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Website Usability, Perceived Usefulness and Adoption of Internet Banking Services in the Context of Sri Lankan Financial Sector

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Abstract - *Research evaluates the effects of website user friendliness or in a broader sense: web usability (UF), perceived usefulness (PU) and interactions towards internet banking adoption in the context of Sri Lankan commercial banks and finance companies. Sample consisting 60 respondents, was drawn from the students of Uwa Wellassa University considering the simple random sampling method. Questionnaire survey was performed amongst each of 30 male and female respondents in which they were requested to rate nine internet banking websites of aforesaid institutions (segregated considering UF-very high/high/average and PU-very high/high/average attributes and designated nine websites as first being UF-very high and PU-very high and following the same sequence) out of total score of 100 with respect to adoption of internet banking services (AoIBS). TAM and E-SERVQUEL models have been adopted. Mixed design ANOVA was used as the primary analysis tool. Empirical evidence supported all the four hypotheses indicating the significance of levels of UF, PU and interactions on AoIBS. Non evaluation of sub interactions on UF * PU and Gender * UF * PU was a limitation of the present study. However, findings of the research would be beneficial in uplifting the status of internet banking adoption in Sri Lanka across the entire banking and financial institutions. Mixed ANOVA analysis and incorporation of aforementioned related models would contribute towards originality of the study. Similarly, future researches could be performed in different contexts alongside related variables in quest of innovative findings.*

Keywords – Financial sector, internet banking, mixed design ANOVA, PU, web usability

INTRODUCTION

Complex computer systems find their way into contemporary human life styles and simultaneously, the online market space is saturated with competing products and services across different industries in connection to internet related business operations. This has made web usability more popular and broadly recognized in recent years as the companies identify the benefits of researching and developing customer-oriented products and services as against merely focusing on technology orientation. In this context, web usability factors encompass numerous aspects such as small learning curve, easy content exploration, findability, task efficiency, user satisfaction, automation and voice commands and etc. These novel components of usability are present as a result of the rapid evolution of the web and personal devices. In view of growing

number of websites, the necessity has arisen for well-designed websites in a fiercely competing market condition. By means of high usability, users can find what they are looking for instantly. Along with the wide spread mobile devices and wireless internet access, companies are now able to reach a global market with users of all nationalities at any time and almost any place in the world. It is important for websites to be usable despite of users' language, culture and preferences. Nowadays most of the individuals conduct wide array of personal activities in online medium, including banking transactions, e-learning, e-tourism activities, errands, etc., which offers the people enhanced convenience and comfort. Websites are meant to be accessible for diverse users. The goal of Web usability is to provide user experience satisfaction by minimizing the time taken from the user to learn new functionality and page navigation system, allowing the user to accomplish a task or obtain a service efficiently without major drawbacks, providing the user easy ways to overcome roadblocks and fixing errors and re-adapting to the website or application system and functionality with minimum effort.

According to ISO 9241(Ergonomic Requirements for Office Work with Visual Display Terminals), usability has been elaborated as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use". Thus, web usability can be defined as the ability of web applications to support web-related tasks with effectiveness, efficiency and satisfaction. Effectiveness represents accuracy and completeness when users achieve a specified goal. Efficiency is resource cost in relation to the accuracy and completeness. Satisfaction is the comfort and acceptability of use. Meanwhile, Central bank of Sri Lanka (CBSL) encourages usage of the digital platforms in financial services with a view to eliminate the frequent cash transactions and continuously facilitates the industry in creation of an environment where industry embraces technology advancements wholeheartedly. Consequently, inter-industry collaborations to strengthen dynamic partnerships enabling to implement fintech solutions and open application programming platforms are well within the recent priorities undertaken by the regulator [1].

OBJECTIVES

Primary objective of the study is to identify the impact of internet banking website user friendliness (UF) and websites' perceived usefulness (PU) towards users' adoption of internet banking services (AoIBS). As the second objective, proposed to recognize the interaction effects of UF * PU and UF * PU * Gender.

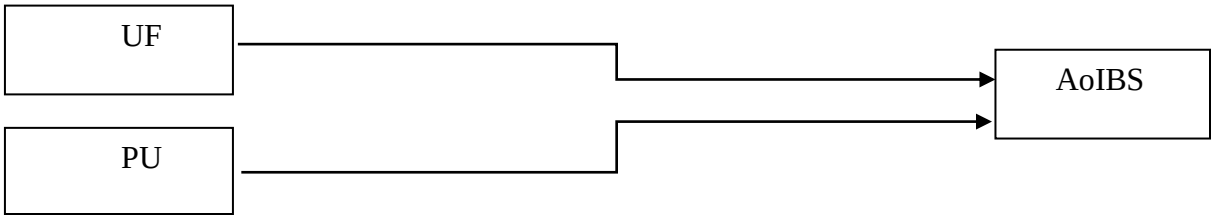
METERIALS AND METHODS

Deductive methodology and quantitative method have been followed [2] [3]. Questionnaire survey was conducted among 30 male and 30 female students of Uwa Wellassa University (UWU), during which they have been requested to rate nine separate internet banking websites (segregated according to website UF; very high, high, average and PU of websites; very high, high, average; first internet banking website designated as UF-very high / PU-very high, second website designated as UF-very high / PU-high, third website designated as UF-very high / PU-average and other websites also designated accordingly as per author discretion) out of a total score of 100 in relation to adoption of internet banking services. Respondents were selected on random sampling method as per registration numbers assigned to them by the UWU.

Technology acceptance model (TAM) and UF as a website design related construct of E-SERVQUEL model, have been adopted in

arriving at the conceptual model. Accordingly, succeeding conceptual model was proposed,

Figure 1 – Conceptual model



Hypotheses of the Study

Website usability/user friendliness, web security aspects have been researched in different country perspectives in relation to online banking services [4] [5]. Influence of PU, perceived ease of use (PEOU), website attributes and other factors have been evaluated in adopting internet banking services across numerous countries and it was found that aforementioned factors are significant towards internet banking adoption [4] [6] [7] [8] [9] [10]. Researchers have discussed the effects of UF, PU, PEOU and interrelationships among the said factors on various electronic services including internet banking in relation to usage of mobile devices, personal computers and other devices [4] [11] [12]. Similarly, studies have identified effects of gender and demographic variables towards adoption of internet services including e-banking during which some of the studies have identified and analyzed moderating effects and interactions effects in different contexts [13] [14] [15] [16]. Considering the aforesaid, following hypotheses were proposed,

$H_1$1- There is a significant impact of level of UF towards AoIBS

$H_1$2- There is a significant impact of level of PU on AoIBS

$H_1$3- There is a significant impact of interaction of UF * PU and AoIBS

$H_1$4- There is a significant impact of interaction of UF * PU * Gender on AoIBS

RESULTS AND DISCUSSION

SPSS V. 20 was used in analyzing data and initial analysis demonstrated that socio-demographic characteristics of population have been sufficiently replicated by the sample. Table 1 demonstrates the results of Mauchly's sphericity test for each of the three repeated-measures effects in the model. None of the effects violate the assumption of sphericity as all of the values in the column labelled Sig. are above the threshold value of .05; thus, it enables to assume sphericity when looking at *F*-statistics in the subsequent tables [17].

Table 1 - Mauchly's Test of Sphericity[a]

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	Sig.	Epsilon[b]		
				Greenhouse-Geisser	Huynh-Feldt	Lower-bound
UF	.960	2.315	0.314	.962	1.00	.500
PU	.929	4.178	0.124	.934	.981	.500
UF * PU	.613	27.577	0.061	.699	.766	.150

Following table (table 2) shows the ANOVA summary table for the main effect of gender and this reveals a non-significant effect, $P > .05$. This effect states that ignoring all other variables, male participants' ratings were basically the same as the female participants' ratings. Partial eta squared statistic revealed that the effect is negligible.

Table 2 - Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	282083.267	1	282083.267	64563.343	.000	.999
Gender	.067	1	.067	.015	.902	.000
Error	253.407	58	4.369			

Following table also supports the above finding, where means are almost the same for both the genders.

Table 3 – Estimates

Gender	Mean	Std. Error	95% Confidence Interval (CI)	
			Lower Bound (LB)	Upper Bound (UB)
Male	68.600	.382	67.836	69.364
Female	68.533	.382	67.769	69.297

Consistent with table 4, it is noted that there was a significant main effect of UF, F (2, 116) = 1365.36, P = .000. This effect shows that, ignoring all other variables, AoIBS ratings were different for different levels of UF such as very high, high and average levels. This finding supports the first hypothesis.

Table 4 - Tests of Within-Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared (P.E.S.)
UF	Sphericity Assumed	62338.900	2	31169.450	1365.360	.000	.959
	Greenhouse-Geisser	62338.900	1.923	32409.826	1365.360	.000	.959
	Huynh-Feldt	62338.900	2.000	31169.450	1365.360	.000	.959
	Lower-bound	62338.900	1.000	62338.900	1365.360	.000	.959

Table 5 demonstrates UF levels, means, confidence intervals, in which UF level 1 is very high user friendliness of website, level 2 is average and level 3 is high. This sequence was used to compare UF-very high Vs average (1 Vs 2) and UF-high Vs average (3 Vs 2) as a separate analysis in a subsequent study.

Table 5 - Estimates

UF	Mean	Std. Error	95% CI	
			LB	UB
1	82.100	.363	81.372	82.828
2	55.817	.363	55.091	56.543
3	67.783	.457	66.869	68.697

As per the table 6 with the heading of 'tests of within-subjects effects' it could note that there was a significant main effect of PU, F (2, 116) = 1057.70, P = .000. This effect states that ignoring all other variables, AoIBS ratings were different for websites with different levels of PU such as very high PU, high PU and average PU, supporting the second hypothesis.

Table 6 - Tests of Within-Subjects Effects

Source	Type III Sum of Squares		df	Mean Square	F	Sig.	P.E. S
PU	Sphericity Assumed	69700.800	2	34850.400	057.694	000	948
	Greenhouse-Geisser	69700.800	1.868	37313.284	057.694	000	948
	Huynh-Feldt	69700.800	1.961	35542.059	057.694	000	948
	Lower-bound	69700.800	1.000	69700.800	057.694	000	948

As per table 7, PU levels's means, CI are different from one another and the levels of PU are labelled simply 1, 2 and 3, where level 1 is very high PU, level 2 is average PU and level 3 is high PU.

Table 7 - Estimates

PU	Mean	Std. Error	95% CI	
			LB	UB
1	82.100	.563	80.974	83.226
2	54.300	.319	53.661	54.939
3	69.300	.408	68.484	70.116

In accordance with 'tests of within-subjects effects' titled table 8, the UF of the website interacted in some way with how useful the web-site was. From the summary table it could report that there was a significant interaction effect in between the UF of the website and the PU of same, F (4, 232) = 118.04, P = .000. This effect tells that the profile of ratings across websites of different levels of PU was different for very high user friendliness of website, high and average level user friendly websites. The estimated marginal means (Figure 1) shows that the meaning of this interaction while supporting the third hypothesis of the study.

Table 8 - Tests of Within-Subjects Effects

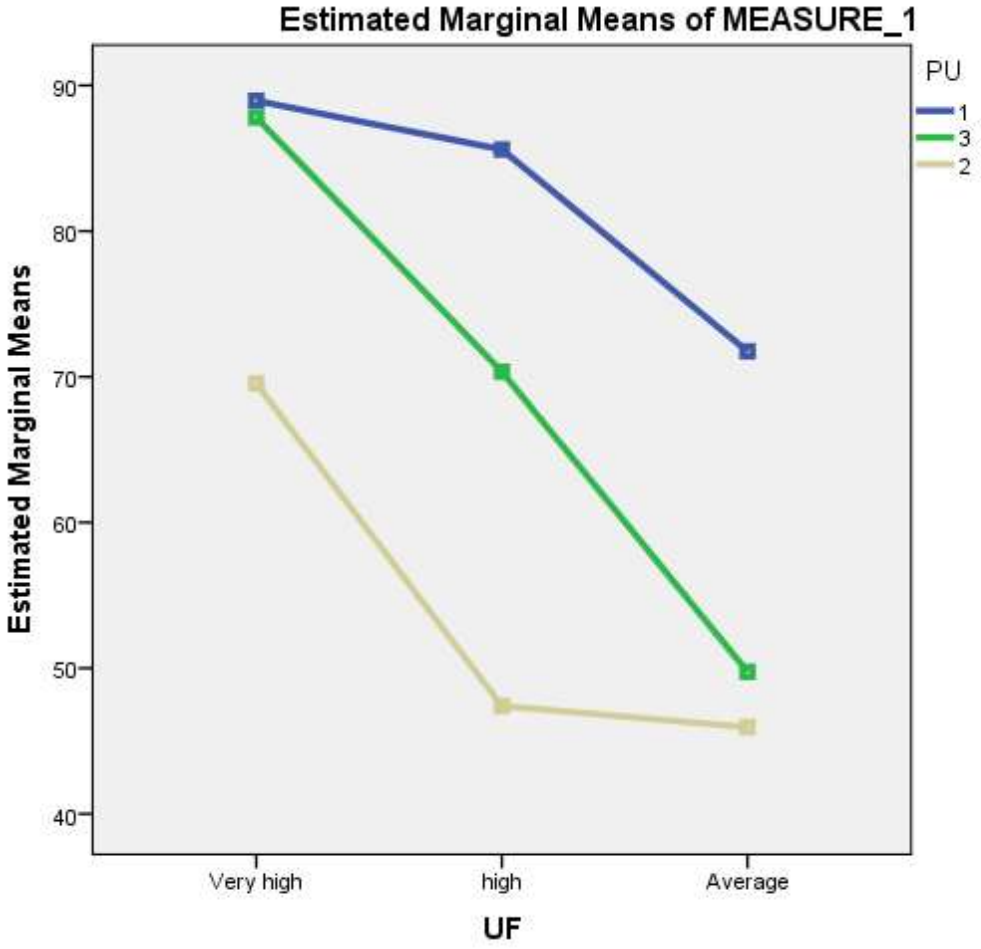
Source	Type III Sum of Squares		df	Mean Square	F	Sig.	P.E.S
UF * PU	Sphericity Assumed	12165.800	4	3041.450	118.038	000	.671
	Greenhouse-Geisser	12165.800	3.197	3804.884	118.038	000	.671
	Huynh-Feldt	12165.800	3.464	3511.903	118.038	000	.671
	Lower-bound	12165.800	1.000	12165.800	118.038	000	.671

Table 9 - UF * PU interaction

UF	PU	Mean	Std. Error	95% CI	
				LB	UB
1	1	88.950	.770	87.408	90.492
	2	69.550	.568	68.414	70.686
	3	87.800	.784	86.230	89.370
2	1	71.750	.696	70.357	73.143
	2	45.950	.416	45.118	46.782
	3	49.750	.674	48.400	51.100
3	1	85.600	.959	83.681	87.519
	2	47.400	.494	46.410	48.390
	3	70.350	.653	69.043	71.657

Figure 2 illustrates that the average AoIBS ratings of websites of different levels of UF when the website also had very high levels of PU (blue line), high PU (green line) and average PU (white line). Initially, look at the difference between very high user friendly and high user-friendly websites. The slope in very high PU websites doesn't change (the line is more or less flat between these two points), but for websites with high PU or average PU, AoIBS interest levels decline. So, if the websites' PU is very high, it can grab customers, with being high UF and customers will still want to transact with that website. Now, investigate the difference between high UF and average UF websites, a different pattern is observed. For the websites with average PU (white line) there is no difference between average UF and high UF websites (this means that if the website's PU is just average, it has to be very high UF if the customers need to adopt it). Nonetheless, for those with comparatively higher PU, there is a decline in adoption interest if the website is average UF (so, if the website is average UF, having higher PU won't help it very much). Although this interaction is complex, it could be analyzed separately using the contrasts in SPSS for four different situations in detail.

Figure 2 – UF Vs PU



Finally, the three-way interaction estimates whether the UF × PU interaction described above is the same for respondent men and women (i.e. whether the combined effect of UF of the website and websites' level of PU is the same for male participants as against for females). Table 10 shows that there is a significant three-way UF × PU × gender interaction, F (4, 232) = 77.71, P = .000, whilst supporting the fourth hypothesis (as per 'tests of within-subjects effects' named table).

Table 10 - Tests of Within-Subjects Effects

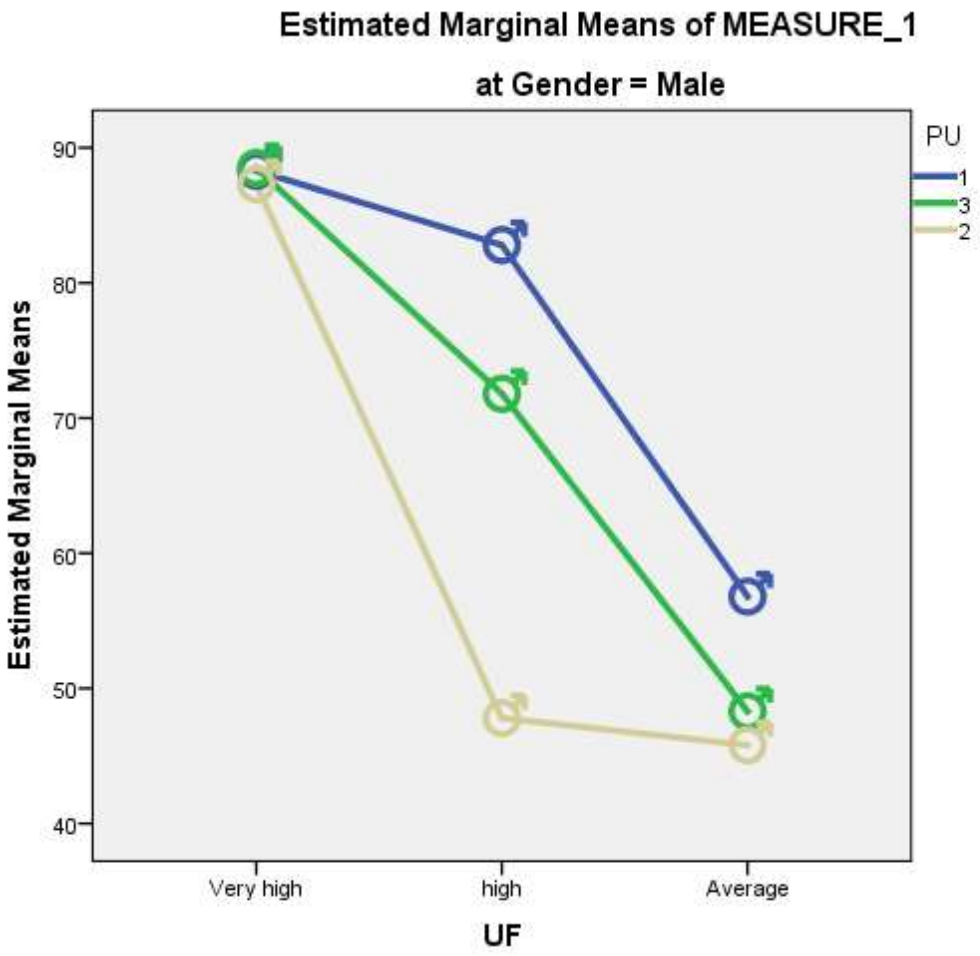
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	P.E.S
UF * PU * Gender	Sphericity Assumed	8009.000	4	2002.250	77.707	.000	.573
	Greenhouse-Geisser	8009.000	3.197	2504.834	77.707	.000	.573
	Huynh-Feldt	8009.000	3.464	2311.959	77.707	.000	.573
	Lower-bound	8009.000	1.000	8009.000	77.707	.000	.573

Table 11 - Gender * UF * PU interaction

Gender	UF	PU	Mean	Std. Error	95% CI	
					LB	UB
Male	1	1	88.300	1.090	86.119	90.481
		2	87.300	.803	85.693	88.907
		3	88.500	1.109	86.280	90.720
	2	1	56.800	.984	54.830	58.770
		2	45.800	.588	44.623	46.977
		3	48.300	.954	46.391	50.209
	3	1	82.800	1.356	80.086	85.514
		2	47.800	.699	46.400	49.200
		3	71.800	.923	69.952	73.648
Female	1	1	89.600	1.090	87.419	91.781
		2	51.800	.803	50.193	53.407
		3	87.100	1.109	84.880	89.320
	2	1	86.700	.984	84.730	88.670
		2	46.100	.588	44.923	47.277
		3	51.200	.954	49.291	53.109
	3	1	88.400	1.356	85.686	91.114
		2	47.000	.699	45.600	48.400
		3	68.900	.923	67.052	70.748

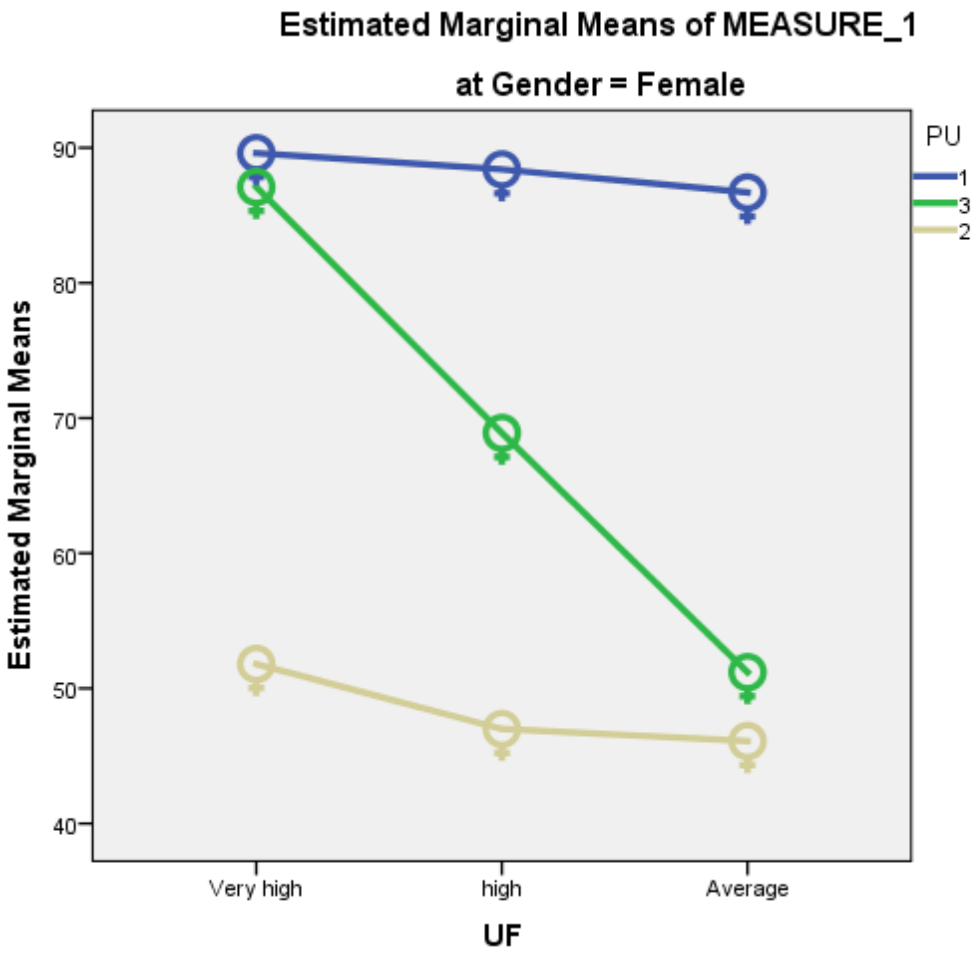
The nature of the three-way interaction is revealed in figure 3 and 4, which shows the UF × PU interaction for men and women separately (the means on which this graph is based, is as per the data in table 11). The graph for male participants shows that when websites are very high UF, men will express a high interest regardless of PU levels (the blue, green and white lines all overlap). At the opposite end of the UF scale, when a website is average UF, regardless of PU, men will express very little interest (ratings are all low; all lines declines to bottom of graph). The only time PU makes any difference to a male participant is, when the website is high UF, in which case very high PU boosts interest, whereas average PU reduces interest, and having high PU leave things somewhere in between. The underlying message is that male respondents are more interested in UF attributes of the website.

Figure 3 – UF Vs PU, of Male respondents



The picture for women respondents is somewhat different. If a website has very high levels of PU then it doesn't really matter how user friendly the website is, women will transact with such web-sites (the blue line is relatively flat). At the other extreme, if the website's PU is average, then they will hardly transact with such websites, regardless of how UF those websites are (the white line is relatively flat). The only time UF makes a difference is when a website has high PU, in which case being very high UF boosts interest, and being average UF reduces the interest on AoIBS. Stating it differently, women prioritize PU over website attributes such as website user friendliness. Once again, could look at some contrasts to further break this interaction down where there are another four interactions which will not be discussed here. These contrasts will be similar to those for the UF × PU interactions; additionally, at this point takes into account the effect of gender as well.

Figure 4 – UF Vs PU, of Female respondents



CONCLUSION AND RECOMMENDATION

Mixed ANOVA method compares several means when there are several independent variables and study had 2 repeated-measures variables (has been measured using the same participants) and one other (gender-between groups variable) has been measured using different participants. Initially, tested the assumption of sphericity for the repeated-measures variables (UF and PU) when they have three or more conditions using Mauchly's test. The tables labelled as 'Tests of Within-Subjects Effects' depicts the results of the ANOVA for the repeated-measures variables and all of the interaction effects; in this study other than for main effect of gender, all other effects that were discussed were significant. The table labelled 'Tests of Between-Subjects Effects' exhibits the results of the ANOVA for the between-group variable.

Data analyses denoted that all the four hypotheses have been supported by the empirical evidences of the research. Furthermore, what is obvious from the analysis is that differences exist between men and women in terms of how they adopt internet banking considering the UF and PU of internet banking websites. Male respondents appear to be enthusiastic about adopting with any website which is user friendly regardless of how useful that website is. Female participants are almost contradicting with males as they are enthusiastic about adopting or transact with a website with very high PU aspect, regardless of how user friendly the website is (and are less favorable towards acceptance of websites without PU in spite of how user friendly such websites are). The only consistency between male and female respondents is, when there is high PU, in which case for both genders the UF influences how passionate they are about adopting that particular website. Non evaluation of sub interactions was a limitation of the present study. Nevertheless, findings of the research would be beneficial for banks and financial institutions, in uplifting the status of internet banking adoption in Sri Lanka in which the promoters of internet banking services could pay more attention towards socio-demographic attributes of the existing and prospective users. Mixed ANOVA analysis and incorporation of related models would contribute towards originality of the study. Similarly, future researches could be performed in different contexts by integrating interrelated variables seeking distinct findings.

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