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Behavioral Modeling of the Individual's Acceptance and use of Internet in Bangladesh: An Analysis Using an Integrated Approach

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ABSTRACT

This study attempts to examine individuals' behavior in the adoption and usage of the Internet for accomplishing various transactions and communication in Bangladesh. A descriptive research design is administered to ascertain the joint impact of the study constructs. A combination of AMOS 18 and PLS graph has been used for structural equation modeling with a cross-sectional dataset of 239 individuals in Bangladesh collected through a questionnaire survey. The proposed model was assessed with two step procedure after scrutiny and correction for non response and subjective response bias. The psychometric properties of the model, convergent and discriminant validity were assessed through confirmatory factor analysis, construct reliability and the constructs correlation. The structural model estimation results reveal a significant association of image with perceived ease of use, perceived usefulness and intention while indirect correlation with actual usage through intention. On the other hand, perceived usefulness has direct effects on intention while perceived ease of use is found to be indirectly associated through perceived usefulness. The path analysis furthered the significant effects of intention on actual usage behavior. The study also reports that analysis of the entire dataset with two different a roaches of structural equation modeling produces a consistent result which ensures robustness in the analysis. The study concludes with implications.

INTRODUCTION

In past few years the seemingly increasing rate of usage of Information and Communication Technologies (ICTs) has reshaped the global socio-economic and business environment and made changes in the pattern of personal, social and business communication. The world's shift towards the digital culture, from the traditional way of transaction and communication, creates enormous research opportunities in the IS domain and also in the multidisciplinary fields of studies to look at the adoption and diffusion of Information and Communication Technologies (ICTs). ICT, particularly the Internet, underpins almost every single activity undertaken in the modern world, and affects everyone on the planet — even those who do not themselves have first-hand access to ICTs (ITU 2010). Good examples include food distribution, power networks, water supplies or mass transportation, all of which are controlled and managed today by ICT networks and applications.

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According to the World Telecommunication Report 2010, released to review the mid-term status and achievement in-between the World Summit on the Information Society (WSIS) 2005 and the Millennium Development Goals (MDG) 2015, tremendous progress has been made over the past decade, with almost two billion people throughout the world now having access to the Internet.

Although significant progress has been evident in the world's Internet population, household Internet penetration levels vary substantially between countries and regions. At the end of 2008, one out of four households in the world had access to the Internet but only one out of eight households in the developing countries was connected, compared to three out of five in the developed countries.

While by the end of 2008, 58.1 per cent of households in Europe had Internet access, only 16.8 per cent of the household in Asia and Pacific countries were connected to the Internet. The Internet population of Asia-Pacific countries remains at a lower level in comparison to Europe, America, CIS and the Arab States. The Internet penetration of Bangladesh is significantly lower, below 1 percent, than that of other Asia-Pacific countries, such as Japan, Malaysia, Korea, Singapore and Australia.

Despite its poor internet penetration the present government of Bangladesh has given the highest priority to ICT and initiated diverse policies and programs to achieve the digital goal provisioned in the national election 2009 and post-election agenda. The country's national budget for 2010-2011 allocates a substantial amount of resources for ICT development and reiterates expanding the ICT networks to the rural communities to achieve government, citizen and business interactions and exchanges through the Internet (GOB 2010). The government also initiated some modifications to the country's national ICT policy in 2009 which reiterates the necessity of establishing e-government, e-services and e-commerce environments in order to gain economic potential. It also emphasizes formulating appropriate policies and strategies for facilitating Internet related communication, e-commerce operation and e-governance. In order to achieve ICT potentials the government is dedicated to utilizing the Internet in the education and service sector (Azam & Quaddus, 2009a; Azam & Quaddus, 2009b; Azam & Quaddus, 2009c). Although countable policy initiatives have been adopted to utilize the potential of ICT in the economic development of the country, the success of digitization or computerization is still doubtful.

Although Bangladesh has already initiated appropriate steps to fight against the hurdles and hindrances of ICT adoption, such as, limited accessibility to the internet, poor teledensity, poor electricity network, limited affordability of computer and limited knowledge, inadequate legal and regulatory support, inefficient and traditional systems of banking operation, poor financial support and traditional payment mechanism, lack of human resource, high Internet usage cost as well as security concerns (Azam & Quaddus, 2009; Azam, 2005; Azam & Lubna, 2008; Azam, 2006; Hossain, 2000; ITRC, 2000; Rahman, 2002), poor Internet penetration is still considered as the main issue for establishing an e-based transparent society.

According to the World Bank (World Bank 2010) the Internet penetrations in various countries are estimated as USA 75.9%, UK 76%, Australia 70.8%, Singapore 69.6%, Malaysia, 55.8%, while Bangladesh's internet penetration is only 0.347% in 2008. While many developed and developing countries achieved significant advantages through computerization of government departments, business firms and educational institutes, the digital initiatives of Bangladesh remain at risk due to the

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poor digital participation of the citizenry. In this context a study looking at individuals' Internet acceptance behavior in Bangladesh has great significance.

Bangladesh is basically an agro-based country. It's recently developed industrial base, particularly the RMG industry has been emerged as the main vehicle for the country's economic development. The overall culture of the country is characterized by high population, low income and quite a big number of unemployed people where labor is cheap and available. Like many other Asian states; Bangladesh's culture has also been characterized by high power distance, collectivism and low uncertainty avoidance (House, et al. 2004). The power is concentrated at the top of the society. There also remain discriminatory rights, privileges, resources, status, and prestige among the individuals in different classes across the social system. The individuals of the upper class in the social hierarchy enjoy more power, prestige and image than others in the lower class.

Social class can contribute significantly in forming individual or group behavior with the internal variables such as subjective perceptions and innovations characteristics (Blackwell et al, 2006). With occupation, education, friendship, way of speaking and position, perceived variables that define social classes include power and prestige (Rossides, 1990) which is a relatively under researched issue in the Information Systems (IS) literature in both developed and developing country context.

Most of the previous studies examined ICT adoption behavior in Bangladesh through utilization of the Rogers Innovation Diffusion Theory, Theory of Planned Behavior and Theory of Reasoned Action, while a few empirical studies include individuals' beliefs and perceptions as well as some cultural aspects (Azam, 2006; Azam, 2007; Azam & Quaddus, 2009a; Azam, 2005; Azam & Lubna, 2008; Hossain, 2000; ITRC, 2000; Rahman, 2002). The Technology acceptance model (TAM) although believed to be a robust and parsimonious model for ICT adoption and which is also widely used in different places around the world (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Igbaria, Guimaraes, & Davis, 1995; Mathieson, 1991), it's a location in Bangladesh is not well documented. This paper thus looked at the role of Image (Image is conceptualized as the degree to which use of innovation is perceived to enhance one's image or status in one's social system, Moore & Benbasat, 1991) in intention to use Internet in communication and transaction as well as actual behavior in modeling with the two fundamental users' beliefs in TAM, perceived usefulness and ease of use.

THEORETICAL FRAMEWORK AND HYPOTHESES

Numerous theories and models have been used to investigate technology acceptance phenomena in the past couple of decades, most of them are adapted from Rogers Innovation Diffusion Theory (Rogers, 1985), Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), Theory of Planed Behaviour (Ajzen, 1985; Ajzen, 1981) or Technology Acceptance Model (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). TAM is the most recent one among these four theories developed to study the innovation adoption and diffusion phenomena.

Analyzing the scope and structure of the models and their applicability in different environments, some uniqueness and also some limitations are found that encourage new researchers to look into the issue for re-examination, reconstruction or modification of the theories. In reviewing the technology adoption research, particularly ICT acceptance studies, the Technology Acceptance Model (TAM) is found as one of the most widely used theoretical frameworks. TAM received numerous researchers' attention to

utilize and replicate it in different places around the world in different contexts due to its parsimony and the wealth of recent empirical support for it (Davis 1989; Davis, Bagozzi, & Warshaw, 1989; Igbaria, Guimaraes, & Davis, 1995; Mathieson, 1991; Wang, Wang, & Tang, 2003).

The Technology Acceptance Model (Davis 1989; Davis, Bagozzi, & Warshaw, 1989) has been rooted in the Theory of Reasoned Action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). According to TAM the adoption behaviour of a new information system is determined by the users' intention to use the particular system which in turn is determined by the users' two beliefs, perceived usefulness and perceived ease of use. Perceived usefulness is defined as the extent to which a person believes that using a particular system will enhance his or her job performance. On the other hand perceived ease of use refers to the extent to which a person believes that using a particular system will be free of effort. Between these two beliefs, perceived ease of use is hypothesized to have a direct effect on perceived usefulness.

The earlier version of TAM included subjective norms with perceived ease of use and usefulness as antecedents of behavioral intention which was omitted from the model latter. Social influence has a strong effect in technology adoption in mandatory setting while it has different effects in voluntary setting and in the context of having experience (Venkatesh & Morris, 2000). One key benefit of using TAM to understand system usage behaviour is that it provides a framework to examine the influence of external factors of system usage (Hong et al., 1999).

Various external variables such as computer self efficacy, social influence, experience, voluntariness, diversity of technology, trust, culture, and relevance, have been added in the context of TAM in different settings to get more insight into technology acceptance in previous initiatives (Agarwal and Prasad, 1999; Davis, Bagozzi, & Warshaw, 1989; Shih, 2004; Yoon, 2008; Taylor & Todd, 1995; Venkatesh & Morris, 2000; Hong et al., 1999; Venkatesh & Davis, 1996; Venkatesh & Davis, 2000; Wang, Wang, & Tang, 2003).

Social and cultural issues are strongly associated with consumers' preference and have a significant effect on behavior. Although important, the effects of social class, particularly in a developing countries contexts, are relatively under researched in the IS domain. According to Rossides (1990), power and prestige may be used as variables to define social class.

Moore and Benbasat (1991) developed an instrument to measure individuals' perceptions on the attributes of information and communication technology drawing from Diffusion of Innovation Theory (Rogers 1985) and Theory of Reasoned Action. They addressed relative advantage as perceived ease of use, as in Davis (1989), re-electing the dominant measurement paradigm of research in information technology. In addition a new construct, Image, was also added with the other independent variables. The Image construct was conceptualized as the degree to which use of an innovation is perceived to enhance one's image or status in one's social system (Moore & Benbasat, 1991). Image was also examined in numerous successive research initiatives to measure attitude, intention or adoption of various forms of information and communication technology (Jebeile & Revee, 2003; Karahanna et al., 1999; Mazman & Usluel, 2009; Richardson, 2009; Venkatesh et al., 2003). In those studies image has been included as an antecedent of intention and adoption of ICT and in some cases as an antecedent of perceived usefulness.

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TAM has been used widely to study a range of situations involving a variety of external variables (Lu et al., 2003; Klo ing & McKinney, 2004). Although countable initiatives have been manifested in academic research to look at individuals' information and communication technology adoption behavior utilizing an extended version of technology Acceptance Model (TAM) in past few years (Agarwal & Prasad, 1999; Chau, 1996; Davis et al., 1989; Davis, 1993; Igbaria et al., 1995; Hu et al., 1999; Venkatesh, 2000; Venkatesh & Davis, 2000) the construct image or prestige is relatively under researched.

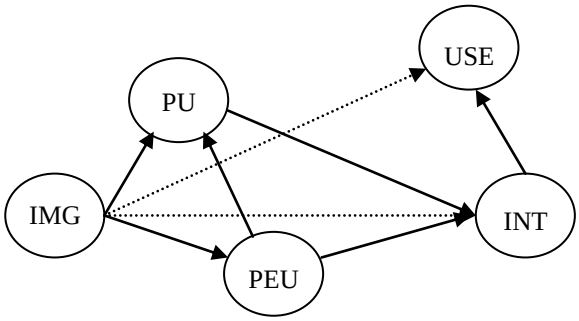
With high power distance and collectivism, individuals' affiliation with certain class and/or position in a hierarchical social system is also a dominating factor in individuals' preference. This study thus adopts image, as an added factor in the parsimonious technology acceptance model to look into its effects as an antecedent of intention, usage as well as perceived ease of use and perceived usefulness (see Figure 1).

Hypotheses

Based on the above discussions the following hypotheses have been proposed:

H1a: Image has direct positive effects on perceived usefulness.
H1b: Image has direct positive effects on perceived ease of use
H1c: Image has direct positive effects on intention to use
H1d: Image has direct positive effects on actual usage behaviour
H2a: Perceived ease of use has direct positive influence on intention
H2b: Perceived ease of use has direct positive influence on perceived usefulness
H3 : Perceived usefulness has direct positive effects on intention
H4 : Intention has direct positive influence on usage behavior

Figure 1: Conceptual framework.



RESEARCH METHODOLOGY AND FINDINGS

To test the conceptual model a survey instrument was designed for data collection. The measures used to operationalize the constructs included in the proposed model were mainly adapted from relevant prior studies, with slight modification and expressional changes to fit them to the targeted context. The questionnaire was fine-tuned via several runs of pretest, revisions and pilot tests. After finalizing the questionnaire a cross sectional survey was administered to the individuals with different occupation, class, academic attainment, income, ICT capability and usage experience. All items were measured using a 7 point Likert-type scale with anchors on strongly agree and strongly disagree, respectively.
The survey instrument was administered to the sample which is determined through a non-probability purposive convenient sampling method. In total 300 questionnaires were su lied for the study while 241 responses were received. The sample was checked for consistency and invalid responses were removed, resulting in a data set of 239 valid responses which was finally used for the purpose of the analysis.

Subject and Sample

Although the study utilizes non-probability convenience sampling technique, the individuals' of different class, income, education, and professional position were included in the survey to make the logical ground for generalizing the inferred outcomes.

The study investigates perceptions of present and potential internet users from different locations of Rajshahi City, a Divisional Metropolitan City in Bangladesh. The sample consists of 42.2% Service holders, 14.2% Businessman, 23.9% Students, 10.6% Professionals (Doctor, Engineer, Lawyer, Journalist, teacher etc.) and 9.2% Others (self-employed or even unemployed).

6.84% of the individuals surveyed have primary education, 5.94% of the respondents have up to S.S.C. level of education, 23.08% have H.S.C. certificate and 42.74% have Bachelor Degree, while 21.37% respondents have Masters Degree and other higher educational qualifications. The study includes 40.2 % individuals with an age below 25 years, 37.7% 25 years to 34 years, 17.8% 35 years to 44 years, while 4.2% respondents fall into the category of 45 years and above. 83.5% respondents live in urban area and 49.8% respondents have Internet connection. 3.9% of respondents have experience of sophisticated technology operation such as online shopping, 2.5% use Internet for news, 10.8% use Internet for software or document download while 82.8% respondents are using the Internet for e-mail, entertainment, chat and other fun activities. Further, respondents consist of 74.8% male and 25.2% female.

The distributions of the sample into various classes of individuals results in a balance among different categories of the people having different income, education, and professional position. The sample also includes one fourth of female and three fourth of male respondents. Discriminatory power, income, privileges and exercise of rights are evident between male and female individuals on various counts in Bangladesh. A recent study examining the co-existence of m-commerce and e-commerce in USA also reveals that males and females are categorized as high and low users of ICT (Banerjee 2010). The freedom, privileges and positions of the respondents suggest the good quality of the data source.

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To ascertain the quality of the data the study examines whether any systemic biases could exist due to respondents' positions and affiliation with privileged or underprivileged groups.

As the survey includes both male and female respondents, there might be a question that the males being are more involved in outside work and enjoying various facilities and freedoms to get into contact with an innovation and also exercise power in most of the developing countries, still in Bangladesh, may overrate the benefits, utility, usage of ICT and other aspects of the study. To test this possible bias, the total sample was divided into two groups: Male (affiliated with various professions, income and education) and female (affiliated with various positions, income and education).

Table 1: Test of Possible Biases.

	MALE		FEMALE		One-Way ANOVA		KS TEST	
	Mean	SD	Mean	SD	T-stat	p. Value	Z score	P Value
PU	5.49	0.97	5.35	1.12	.970	.333	.914	.374
PEU	5.35	1.02	5.32	1.27	.203	.839	.701	.710
INT	5.46	0.96	5.27	1.16	1.274	.204	.946	.333
IMG	5.17	1.17	5.09	1.15	.471	.638	.717	.683
USE	4.21	1.31	3.66	1.58	2.671	.008	1.173	.127

The one way ANOVA was used to compare the means of factor scores of all constructs between the two groups. A Kolmogorov-Smirnov (K-S) test was further used to examine if the sample distribution of the male group is equal to that of the female group (Boes, Graybill, & Mood et al., 1974 reported in Zhu & Kraemer, 2005). As shown in Table.1, the *p* value of each factor is insignificant ($p>0.10$), with only one exception -ICT use. It occurred as the study examined actual daily usage of ICT in terms of both degree of use and frequency of use. It may ha en as the females don't have adequate facilities to use the technology. However, all other constructs such as perceptions on usefulness of the technology, ease of use, image and intention seemed to be equal between the groups. Thus, the study concluded the role of the responded did not cause any survey bias.

Operationalization of the constructs under study

The study a lies second generation multivariate analytical methodology where multiple dependent variables are involved and each of the study constructs has multiple indicators. According to the objective and the theoretical model, this study is designed to portray the association between image, perceived usefulness, ease of use, intention and actual behavior. All of the constructs are measured through multiple latent variables.

Perceived ease of use, the extent to which a person believes that using a particular system will be free of effort, has been measured by 5 latent variables adapted from Davis (1989).

Perceived usefulness, the extent to which a person believes that using a particular system will enhance his or her performance, has been measured by 5 latent variables adapted from Davis (1989).

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Image, the degree to which use of innovation is perceived to enhance one's image or status in the social system, has been operationalised by 3 latent variables adapted from Moore and Benbasat (1991).

Intention, the extent to which a person shows his or her willingness to use the innovation, has been measured through 5 latent items adapted from Klopping and McKinney (2004).

Actual behavior, the extent to which a person uses the innovation to accomplish his or her intended service, is measured through 2 latent variables adapted from Klopping and McKinney (2004).

Model Specification

In the theoretical model, actual usage behavior (*B*) has been modeled as a direct function of behavioural intention (*BI*). *BI* is in turn, a weighted function of perceived usefulness *(U)*, perceived ease of use *(E)* ,image *(P)* and error term *(e)*. Perceived usefulness is a weighted function of perceived ease of use which is also a function of image.

$$B = w_1BI + w_2P + e \quad \text{.....(1)}$$

$$BI = w_3U + w_4E + w_5P + e \quad \text{.....(2)}$$

$$U = w_6E + w_7P + e \quad \text{.....(3)}$$

$$E = w_8P + e \quad \text{.....(4)}$$

Data Analysis and results

The structural equation modeling is appropriate to analyze the data in accordance with the proposed conceptual framework. A growing number of researchers are adopting causal or structural equation modeling as it allows the analysis of complex networks of constructs, each construct typically measured by multiple variables. Covariance structure analysis, as implemented by LISREL, EQS or AMOS, is the best a roach to causal modeling. However Partial Least Squares (PLS) is a complementary a roach with features well suited to the domain of technology research (Barclay, Higgins, & Thomson, 1995).

Chin (1995) reports that the covariance based SEM is superior on mathematical grounds while correlation based SEM has superiority on practical grounds (Chin 1995). Understanding the nature of the study and its practical implications, the data gathered from the survey were analyzed by partial least squares (PLS) based structural equation modeling (Barclay, Higgins, & Thompson, 1995) while the measurement model is assessed by covariance based structural equation modeling, as the conceptual framework of the grounded in past established theories.

In view of utilizing the potential of two a roaches of structural equation modeling this study utilizes a combination of AMOS 18 and PLS graphs software to administer entire data analysis. Understanding the superiority of covariance and component based structural equation modeling and considering the mathematical and practical grounding of the two analytical instruments, this study estimates measurement model by AMOS 18 and PLS graph software has been used for structural model estimation.

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Measurement model

The measurement model was first assessed by a confirmatory factor analysis using AMOS version 18. Different model fit indices are used in structural equation modeling as there is no consensus on the performance of adequacy of model fit by a certain fit index. In the baseline comparisons, most commonly used fit indices: incremental fit index (IFI) proposed by Bollen (1989), the Tucker Lewis Index (TLI) known as the non-normed fit index (NNFI) by Tucker and Lewis (1973), comparative fit index (CFI) proposed by Bentler (1990) and normed fit index (NFI) by Bentler and Bonett (1980) are widely used indices in SEM to assess the relative improvement in fit to the model. Incremental fit index (IFI) and comparative fit index (CFI), were used with χ^2 and RMSEA index to assess the proposed model's overall goodness of fit. As shown in the Figure 2, all of the model-fit indices a eared in their respective common acceptance levels, value equal to or greater than 0.90, suggested by previous studies (Chau 1997; Hulland et al., 1996; Kline, 2005), thus demonstrating that the measurement model exhibited a good fit with the data collected.

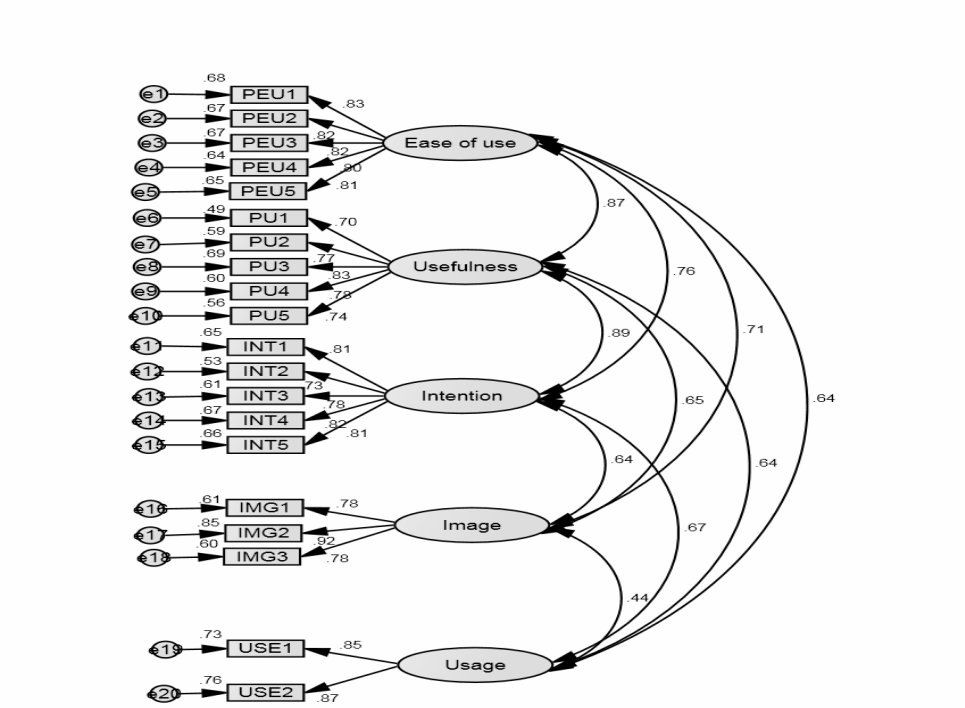
The model, therefore, was assessed for evaluating the psychometric properties of the measurement model in terms of reliability, convergent validity, and discriminant validity (Fornell & Larker, 1981). The reliability of the constructs was assessed by considering composite reliability and Cronbach's alpha. Construct reliability for all of the factors in the measurement model, both composite reliability and Cronbach alpha, were above 0.70, an acceptable threshold suggested by Nunnanly and Bernstein (1994) and Straub (1989) respectively.

Table 2: Measurement Model-I.

Construct	Items	Loadings	SE	CR	AVE
Perceived ease of use	PEU 1	0.805	na	na	0.908
	PEU 2	0.802	0.072	14.141***	
	PEU 3	0.821	0.073	14.133***	
	PEU 4	0.816	0.068	14.077***	
	PEU 5	0.826	0.069	14.709***	
Perceived usefulness	PU 1	0.699	na	na	0.873
	PU 2	0.769	0.099	11.133***	
	PU 3	0.83	0.093	11.8***	
	PU 4	0.773	0.095	11.175***	
	PU 5	0.749	0.101	10.76***	
Intention	INTENT 1	0.804	na	na	0.890
	INTENT 2	0.85	0.067	15.141***	
	INTENT 3	0.78	0.069	13.643***	
	INTENT 4	0.771	0.075	12.875***	
	INTENT 5	0.799	0.064	14.025***	
IMAGE	IMAGE 1	0.777	na	na	0.857
	IMAGE 2	0.918	0.072	14.689***	
	IMAGE 3	0.782	0.075	12.46***	
USE	USE 1	0.857	Na	na	0.852
	USE 2	0.869	0.079	11.937***	

*Note: AVE=Average variance extracted, ***=Significant at .001*

Figure 2: Measurement Model.



CMIN=494.950.352, df=159, CMIN/df=3.11, RMSEA=.094, IFI=906, CFI=905

Construct validity was evaluated by examining the factor loadings within the constructs as well as the correlation between the constructs (Andrson & Gerbing, 1988). The factor loadings on all of the constructs were highly satisfactory in the expected direction with satisfactory critical ratio and level of significance (i.e. ranged between .699 to .918), thus providing evidence of satisfactory item convergence on the intended constructs (see Table 2).

This study used the square root of the AVE and cross loading matrix to assess the discriminant validity as suggested by Igbaria, Guimaraes, and Davis (1995) and Barclay, Higgins and Thompson (1995). According to Barclay, Higgins and Thompson (1995), the model is assessed to have acceptable discriminant validity if the square-root of the AVE of a construct is larger than its correlation with other constructs. The results are detailed in Table 3 with the square roots of the AVEs shown in the main diagonal of the table. The off diagonal elements represent the correlations among the latent variables. Table 4 indicates that the discriminant validity of the latent variables was met, which means that all the latent variables are different from each other.

Discriminant validity of the measures have also been cross-checked through a series of confirmatory factor analyses for each pair of constructs (Atuahene-Gima, 2005) and cross loading matrix (Barclay, Higgins, and Thompson 1995). In each test, the $\Delta\chi 2$ (1 df) for the constrained model were found to be

significantly greater than the unconstrained model, thus showing the adequate discriminant validity (Table 4).

Table 3: Measurement Model-II.

Factors	No of Items	CR	PEU	PU	EX	INT	USE
PU	5	.931	**.854**				
PEU	5	.908	0.776	**.815**			
INT	5	.92	0.702	0.8	**.884**		
IMG	3	.915	0.649	0.583	0.582	**.835**	
USE	2	.932	0.567	0.552	0.583	0.388	**.934**

Note: CR = Composite reliability, PU = Perceived usefulness, PEU = Perceived ease of use, EXP = Experience, INT = Intention, USE = Use

Results of the cross-loading analysis showed that all items loaded higher on the construct that they were measuring than they did on other constructs in the model (Barclay, Cavay,& Thompson 1995). To save space, the cross-loading matrix is not presented in this paper. Although the results from AMOS 18 are reported in the tables, it is also cross-checked with the analysis of PLS which produces consistent results, thus indicating robustness of the model.

Table 4: Measurement Model III.

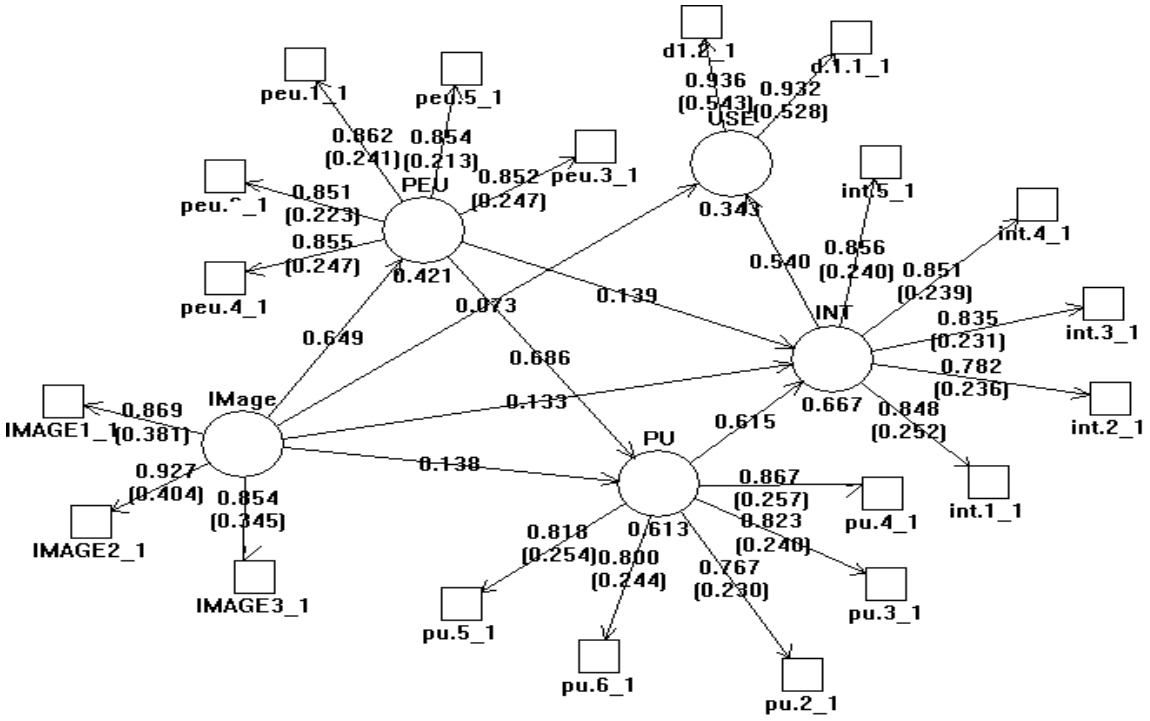
	Constrained		**Unconstrained**		$\Delta\chi^2$	**Δdf**	**sig**
	χ^2	**df**	χ^2	**df**			
ATT□□SN	**131.047**	**9**	**23.21**	**8**	**107.837**	**1**	**.001**
ATT□□PBC	**206.043**	**10**	**51.203**	**9**	**154.84**	**1**	**.001**
ATT□□INT	**156.502**	**10**	**35.332**	**9**	**121.17**	**1**	**.001**
SN□□PBC	**206.991**	**4**	**21.362**	**3**	**185.629**	**1**	**.001**
SN□□INT	**87.605**	**4**	**5.803**	**3**	**81.802**	**1**	**.001**
PBC□□INT	**109.432**	**4**	**7.764**	**3**	**101.668**	**1**	**.001**

Structural model

The structural model deals with testing the hypothesized relationships. Bootstrap method has been used to test the hypotheses. The results detailing the path coefficients and *t*-statistics are summarized in Table 5.

It is observed that among the primary hypotheses H1a, H1b, H1c, H2b, H3, H4 were supported (significant *t*-values), while hypotheses H1d and H2a were not supported (insignificant *t*-values). According to Santosa, Wei, and Chan (2005) the nomological validity or explanatory power of the proposed model can be assessed by observing the R^2 values of the endogenous constructs. The model explains 66.7% of the variance (R^2) of the intention to adopt Internet. All R^2 values exceeded the minimum required value of 0.10 as suggested by Falk & Miller (1992) (see Table 5 and Figure 2).

Figure 2: Illustration of Structural Model.



The path coefficient for the model shows that all the constructs under the model are related in expected direction, although some of them are not significant, according to the proposed theoretical framework. The study has shown that the proposed model is applicable in Bangladesh setting to significantly explain intention to use as well as actual use of Internet. Image was found to be one of the strongest constructs influencing intention of Internet use, perceived ease of use as well as perceived usefulness, while it did not produce any significant contribution to actual usage behavior.

The fundamental component of TAM, perceived ease of use, was found to have no significant effects on behavioral intention. In addition to the finding of insignificant direct effect, perceived ease of use was found to have significant indirect effects on behavioral intention through a strong direct effect on perceived usefulness. Although the result is contrary to some of the previous studies (Igbaria et al., 1997; Adams, Nelson, & Todd, 1992), it is consistent with some other studies (Szajna, 1996; Subramanian, 1994; Chau & Hu, 2002; Chau, 1996).

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Table 5: Structural Model.

	Beta	SE	t statistic	Comments
PU←IMG	0.138	0.0618	2.2324*	Supported
PEU←IMG	0.649	0.0469	13.834**	Supported
INT←IMG	0.133	0.0528	2.5203*	Supported
USE←IMG	0.073	0.0641	1.138	Not Supported
INT← PEU	0.139	0.0885	1.5714	Not Supported
PU← PEU	0.686	0.0638	10.7498**	Supported
INT ← PU	0.615	0.0695	8.8445**	Supported
USE←INT	0.54	0.059	9.1475**	Supported

*** indicates p> .01, * indicates p> .05*
Note: R^2 for INT = 0.667, R^2 for USE = 0.343, R^2 for PEU = 0.421, R^2 for PU = 0.613,

Perceived usefulness was found to have a significant direct effect on intention to use the Internet which is consistent with the fundamental assumptions of TAM as supported by many previous studies (Davis 1989; Davis, Bagozzi, & Warshaw, 1989; Lu et al., 2003; Mathieson, 1991; Taylor & Todd, 1995; Venkatesh & Davis, 2000; Szajna, 1996; Yoon, 2008). Finally the structural model depicts intention as a strong significant determinant of actual behaviour which refers actual use of the Internet in this study. The finding supports previous theories and empirical studies (Ajzen & Fishbein, 1980; Azam & Quaddus, 2009d; Chang, 1998; Fishbein & Ajzen, 1975; Mathieson, 1991; Taylor & Todd, 1995; Taylor & Todd, 1995; Taylor & Todd, 1995; Venkatesh & Morris, 2000; Venkatesh & Davis, 2000).

DISCUSSION AND CONCLUSION

The structural equation model explains the joint effects of all constructs used in the model. The study depicts the magnitude and degree of effects of the antecedent factors of internet use in Bangladesh. The study found that image has a positive direct effect on perceived ease of use, perceived usefulness and behavioral intention. Thus hypotheses $H_{1a,}$ H_{1b} and H_{1c} were supported. Contrary to this result image did not exhibit a significant effect on actual usage thus hypothesis H_{1d} was not supported.

The findings of the study is partly consistent with other previous studies which investigate the effects of image on the adoption of information and communication technology (Jebeile & Revee, 2003; Mazman & Usluel, 2009; Moore & Benbasat, 1991; Richardson, 2009). Some of the previous studies utilize image as an internal independent variable with other perceptions such perceived relative advantage, perceived ease of use, compatibility, trialability, result demonstrability, self efficacy. Some other studies examine the effects of image as one of the antecedents of perceived usefulness as it was believed that the higher the ability of creating image the higher is the usefulness of the technology.

This study depicts a unique association in-between image and perceived ease of use which is different from other previous studies. The outcome may be explained in that the use and adoption of the Internet is concentrated in the upper class. The individuals affiliated with the upper class are economically powerful and hold a higher image and social prestige over others across the social system. They have the resources, ability and experience to use Internet, thus they feel the technology is easy to use. On the other hand the individuals in the upper class are the innovators in character, they have the ability to take

higher risks associated with the use of an innovation. They are educated and already exposed to modern systems those are complementary with the Internet and other information technology. Thus they feel the use of the technology is useful.

Consistent with the prior technology acceptance studies, perceived ease of use has a positive and direct effect on perceived usefulness and perceived usefulness has a positive direct effect on behavioral intention, thus hypotheses H_{2b} and H_3 are supported. As postulated in hypothesis H_{2a} perceived ease of use doesn't affect behavioral intention.

Finally a strong and significant effect of behavioral intention on actual usage behavior is found. Thus hypothesis H_4 is supported.

Image, with its significant influence on intention of using Internet as the medium of transaction and communication, as well as perceived ease of use and usefulness, may be used in promoting the use of Internet in Bangladesh. Promoting the ICT as a means of creating social image and prestige may result in individuals' motivation to learn and adopt it in accomplishing different functions. The campaign in promoting ICT in such a way would attract a wide range of people to adopt and utilize the Internet in their day-to-day communication, activities and transactions. The individuals from different classes will enjoy the facility to be connected with a wider community regardless of their class affiliation and status. Thus, with the existing programs the government, private organizations and other concerned parties can take the initiatives to create a positive environment that will move towards achieving a class-free society through ICT. National mass media, formal and informal education institutions, community organizations, NGOs, civil society organizations should take a vital part in this regard. Community based movements in conjunction with existing support may have achieved significant development in the accomplishment of the national digital goal. Government should also continue providing positive technological, financial and legal infrastructural supports that would help create the technology useful in various working areas. It is hoped that the country would be able to overcome the hindrances and pull off the economic potentials of the technology in the country's overall development initiatives.

Finally the outcomes of the study substantiate the applicability of an extended version of the technology acceptance model in Bangladesh assessing individuals' acceptance and usage behavior of the Internet as a strong medium of transaction and communication.

REFERENCES

Adams, D. A., Nelson, R. R. , & Todd, P. A. (1992). Perceived Usefulness, Perceived Ease of Use, and Usage of Information Technology: A Replication. *MIS Quarterly*, 16(2), 227-247.

Agarwal, R., & Prasad, J. (1999). Are individual Differences Germane to the Acceptance of New Information Technologies? *Decision Sciences*, 30(2), 361-391.

Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.

Ajzen, I., (1985). From Intentions to Actions: A Theory of Planned Behavior. In J. Kuhl & J. Beckman (Eds.). *Action-control: From Cognition to Behavior*, 11(39), Heidelberg: Springer.

Anderson, J. C., & Gerbing, D. W. (1988). Structural Equation Modeling in Practice: A Review and Recommended Two-step A roach. *Psychological Bulletin*, 103(3), 411-423.

Atuahene-Gima, K. (2005). Resolving the Capability-Rigidity Paradox in New Product Innovation. *Journal of Marketing*, 69, October, 61-83.

Azam, M. S. (2005). Adoption of Personal Computer in Bangladesh: The Effects of Perceived Innovation Characteristics. In Noorhayati Mansor, Lim Thien Sang, Mohd Safri Saiman and Kalsom Abd Wahab (eds.). *Proceedings of the 2nd International Conference of the Asian Academy of A lied Business (AAAB)*, 647-655, 28 -30 July, Padang, Indonesia.

Azam, M. S. (2006a). E-commerce in Bangladesh: Understanding SMEs Intention and Exploring Barriers. *Journal of Business Studies*, 2, 37-58.

Azam, M. S. (2006b). Implementation of B2C E-Commerce in Bangladesh: The Effects of Buying Culture and E-infrastructure. In Dianne H.B. Welsh, Mohd. Shukri Ab Yajid, Valentin H. Pasthenko and Zafar U. Ahmed (eds.). *Advances in Global Business Research*, 3(1), 55-66.

Azam, M. S. (2007). Adoption and usage of Internet in Bangladesh. *Japanese Journal of Administrative Science*, 20(1), 1-12.

Azam, M. S., & Quaddus, M. (2009a). Adoption of B2B E-commerce by the SMEs in Bangladesh: An Empirical Analysis. In *Proceedings of Asian Business Research Conference*, 11-12 January 2009. Dhaka, Bangladesh. Retrieve 17 June 2011, from http://www.wbiconpro.com/18[1].-Azam-.pdf.

Azam, M. S., & Quaddus, M. (2009b). Adoption of E-Commerce by the SMEs in Bangladesh: The Effects of Innovation Characteristics and Perceived Risk. In *Proceedings of the Australian and New Zealand Marketing Academy Conference (ANZMAC)*, 30 November -02 December, Melbourne, Australia.

Azam, M. S., & Quaddus, M. (2009c). How Organisational Characteristics Explain the Adoption of e-Commerce by the SMEs in Bangladesh? In *Proceedings of the 20th Australasian Conference on Information Systems (ACIS)*, 03-05 December, Melbourne, Australia.

Azam, M. S., & Quaddus, M. (2009d). Internet Usage Behavior in Bangladesh: A Test of Theory of Planned Behaviour Through Structural Equation Modeling. *Proceedings of the Curtin International Business Conference*, 21-23 December, Mirri, Malaysia.

Azam, M. S., & Lubna, N. (2008). Concerns and Constraints of E-commerce: An Investigation into the Service Industry and Manufacturing Industry in Bangladesh. In D S Chundawat, Karunesh Saxena and Shishupal Singh Bhadu (eds.). *Managing Global Competition A Holistic A roach,* Delhi: Macmillan India Ltd, 101-121.

Banerjee, A. (2010). Will Mobile Commerce Compete or Co-exist with Electronic Commerce? Evidence from the United States. Presented at International Telecommunications Society 18th Biennial Conference, Tokyo, June 27-30.

Barclay, D., Higgins, C., & Thompson, R. (1995). The Partial Least Squares (PLS) A roach to Causal Modeling: Personal Computer Adoption and Use as an Illustration. *Technology Studies*, 2(2), 285–309.

Bentler, P. M., & Bonett, D. G. (1980). Significance Tests and Goodness-of-fit in the Analysis of Covariance Structures. *Psychological Bulletin,* 88, 588-600.

Blackwell, R. D., Miniar, P.W., and Engel, J. F. (2006). *Consumer Behvaiour,* Singapore: Thomson South-Western.

Boes, D. C., Graybill, F. A., & Mood, A.M. (1974). *Introduction to the Theory of Statistics,* 3rd ed., New York: McGraw-Hill.

Bollen, K. A. (1989). A New Incremental Fit Index for General Structural Equation Models. *Sociological Methods and Research* (17), 303-316.

Chang, M. K. (1998). Predicting Unethical Behaviour: A Comparison of the Theory Reasoned Action and the Theory of Planned Behaviour. *Journal of Business Ethics,* 17, 1825-1834.

Chau, P. & Hu, P. (2002). Investigating Healthcare Professionals' Decisions to Accept Telemedicine Technology: An Empirical Test of Competing Theories. *Information and Management,* 39(4), 699-719.

Chau, P. Y. K. (1997). Reexamining a Model for Evaluating Information Center Success Using a Structural Equation Modeling A roach. *Decision Sciences,* 28(2), 309-334.

Chau, P. Y. K. (1996). An Empirical Assessment of a Modified Technology Acceptance Model. *Journal of Management Information Systems,* 13(2), 185-204.

Chin, W. W. (1995). Partial Least Squares is to LISREL as Principle Components Analysis is to Common Factor Analysis. *Technology Studies,* 2, 315-319.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly,* 13(3), 319-339.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Davis, F. D. (1993). User Acceptance of Information Technology: System Characteristics, User Perceptions and Behavioral Impact. *International Journal of Man-Machine Studies,* 38, 475-487.

Davis, F. D,, Bagozzi, R .P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science,* 35(8), 982-1003.

Falk, R. F., & Miller, N. B. (1992). *A Primer for Soft Modeling*. Akron: University of Akron Press.

Fishbein, M., & Ajzen, I. (1975). *Beliefs, Attitude, Intention, and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley.

Fornell, C., & Larcker, D. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research,* 18, 39–50.

GOB. (2010). The National Budget 2010-11. Government of the Peoples Republic of Bangladesh.

Hair, J. F., Anderson, R. I., Tatham, R. L., & Black, W. C. 1995. *Multivariate Data Analysis*. 5th ed., Engle wood cliffs: Prentice Hall International.

Hong, W., Thong, J. Y. L., Wong, W. M. & Tam, K. Y. (1999). Determinants of User Acceptance of Digital Libraries: An Empirical Examination of Individual Differences and System Characteristics. *Journal of Management Information Systems,* 16(2), 91-112.

Hossain, N. (2000). E-commerce in Bangladesh: Status, Potential and Constraints. Retrieved 23 September 2009, from http://www.iris.umd.edu/publications/detail.asp?ID=bd&number=6.

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., & Gupta, V. 2004. *Culture, Leadership and Organizations: The GLOBE Study of 62 Societies*. California: Sage Publications, Inc.

Hu, P. J., Chau, P. Y. K., Sheng, O. L., & Tam, K. Y. 1999. Examining the Technology Acceptance Model Using Physician Acceptance of Telemedicine. *Journal of Management Information Systems,* 16(2), 91-112.

Hulland, J. (1999). Use of Partial Least Square (PLS) in Strategic Management Research: A Review of Four Recent Studies. *Strategic Management Journal,* 20(2), 195–204.

Hulland, J., Chow, Y. H., & Lam, S. (1996). Use of Causal Models in Marketing Research: A Review. *International Journal of Research in Marketing,* 13(2), 181-197.

Igbaria, M, Guimaraes, T., & Davis, G B. (1995). Testing the Determinants of Micro Computer Usage via Structural Equation Model. *Journal of Management Information Systems,* 11(4), 87-114.

Igbaria, M., Zinatelli, N., Cragg, P., & Cavayv, A. (1997). Personal Computing Acceptance Factors in Small Firms: A Structural Equation Model. *MIS Quarterly,* 21(3), 279-305.

ITRC. (2000). E-commerce in Bangladesh: A Readiness Assessment. *ITRC Research Brief,* Retrieved 21 February 2009, from http://www.itrc.techbangla.org.

ITU. (2010). *World Telecommunication/ICT Development Report 2010: Monitoring The WSIS Targets: A mid-term review.* Geneva: International Telecommunication Union.

Jebeile, S., & Reeve, R. (2003). The Diffusion of E-Learning Innovations in an Australian Secondary College: Strategies and Tactics for Educational Leaders. *The Innovation Journal,* 8(4), 1-21.

Karahanna, E., Straub, D. W., & Chervany, N. L. (1999). Information Technology Adoption Across time: A Cross-sectional Comparison of Pre-adoption and Post-adoption Beliefs. *MIS Quarterly,* (23(2), 183-213.

Kline, R. B. (2005). *Principles and Practice of Structural Equation Modeling*. New York: The Guilford Press.

Klopping, I. M., & McKinney, E. I. (2004). Extending the Technology Acceptance Model and the Task-technology Fit model to Consumer E-commerce. *Information Technology, Learning and Performance Journal,* 22(1), 35-48.

Lu, J., Yu, C-S. , Liu, C., & Yao, J. E. (2003). Technology Acceptance Model for Wireless Internet, *Internet Research,* 13(3), 206-222.

Mathieson, K. (1991). Predicting User Intention: Comparing the Technology Acceptance Model with the Theory Planned Behavior. *Information Systems Research,* 2(3), 173-191.

Mazman, S. G., & Usluel, Y. K. (2009). The Usage of Social Networks in Educational Context. *International Journal of Human and Social Sciences,* 4(12), 849-853.

Moore, G. C., & Benbasat, I. (1991). Development of an Instrument to Measure Perceptions of Adopting an Information Technology Innovation. *Information Systems Research,* 2(3), 192-222.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory*. New York: McGraw-Hill.

Rahman, M. L. (2002). E-commerce and Concerns for E-Commerce in Bangladesh. *Journal of the Institute of Bankers Bangladesh,* 48, January 2001- June 2002.

Richardson, J. (2009). Diffusion of Technology Adoption in Cambodia: The Test of a Theory. *International Journal of Education and Development Using Information and Communication Technology(IJEDICT),* 5(3), 157-171.

Rogers, E. (1985). *Diffusion of Innovations.* 3rd ed., NY: Free Press.

  ISSN: 1543-5962-Printed Copy ISSN: 1941-6679-On-line Copy

Rossides, D. W. (1990). *Social Stratification.* Englewood Cliffs: Prentice-Hall.

Santosa, P I., Wei, K. K., & Chan, H. C. (2005). User Involvement and User Satisfaction with Information-Seeking Activity. *European Journal of Information Systems,* 14, 361–370.

Shih, H. (2004). Extended Technology Acceptance Model of Internet Utilisation Behaviour. *Information & Management,* 41, 719-729.

Subramanian, G. H. (1994). A Replication of Perceived Usefulness and Perceived Ease of Use Measurement. *Decision Science* , 25(5-6), 863-874.

Szajna, B. 1996. "Empirical Evaluation of The Revised Technology Acceptance Model," *Management Science* (42:1), 85-92.

Taylor, S., & Todd, P. (1995). Assessing IT Usage: The Role of Prior Experience. *MIS Quarterly,* 19(4), 561–570.

Taylor, S., & Todd, P. (1995). Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research,* 6(2), 144-176.

Tucker, C. & Lewis, C. (1973). A Reliability Coefficient for Maximum Likelihood Factor Analysis. *Psychometrika,* 38, 1-10.

Venkatesh, V. (2000). Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model. *Information Systems Research,* 11(4), 342-365.

Venkatesh, V., & Davis, F. D. 1996. A Model of the Antecedents of Perceived Ease of Use: Development and TesT. *Decision Sciences,* 27, 451-481.

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science,* 46(2), 186-204.

Venkatesh, V., & Morris, M. D. (2000). Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influences and Their Role in Technology Acceptance and Usage Behavior. *MIS Quarterly,* 24(1), 115-139.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, E. D. (2003). User Acceptance of Information Technology: Towards a Unified View. *MIS Quarterly,* 27(3), 425-478.

Wang, Y., Wang, Y., Lin, H., & Tang, T. (2003). Determinants of user acceptance of internet banking: an empirical study. *International Journal of Service Industry Management*, 14(5), 501-519.

World Bank. (2010). Country Level Internet Usage Statistics, Retrieved 28 June 2008, from http://data.worldbank.org/indicator/IT.NET.USER.P2?cid=GPD_44.

Yoon, C. (2008). The Effects on National Cultural Values on Consumer Acceptance of E-Commerce: Online Sho ers in China. *Information & Management,* 46, 294-301.

Zhu, K., & Kraemer, K. L. (2005). Post-Adoption Variation in Usage Value of E-Business by Organizations: Cross-Country Evidence from the Retail Industry. *Information Systems Research*, 16(1), 61-84.

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