

A Study Using Customer's Perception and Factor Analysis of Internet Banking Services in Purba Bardhaman District, W.B

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Abstract—The data for this study was collected through survey conducted in purba bardhaman district, West Bengal. A total of 250 questionnaires were distributed through mail to the people inhabiting in the Burdwan district regarding their usage of IB services, of which only 130 respondents provided their response to this survey with a 52 percent rate of response. The questionnaire consisted of two sections, in the first section it is concerned with the personal details of the respondents whereas in the second section it consisted of only Likert five-point scale (1= strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree) regarding their perception with the IB services. In this research we have utilized Microsoft Excel and Microsoft Word along with SPSS (Statistical Package for Social Sciences) version 12 was used as the analysis tool to determine the results for this research study. This SPSS software helped us to determine the impact of all the factors on adoption of internet banking and also to understand the relationship between the various factors on the adoption of internet banking.

Keywords— *perception, internet banking, consumers, factor analysis.*

I. INTRODUCTION

Factor analysis is a multivariate statistical method whose primary purpose is to define the underlying structure among the variables in the analysis (Hair, Black, Babine and Anderson, 2010). Factor analysis is an interdependence technique in which all variables are simultaneously considered (Hair et al., 2010). "The general purpose of factor analysis is to find a way to summarize the information contained in a number of original variables into a smaller set of new, composite dimensions or factors with a minimum loss of information- that is, to search for and define the fundamental constructs or dimensions assumed to underlie the original variable" (Hair et al., 2010). Stewart (1981) summarized three functions of factor analysis: (1). Minimizing the number of variables while the amount of information in the analysis is maximized. (2). Searching qualitative and quantitative data distinctions when the data is too large and (3). Testing hypotheses about the number of distinctions or factors underlying a set of data. Factor analysis as used in research to answer two objectives: one is to identify underlying structure in the data and two is to reduce number of variables into a more manageable set (Hair et al., 2010).

There are two general types of factor analysis: exploratory factor analysis and confirmatory factor analysis (Stewart, 1981). Exploratory factor analysis (EFA) seeks to uncover

the underlying structure of a relatively large set of variables (Garson, 2011). With EFA, all measured variables are related to every factor by a factor loading estimate (Thompson, 2004). EFA allows the multivariate technique to estimate relationships (Hair et al., 2010). The distinctive feature of EFA is that the factors are derived from statistical results, not from the theory, and so they can only be named after the factor analysis is performed (Hair et al., 2010).

Confirmatory factor analysis (CFA) is a way of testing how well variables measured represents a small number of constructs (Hair et al., 2010). With CFA, the research must specify both the number of factors that exist within a set of variables and which factor each variable will load highly on before the result can be computed (Hair et al., 2010). CFA seeks to test hypothesis about the structure of a data set that has been formed by prior research (Stewart, 1981).

EFA has two widely used models to obtain factor solutions: common factor analysis and component factor analysis (Hair et al., 2010). The selection of an appropriate model is based on two criteria: (1) The objective of the factor analysis and (2) the amount of prior knowledge about the variance in the variables (Hair et al., 2010).

Common factor analysis is used primarily to recover the underlying factors in the original variables. In contrast, component factor analysis is used when the objective is summarizing information in a large set of variables into a minimum number of factors (Aaker, Kumar, Day and Lawley, 2005). Hair et al. (2010) note that component factor analysis is appropriate when prior knowledge suggests that specific and error variance presents a relatively small proportion of the total variance. Thus, component factor analysis is appropriate method of this study.

II. CONSUMER ACCEPTANCE FACTORS

A. Perceived Usefulness

Davis (1989) asserts that the decision to use new technology is determined by the extent to which a person believes that it is cost effective in providing goods or services compared to the current method. PU is recognized as having strong positive effect on Internet Banking. PU is the degree to which a person believes that using a particular system would enhance their performance. According to Amin (2009) PU is the extent to which a person believes that using a particular system will enhance his or her performance.

B. Perceived Ease of Use

PEU is dependent upon the frequency of using the IB services on a regularity basis. According to Davis (1989) Perceived ease of use is defined as the degree to which a person believes that using a particular system would be free of physical and mental effort. Cooper (1997) identifies “ease of use” as one of the three important characteristics from customers’ perspective for adoption of innovative service. Wallis (1997) identifies that technological innovation must be easy to use to ensure customer acceptance.

Extensive research over the past decade provides evidence of the significant effect of perceived ease of use on usage, either directly or indirectly through its effect on perceived usefulness (Agarwal and Prasad, 1999; Davis et al, 1989; Hu et al, 1999, Venkatesh, 1999; Venkatesh and Davis, 1996, 2000; Venkatesh and Morris, 2000). Information technologies that are easy to use will be less threatening to the individual (Moon and Kim, 2001). This implies that perceived ease of use is expected to have a positive influence on users in their interaction with Internet banking systems. It is also found that ease of use positively correlates with use of consumer technologies, such as computer software (Davis, 1989; Venkatesh and Davis, 1996). Suganthi et al (2001) label one of their dimensions “ease of use” showing its effect on Internet banking adoption. Therefore, the more the consumer perceives Internet banking as easy to use, the more he or she is likely to adopt Internet banking.

C. Perceived Reliability

PR is one of the major influencing factors according to McKnight, Choudhury & Kacmar (2002) around the establishment and use of new technologies for financial transactions is that of security and trust. The need for security of personal details and financial information is therefore critical to the success of IB. As a result, the perception of risk involved in using Internet banking, the more likely that it will be adopted.

This study considers “Reliability” which explains the degree to which Internet banking is perceived to be safe and reliable” in the offering and secure transmission of financial transactions. If the potential adopter of internet banking perceives that the new technology is not safe and believes that mistakes are likely to occur, she or he is not likely to adopt (Dabholkar, 1996). Polatoglu and Ekin (2001) found that the security dimension was an important determinant for consumers who used electronic banking. Furthermore, Sathye (1999) found that security was positively related to the use of Internet banking. For banks, their immediate need is not simply to reduce fraud in internet banking. It is also about retaining consumers’ confidence and making customers rely, not just in their bank and its ability to deliver secure access to their money, but also in internet banking as a key delivery channel. Therefore, perceived reliability is expected to have a positive influence on adoption of Internet banking.

III. HYPOTHESIS DEVELOPMENT

The questionnaire for the different constructions was validated using a 5-point Likert Scale. The statements were modified based on Perceived Usefulness (PU), Perceived Ease of Use (PEU) and Perceived Reliability (PR) to match the context of the perception of internet banking shown in Table 1.

This work has been undertaken with an objective to study that the factors influence Internet Banking adoption in Purba Bardhaman District. Hypotheses are formulated based on three factors (PU, PEU, PE) and to determine whether the hypothesis is being supported by our research model or not. The study makes significant knowledge about perception of Internet Banking in Purba Bardhaman District.

This study has postulated to test the following hypotheses:

Null H_A: Perception level of consumers on Internet banking has not a strong influence over Perceived Reliability (PR).

Null H_B: Perception level of consumers on Internet banking has not a strongly influence over Perceived Ease of Use (PEU).

Null H_C: Perceived Usefulness (PU) has not a strong impact on Perceived Reliability (PR).

Null H_D: Perceived Ease of Use (PEU) has not a significant relation over Perceived Reliability (PR).

Null H_E: PU has not a strong impact on adoption of Internet banking.

TABLE 1. CONSTRUCTS AND CORRESPONDING ITEMS

Constructs	Corresponding Items	SA	A	N	D	SD
Perceived Usefulness (PU)	PU1: Internet Banking enables people to conduct financial transactions more quickly.					
	PU2: Internet Banking provides convenience since it is available 24 hours, 7days of the week.					
	PU3: Internet Banking saves time compared to traditional banking.					
Perceived Ease of Use (PEU)	PEU1: Internet banking makes it easier to conduct banking transactions.					
	PEU2: Learning to use Internet Banking is easy.					
	PEU3: I am aware of the services that could be done using Internet Banking.					
Perceived Reliability (PR)	PR1: Using Internet Banking is as safe as using other modes of banking.					
	PR2: Internet Banking is reliable and can be used for my banking transactions.					
	PR3: I am aware of the security and privacy issues of Internet Banking.					

IV. RELIABILITY ANALYSIS

Reliability of the factors is determined by means of Cronbach’s alpha a method used to measure the internal consistency of a set of items. Alpha value of 0.60 or above is considered to be reliable for any research. As shown in Table 2 the reliability scores of all the factors were observed to exceed the required standard reliability of 0.60 thus indicating that the convergent validity of the model is proven.

TABLE 2. RELIABILITY STATISTICS

Determinants	No. of items belonging to this determinant	Reliability measure for this determinant
PU	3	0.789419900
PEU	3	0.782839452
PR	3	0.752230000
Perception	9	0.888224000

V. HYPOTHESIS TESTING

Hypothesis A

Having analyzed the data from the questionnaire using t-test to examine the perception of Internet banking can affect the perceived reliability of Internet banking services in Purba Burdhaman District. Table 3 reveals that the result of t- test. If $t\text{-stat} < -t\text{ critical two-tail}$ or $t\text{ stat} > t\text{ critical two-tail}$, then we reject the null hypothesis. In Table 3 the value of t- stat is 48.196 and the value of t- critical two tail is 1.973, due to this observation we reject the null hypothesis and accept the alternate which state that Perception level of consumers on Internet banking has a strongly influence over PR.

TABLE 3. SAMPLE RESULTS OF t- TEST BETWEEN PERCEPTION-PR

t-Test: Two-Sample Assuming Unequal Variances		
	Perception	PR
Mean	37.08661417	11.27559
Variance	30.54005749	5.883765
Observations	127	127
Hypothesized Mean Difference	0	
df	173	
t Stat	48.19637015	
P(T<=t) one-tail	1.6891E-102	
t Critical one-tail	1.653709184	
P(T<=t) two-tail	3.3782E-102	
t Critical two-tail	1.973771337	

Hypothesis B

Having analyzed the data from the questionnaire using t-test shown in Table 4, examines that the value of t- stat 47.52 and the value of t- critical two- tail is 1.975. So, $47.52 > 1.975$ due to the observation value of t- stat and t- critical two tail, we reject the null hypothesis and accept the alternate one which state that Perception level of consumers on Internet banking has a strongly influence over PEU.

TABLE 4. SAMPLE RESULTS OF t- TEST BETWEEN PERCEPTION-PEU

t-Test: Two-Sample Assuming Unequal Variances		
	Perception	PEU
Mean	37.08661417	12.41732
Variance	30.54005749	3.673666
Observations	127	127
Hypothesized Mean Difference	0	
df	156	
t Stat	47.52896588	
P(T<=t) one-tail	5.17736E-95	
t Critical one-tail	1.654679996	
P(T<=t) two-tail	1.03547E-94	
t Critical two-tail	1.975287508	

Hypothesis C

Table 5 indicates that the Mean and Variance of Perceived Usefulness and Perceived Reliability that is PU (min = 13.39, Sig = 3.66) and PR (min = 11.27, Sig = 5.88) respectively and $t\text{-stat} > t\text{-critical two-tail}$. We reject the null hypothesis and accept alternative.

Null H_0 : PU has not a strong impact on PR

H_c : PU has a strong impact on PR

TABLE 5. SAMPLE RESULTS OF t- TEST BETEWWN PU- PR

t-Test: Two-Sample Assuming Unequal Variances		
	PU	PR
Mean	13.39370079	11.27559
Variance	3.669166354	5.883765
Observations	127	127
Hypothesized Mean Difference	0	

df	239	
t Stat	7.722930058	
P(T<=t) one-tail	1.55538E-13	
t Critical one-tail	1.651254165	
P(T<=t) two-tail	3.11077E-13	
t Critical two-tail	1.969939406	

Hypothesis D

Data for the test of this hypothesis were obtained from responses from the questionnaire. T- test analysis was used to test the validity. The observation difference between the samples means (12.41 and 11.27). In this observation in Table 6. $t\text{-stat} > t\text{-critical two-tail}$. We reject the null hypothesis.

Null H_0 : PEU has not a significant relation over PR

H_D : PEU has a significant relation over PR

TABLE 6. SAMPLE RESULTS OF t-TEST BETWEEN PEU- PR

t-Test: Two-Sample Assuming Unequal Variances		
	PEU	PR
Mean	12.41732	11.27559
Variance	3.673666	5.883765
Observations	127	127
Hypothesized Mean Difference	0	
df	239	
t Stat	4.161938	
P(T<=t) one-tail	2.2E-05	
t Critical one-tail	1.651254	
P(T<=t) two-tail	4.41E-05	
t Critical two-tail	1.969939	

Hypothesis E

Having analyses, the data from questionnaire the adoption of Internet banking can affect the perceived usefulness of internet banking usages in Purba Burdhaman District. Here we using t-test over 127 sample size. The observation state that in Table 7. The $t\text{-stat} > t\text{-critical (two-tail)}$. If $t\text{-stat} < -t\text{-critical two tail}$ or $t\text{-stat} > t\text{-critical two tail}$, then we

reject the null hypothesis. Now the accept alternate one is PU has a strong impact on adoption of Internet banking.

TABLE 7. SAMPLE RESULTS OF t- TEST BETWEEN PU- ADOPTION

t-Test: Two-Sample Assuming Unequal Variances		
	PU	Adoption
Mean	13.39370079	2.771653543
Variance	3.669166354	0.352205974
Observations	127	127
Hypothesized Mean Difference	0	
df	150	
t Stat	59.69293688	
P(T<=t) one-tail	9.9148E-107	
t Critical one-tail	1.6550755	
P(T<=t) two-tail	1.983E-106	
t Critical two-tail	1.975905331	

VI. REGRESSION ANALYSIS

Regression analysis results confirm that there is significant impact of independent variables (perception, PU, PEU and PR) on dependent variable (Adoption of IB) because the R square is 0.966 as shown in Table 8 is greater than 0.6 which is considered as the benchmark. In other words, all the independent variables together explain significantly 96.6% of the variance on user's acceptance of internet banking services. The R value in the table shows the correlation value among the dependent variable and independent variables.

TABLE 8. REGRESSION STATISTICS

Regression Statistics	
R	0.982855366
R Square	0.966004670
Adjusted R Square	0.965732707
Standard Error	1.022998090

The r square values and standard error are 0.966 and 1.02 respectively. Perceived ease of use and perceived usefulness are both influenced by perception to some extent. All relationship is positive showing that the relationship exists. Perception influences perceived usefulness to a large extent,

while perceived ease of use and perceived reliability has the least influence on internet banking adoption in Purba Bardhaman District.

VII. CONCLUSION

This research illustrates a range of factors that affect bank customer's decision to adopt Internet banking using an exploratory investigation. This study also identifies some factors that are more influential than others. An understanding of these influencing factors can assist banks in developing more effective strategies to promote and encourage Internet banking adoption.

While the sampling technique and sample size are consistent with similar studies conducted on online banking services, the study was conducted over one geographic location in Purba Bardhaman District. Given the fact that Burdwan District consists of different location, calculation should be exercised when generalizing the results of this study over the entire population.

In this study proposed an empirical model on Internet Banking use, which incorporates bank customers' perception on perceived usefulness, perceived ease of use and perceived reliability. The study makes significant knowledge in relation to adoption of factors effecting of Internet Banking in Purba Bardhaman District. The results have supported the hypothesis that PU, PEU and PR have positive effect on the use of Internet Banking in Purba Bardhaman District, West Bengal. The result of the regression analysis conducted on the factors indicate that PU, PEU and PR to be the most influential factors explaining the use of Internet Banking services. The results show that the standard error is 1.02299809. The finding refers to the fact that consumers use Internet Banking for the benefits and also due to its easiness in use which provides in comparison to other banking delivery channels.

The objective of this study is to analyze the factors affecting bank customers "decisions to adopt Internet banking. Identified that the characteristics of earlier adopters of innovation as having higher levels of education, social status, self esteem and higher incomes. Therefore, bank manager should have different strategies in targeting different group of customers in terms of gender, age and education in order to promote and encourage Internet banking adoption.

The financial services industry is changing rapidly. Technology, government regulation and deregulation and increasing customer sophistication are forcing financial service institutions to re-evaluate their current business practices in light of a changing and competitive business environment. Banks are forced to develop and use alternative service channels with the aim of building bigger market share, improving customers' perceptions of service quality and achieving customer loyalty. The absence of interpersonal contact and the replacement of human-to-human interaction with human-to-machine interaction have serious implications for dimensions to be used when evaluating internet service quality for purposes of customer satisfactions and loyalty. Thus, an understanding of the dimensionality and relative importance of the service

attributes of online banking service quality is of crucial importance to banks.

Convenience may influence consumption behavior; service convenience is also seen as instrumental to consumers for determining choice of a service and evaluating a firm's service performance. In consumer services research, convenience has increasingly been recognized as a salient product attribute and as a basis for making purchase decisions.

Convenience is one of the key issues surrounding customer acceptance or rejection of a channel. Convenience has a significant impact on customers' adoption of Internet Banking in Burdwan District, which has been conducted on self-service technologies used in banking, has identified convenience as one of the most important factors.

This research illustrates a range of factors that affect bank customer's decision to adopt Internet banking using an exploratory investigation. This study also identifies some factors that are more influential than others. An understanding of these influencing factors can assist banks in developing more effective strategies to promote and encourage Internet banking adoption.

While the sampling technique and sample size are consistent with similar studies conducted on online banking services, the study was conducted over one geographic location in Bardhaman District. Given the fact that Purba Bardhaman District consists of different location, calculation should be exercised when generalizing the results of this study over the entire population.

The findings of the current study have implications for future research. Further research could contribute to analyzing consumer behavior by adding other perception variables that may influence online banking service quality. A quantitative research design was employed in this research. Further research one may consider a mixed method approach, employing both qualitative and quantitative methods. The study was not organization/ bank-specific. For more practical purposes, future endeavors could be focused in organization/ bank-specific studies. It must be emphasized that more research is needed before any final conclusions on the dimensionality and validity of internet banking service quality is reached.

Although this study provides valuable contributions from a theoretical and practical

Perspective, there are a few limitations. First, this research was conducted in Purba Bardhaman District West Bengal. A probability sample in a different geographic area may reveal differences in consumers' attitudes towards the adoption of Internet banking. Therefore, future researchers should use a more geographic dispense sample to analyses consumers' behavioral intentions towards Internet banking services. Future researchers can also undertake a comparative study between two different Districts in West Bengal.

Secondly, this study empirically examined three factors that may influence consumer's adoption of Internet banking. However, there may be some other factors that can impact on customers' adoption of Internet banking but were not identified in this study. Further research is required to identify other factors that may impact on customers

'adoption of Internet banking. This approach may be particularly important in a different cultural setting. Thirdly, this study focused on the customers 'perspectives. Future research could focus on the banks 'perspectives. Interviews with bank management could be conducted to discuss their strategies regarding the implementation of Internet banking.

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