using the subjective norms and security of e-services variables and dimensions of the variables were measured by five-point Lickert scale. Reliability analysis was conducted to measure internal consistencies using Cronbach's alpha. In order to test the hypotheses anova, ancova and multilevel linear model used. The empirical evidence supported three hypotheses indicating the significance of the variables/constructs on adoption of online banking. In conclusion, researcher has presented several suggestions related to future researches on online banking adoption field.*

Keywords – Adoption, security of e-services, online banking, subjective norms, TAM

INTRODUCTION

Amidst the susceptibility of the economy to global and local disturbances, services sector turned out to be the stimulus of the Sri Lankan economic landscape which contributed most to the economy where services related economic activities expanded by 4.7 per cent in 2018 in value added terms in comparison to corresponding 3.6 per cent growth which was reported in the previous year. The progression of service sector activities during the year was essentially backed by the development in financial services activities together with the expansions in wholesale and retail trade activities without causing significant macro-prudential concerns amid critical market conditions. The banking sector of Sri Lanka continued to steer the financial sector performance while accounting for considerable 72.5 per cent out of the entire assets of domestic financial sector. However, the profitability of the banking sector has declined due to the rise in operating costs, among other things; whilst this could be addressed by promoting online banking services with a focused approach.

OBJECTIVES OF THE STUDY

Among other factors, Perceived e-security, PEOU and PU are several influential factors that explain the e-banking adoption in Sri Lanka [1] [2]. Another research outcome revealed the empirical evidence for a positive

relationship/association in between the variables of PU, PEOU and societal influence on positive attitude towards adoption of mobile banking technology in Indian context [3]. Hence, the specific objectives of this particular study were to identify the significance of the security of electronic services (Sec), subjective norms (SN) and interaction of SN and underlying reasons (R) of SN, on online banking adoption in the context of private commercial banks in Sri Lanka. Technology acceptance model (TAM) has been used in this study along with SN and Sec as the primary predictor variables. Researchers' attempts to expand the initial model of TAM (e.g., TAM2) have usually guided mostly by one of the three succeeding procedures: firstly, by integrating variables from interconnected models which emphasizes on customer adoption of innovative technology developments; secondly, extensions to TAM is mostly driven by means of integrating additional or alternative belief factors related to adoption, and lastly by way of exploring the effects of antecedents and moderators of TAM variables, viz. PU and PEOU. This model has been extensively being used in different contexts such as technology adoption in banking services, health care services, hospitality industry, online sales and etc. Model has already been used to explain usage intentions in terms of social influence which includes SN.

Besides identifying the effect of particular antecedents on adoption of e-banking, this study will support management of banks and other stakeholders, regulators and policy makers equally, particularly in Sri Lankan context, to address retail customers' perceptions and create mutually beneficial relationship for the betterment of the overall financial services industry and service sector all together. As the banking stems from the service sector, Sec and SN are paramount and the investment directed on such initiatives can be executed with a greater confidence upon the determination of the actual relationship of the constructs and the adoption of online banking given the escalated risk of threats on e-service platforms in the recent past.

MATERIALS AND METHOD

In this study deductive methodology and quantitative method has been used with questionnaire survey. Respondents of this research study were the students of the Kelaniya University those who were participating for the week-end study programs conducted by the university. They were selected on random sampling method as per registration numbers. The doctoral students of the doctor of business administration, had been elected as enumerators designated for this research's data collection process. In total 400 questionnaire items were disseminated across the respondents and subsequently, 287 properly completed questionnaires accounted for the process of final data analysis of the study.

RESULTS AND DISCUSSION

The IBM SPSS 20 statistical package was utilized as the main data analysis tool for the research study. The demographic characteristic structure of the research sample is in line to examine the research issue in the specified context as most of the demographic features of the population are replicated by the designated sample of the research study. To begin with, a reliability analysis by way of determining Cronbach's alpha coefficients were conducted with the aim of measuring the internal consistencies of the total scores for each of the scales (for both Sec and AOB variables) and both figures were above 0.8. Moreover, K-S test, Levene' s test and linearity tests were performed to ensure normality, homoscedasticity and

linearity where results were not significant for the tests.

Table 1 shows the results of one-way anova, analyzing the effect of SN on AOB, which is significant, F (1, 285) = 15.614, p = .000

Table 1-Anova results

	Sum of Squares	df	Mean Square	*F*	Sig.
Between Groups	2.928	1	2.928	15.614	.000
Within Groups	53.448	285	.188		
Total	56.377	286			

Table 2 shows the results of multilevel linear model (MLM) with only the fixed effect of SN, which is significant and similar to anova, F (1, 285) = 15.614, p = .000

Table 2-MLM results-III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	*F*	Sig.
Intercept	1	287	3625.973	.000
SN	1	287	15.723	.000

a. Dependent Variable: AOB.

Table 3 shows the results of ancova with security as a covariate in determining the effect of SN on AOB. Now, SN does not predict AOB, F (1, 284) = .748, p = .388. However, there is a significant effect of Sec on AOB, F (1, 284) = 634.65, p = .000

Table 3-Ancova results-Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	*F*	Sig.
Corrected Model	39.853[a]	2	19.926	342.488	.000
Intercept	35.459	1	35.459	609.450	.000
Sec	36.925	1	36.925	634.647	.000
SN	.044	1	.044	.748	.388
Error	16.524	284	.058		
Total	5726.500	287			
Corrected Total	56.377	286			

a. R Squared = .707 (Adjusted R Squared = .705)

Table 4 depicts results of MLM with fixed effects of SN and Sec. Even now, SN is not significant although the Sec is significant which is similar to previous ancova results.

Table 4-Reliability analysis of the variables-Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	*t*	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	2.2480	.107701	287	20.873	.000	2.036059	2.460029
SN	-.02545	.029284	287	-.869	.385	-.083099	.032180
Sec	.590894	.023333	287	25.325	.000	.544969	.636819

a. Dependent Variable: AOB.

Table 5 demonstrates the results of MLM with level 2 variable which is the bank. This considers the covariation within banks by including the hierarchical data structure and assumes that intercepts vary across banks. Allowing the intercepts to vary has made a difference to the model. Chi-square change (-2LL change) = -4.827 - -69.968 = 65.141, *df* change = 5-4 = 1, chi-square critical values with 1 *df* is 3.84 ($p < .05$) and 6.63 ($p < .01$); therefore, this change is highly significant; the fit of the model has significantly improved. Hence, it could be noted that the intercepts for the relationships between SN and AOB (when controlling for Sec) vary significantly across the different banks. By allowing the intercepts to vary, there is a new regression parameter for the effect of SN, which is .15 compared to -.03 when the intercept was fixed. In other words, by allowing the intercepts to vary over banks, the effect of SN has become comparatively higher positive from lower negative one. In fact, now SN is significant, F (1, 285.55) = 19.97, p = .000. This shows how, had the researchers ignored the hierarchical structure in the data, researchers would have reached very different conclusions than those mentioned in this section.

Table 5- MLM with level 2 variable (random intercepts-banks) results-Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	*t*	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	1.83480	.134014	31.515	13.691	.000	1.561661	2.107947
SN	.153149	.034271	285.545	4.469	.000	.085694	.220604
Sec	.629412	.021344	285.039	29.489	.000	.587400	.671423

a. Dependent Variable: AOB.

Including a random intercept has changed log-likelihood significantly. Hence, Table 6 shows the results with the addition of random slope. Chi-square change (-2LL change) = -69.968 - -116.427 = 46.459, *df* change = 6-5 = 1, chi-square critical values with 1 *df* is 3.84 ($p < .05$) and 6.63 ($p < .01$); therefore, this change is highly significant; the fit of the model has significantly improved when the variance of slopes included; there is significant variability in slopes.

Table 6- MLM with random intercepts (banks) and random slopes (SN) results-Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	1.75070	.193196	7.595	9.062	.000	1.301026	2.200388
SN	.203444	.114150	4.157	1.782	.147	-.108809	.515698
Sec	.634581	.019406	283.545	32.701	.000	.596383	.672778

a. Dependent Variable: AOB.

As there is significant variability in slopes, now check whether the slopes and intercepts are correlated (or covary). In the previous analysis 'variance components' assumed covariance between intercepts and slopes were zero. Hence, only the variance of slopes has been estimated. Now, covariance being included by selecting 'unstructured' and results given in table 7.

Chi-square change (-2LL change) = -116.427 - -121.408 = 4.981, *df* change = 7-6 = 1, chi-square critical values with 1 *df* is 3.84 ($p < .05$) and 6.63 ($p < .01$); fit not improved at $p < .01$, now SN Not Significant $p = .269$, However, Sec Significant, $p = .000$, variance estimates for the intercept (.113) and slopes (.043) and their associated significance (-.061) (covariance of slopes and intercepts) based on Wald test, confirms this as all the estimates are not significant. As the covariance is negative, it indicates a negative relationship between the intercepts and slopes. Since the research is looking at the effect of SN on AOB in 4 different banks, this means that, across these banks, as the intercept for the relationship between SN and AOB increases, the value of the slope decreases. Variance of the slopes (.043) indicates that how much the slopes vary around a single slope fitted to the entire data set (i.e., ignoring the bank from which the data emanated). This confirms what the chi-square test illustrated: that the slopes across banks are not significantly different.

Therefore, could be concluded then that the intercepts and slopes for the relationship between SN and AOB (when controlling for Sec) do not vary significantly across the different banks. By allowing the intercept and slopes to vary there is also a new regression parameter for the effect of SN, which is .159 compared to .153 when the slopes were fixed. In other words, by allowing the intercepts to vary over banks, the effect of SN has increased very slightly and it is still not significant, F (1, 3.592) = 1.709, $p = .269$. This demonstrates that even if the hierarchical structure in data, has been ignored same conclusion would have been reached in this scenario, as per the analysis.

Table 7-MLM with covariance between intercepts and slopes-Estimates of Covariance Parameters[a]

Parameter	Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Residual	.03521	.00297	11.825	.000	.029835	.041561

Intercept + SN [subject = Q4_Bank]	UN (1,1)	.11306	.09275	1.219	.223	.022647	.564483
	UN (2,1)	-.0614	.05475	-1.123	.261	-.168804	.045828
	UN (2,2)	.04351	.03663	1.188	.235	.008356	.226638

a. Dependent Variable: AOB.

Chi-square change (-2LL change) = -121.408 - -187.098 = 65.69, *df* change = 9-7 = 2, chi-square critical values with 2 *df* is 5.99 ($p < .05$) and 9.21 ($p < .01$); fit improved, now SN Significant, $p = .034$, Sec is also Significant, $p = .000$, R Significant, $p = .049$, SN x R Significant, $p = .000$, regression coefficient of SN = .425, All predict AOB, Values of variables of intercepts/slopes and covariance not significant. Interaction term is the most interesting effect, since this shows the effect of R for SN, taking ac of whether or not the respondent had SN (table 8).

Table 8-MLM with the addition of reason (R) towards SN and interaction (SN x R)-Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	*t*	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	1.87783	.261170	17.904	7.190	.000	1.328922	2.426741
SN	.425807	.148915	5.139	2.859	.034	.046101	.805514
Sec	.571683	.024157	283.43	23.665	.000	.524133	.619234
R	.153230	.077619	280.25	1.974	.049	.000439	.306021
SN * R	-.21992	.045524	280.08	-4.831	.000	-.309542	-.130315

a. Dependent Variable: AOB.

For the respondents those with SN considering PEOU, SN did not significantly predict AOB, $b = .113$, t (3.949) = .905, $p = .417$. The positive gradient showed that in these people, AOB is higher after the SN compared to the control group. Further, for those who had SN considering PU also, SN did not predict AOB, $b = -.0630$, t (27095.493) = -.217, $p = .828$. However, the slope was negative, indicating that people who had SN considering PU, scored lower on AOB, than those who did not have SN (Although this is not significant). The interaction effect, hence, reflects the difference in slopes for SN as a predictor of AOB in those who had SN considering PEOU (slight positive slope) and those who had SN considering PU (slight negative slope). In conclusion it could be noted that AOB, after controlling for Sec, was lower for those who has SN considering PU than those who had SN considering PEOU. This senses that for those who had SN considering PEOU, the SN has probably brought easiness and therefore, their adoption increase while those had SN considering PU, may get to know that usefulness was not the cause for non-adoption, and hence, their AOB is lower (table 9 & table 10).

Table 9-MLM rerun results separately for different 2 reasons by removing R and interaction of R and SN by splitting the file- SN considering PEOU-Estimates of Fixed Effects[a,b]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	2.32346	.238606	9.995	9.738	.000	1.791783	2.855153
SN	.113819	.125827	3.949	.905	.417	-.237320	.464958
Sec	.525894	.027650	187.694	19.020	.000	.471349	.580438

a. R = PEOU

b. Dependent Variable: AOB.

Table 10-MLM rerun results separately for different 2 reasons by removing R and interaction of R and SN by splitting the file- SN considering PU- Estimates of Fixed Effects[a,b]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	3.18838	.363902	27751.58	8.762	.000	2.475118	3.901647
SN	-.06302	.290607	27095.49	-.217	.828	-.632626	.506584
Sec	.327727	.008926	91.127	36.715	.000	.309996	.345458

a. R = 2

b. Dependent Variable: AOB.

CONCLUSION AND RECOMMENDATION

Present study was executed to determine the significance of SN, Sec, R and interaction of SN and R on AOB in the context of top four private commercial banks in Sri Lanka, where the data had two levels of hierarchy; namely individual and bank levels. MLM with random slopes, random intercepts with provisions for covariance of random intercepts and random slopes, illustrated that SN, Sec, R and interaction of R and SN, all predicts AOB significantly. The interaction effect indicated that the difference in slopes for SN as a predictor for AOB, in those who had SN considering PEOU (slight positive slope) and those who had SN considering PU (slight negative slope). The empirical evidence supported the first and second hypotheses suggesting the significance of SN, Sec on AOB. Moreover, interaction of SN and R also significantly predicted AOB. Additionally, there were previous empirical evidences to support a positive relationship of perceived security of e-services on e-banking adoption [4] [5].

Since there were restrictions due to time and other resources, future researches could be performed with enriched representation of the entire population to validate the research findings in search of diverse findings in different country, cultural and social contexts by incorporating different models and perspectives.

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