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Dwivedi, Yogesh; Khan, Naureen; and Papazafeiropoulou, Anastasia, "Consumer Adoption and Usage of Broadband in Bangladesh" (2006). *AMCIS 2006 Proceedings*. 426.
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Consumer Adoption and Usage of Broadband in Bangladesh

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ABSTRACT

This study examines empirically the factors affecting the adoption and usage of broadband Internet in a developing country in this instance Bangladesh. This study is part of a wider research looking to explore consumer adoption of broadband services in various geographical and national settings. Thus, attitudinal, normative and control factors to provide insights of broadband adopters and non-adopters as identified in the literature are examined together with uses of broadband such as: relative advantage, utilitarian outcomes, hedonic outcomes, primary influence, secondary influence, facilitating conditions resources, knowledge and self-efficacy. The data on these variables was collected using a survey study. A self-administered questionnaire was sent between August and October 2005 to 80 consumers with a total of 70 responses obtained from the respondents. The findings of this paper suggest that attitude, primary influence, secondary influence and facilitating conditions resources are important factors for explaining behavioural intentions to adopt broadband. The paper also outlines the theoretical contributions, implications for practice and limitations of this research.

Keywords

Bangladesh, broadband adoption, consumer, survey, Internet usage

INTRODUCTION

As the Internet was introduced comparatively late (in 1996) in Bangladesh, in early 2004 total penetration of Internet was only at 0.25 percent (Totel, 2004). It was suggested that the major obstacles associated with low Internet penetration in the country are the low economic status and still developing infrastructure (Totel, 2004). A recent media report further emphasized that “Bangladesh is not anywhere on the global broadband map, but it is doing its best to get online. Local service provider, DNS SatComm has started deploying fixed wireless gear from Cambridge Broadband and will offer access to government offices, and other commercial entities” (Malik, 2005). It has also been suggested that Internet connection is slow and costly and not affordable by the general public (Hossain, 2004). Given the situations of Bangladesh in terms of demography, telecommunication infrastructure and affordability of Internet by people, it was felt that understanding factors including cost of Internet access and subscription affecting consumer adoption and usage might help to encourage further diffusion of high speed Internet. Therefore, the aim of this study was to empirically examine the factors affecting the adoption and usage of the broadband Internet in a developing country such as Bangladesh.

Having introduced the topic of interest this paper now proceeds to provide a brief discussion on the background literature in Section 2. A brief discussion on the theoretical basis for examining the adoption and usage of broadband is provided in Section 3. Section 4 provides a brief discussion of the utilized research methods. The findings are presented in Section 5 and a discussion in Section 6. Finally, a conclusion including the contributions and limitations to the research are provided in section 7.

BACKGROUND LITERATURE

An analysis of literature suggest that although both macro (Choudrie and Lee, 2004) and micro level (Choudrie and Dwivedi, 2006ab) studies were conducted to understand deployment of broadband in developed world and leading countries such as South Korea, none of studies focused upon third world countries such as Bangladesh. The reason could be the slow

development infrastructure development and very low rate of adoption as mentioned in the introduction section. This has provided motivations to researchers to undertake this exploratory study in order to understand the perception of consumers regarding broadband adoption and its usefulness. Its worthwhile contribution would be to understand reasons for consumer adoption and non-adoption of subscription based technologies such as broadband in developing world. Next section briefly discusses the theoretical basis for examining the factors of consumer adoption and non-adoption of broadband.

THEORETICAL BASIS

The theoretical constructs included in this study were adapted from Dwivedi (2005). In this study it was postulated that the behavioural intentions (BI) to adopt broadband are determined by the following three types of constructs. These are: (1) **attitudinal constructs** (*relative advantage, utilitarian outcomes and hedonic outcomes*) represent the consumers' favorable or unfavorable evaluation of the behaviour in question (i.e. adoption of broadband) (Rogers, 1995; Venkatesh and Brown, 2001); (2) **normative constructs** (*primary and secondary influence*) represent the perceived social pressure to perform the behaviour in question (i.e. adoption of broadband) (Venkatesh and Brown, 2001); (3) **control constructs** (*knowledge, skills and facilitating conditions resources*) represent the perceived control over the personal or external factors that may facilitate or constrain the behavioural performance (Venkatesh and Brown, 2001). It was found that all the aforementioned constructs except knowledge significantly influenced BI to adopt broadband in the UK households (Dwivedi, 2005). Therefore, this study also adapted the same constructs. Figure 1 shows the conceptual model adapted to study consumer adoption of broadband in Bangladesh.

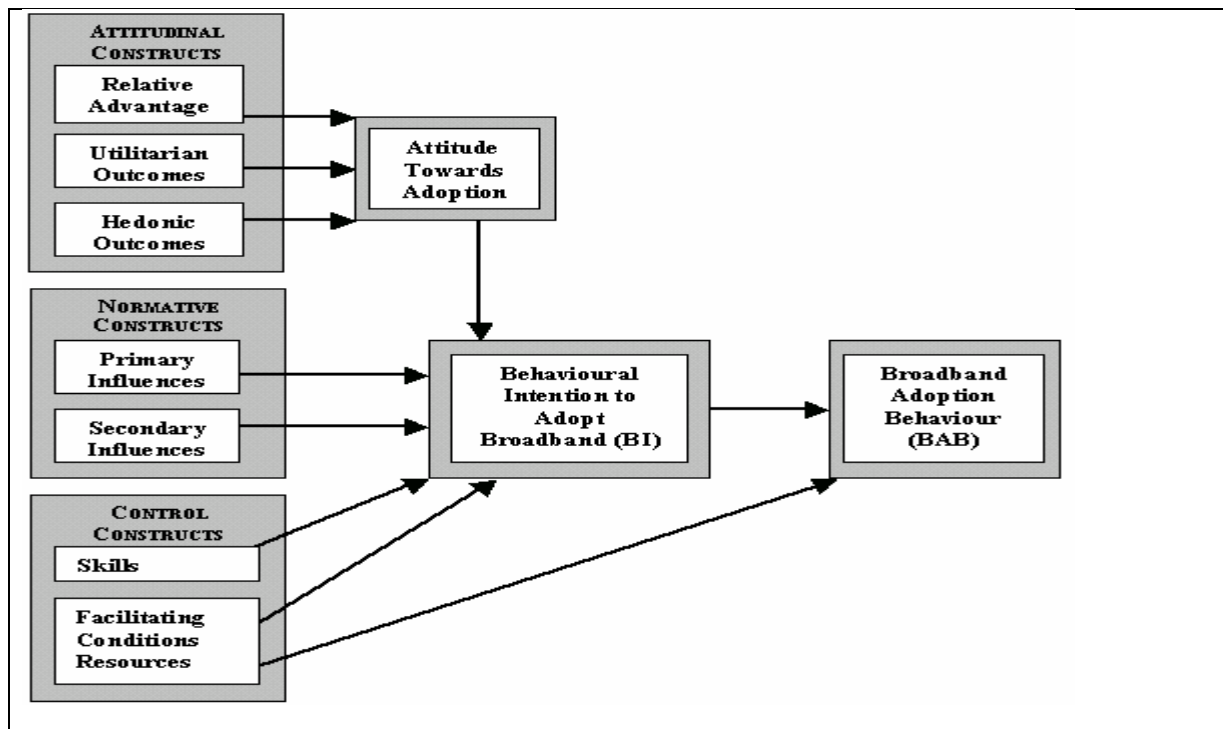


Figure 1. Constructs Included to Examine Consumer Adoption of Broadband in Bangladesh (Source: Dwivedi, 2005)

RESEARCH METHODOLOGY

For the purpose of examining broadband adoption and usage in Bangladesh, researchers considered a survey as a suitable research method (Choudrie and Dwivedi, 2005). A number of techniques are available to capture the data. A self-administered questionnaire was considered to be the primary survey instrument for data collection in this investigation. This is because it addresses the issue of reliability of information by reducing and eliminating differences in the way that the questions are asked, and how they are presented (Fowler, 2002). Furthermore, questionnaires facilitate the collection of data within a short period of time from the majority of respondents and this was a critical issue for this research (Fowler, 2002). Fowler (2002) has suggested that, "if one is going to have a self-administered questionnaire, one must reconcile oneself to closed questions, which can be answered by simply checking a box or circling the proper response from a set provided by the researcher" (Fowler, 2002). Therefore mainly multiple and closed questions were included in the questionnaire. The literature review provided an initial understanding of the broadband adoption and usage, and the basis for the development of a draft questionnaire. The final questionnaire consisted of a total of 14 questions that included 12 close-ended, multiple, likert scale

type and two open-ended questions. The Likert scale type questions were adapted from Choudrie and Dwivedi (2006b) and demographic categories were adapted from Choudrie and Dwivedi (2006a).

Due to the uncertainty regarding personnel using the broadband facility, the researchers adopted the snowball or chain sampling (Fridah, 2002) method when selecting the respondents for the survey. In order to identify the first few respondents with Internet connection, researchers approached friends and colleagues who possess the broadband connections at home using email in order to complete the questionnaire. The respondents were also requested to recommend their friends and family contacts that had Internet connections at home. This strategy led to the questionnaire being administered to a total of 80 broadband users via email attachment during the periods of August and October 2005. All the respondents who replied were located in Dhaka, Bangladesh. Of the 80 questionnaires administered, 70 respondents returned the completed questionnaire. Thus the obtained a response rate was 87.5%.

The initial stage of data analysis involved checking the responses, and providing a unique identification number to each response. Using SPSS (version 11.5) and Excel applications the research generated the descriptive statistics (i.e. frequencies, percentage and tables) and conducted reliability test and regression analysis to analyze and present the research data obtained from the questionnaire. The data obtained from the open-ended questions regarding usage of Internet were coded, summarized and illustrated in graphical forms.

FINDINGS

Respondent Profile

A profile of the survey respondents is presented in Table 1. Of the 70 respondents, only 12.9 percent represented the adopters of broadband and the remaining 87.1 percent were the non-adopters (Table 1). The non-adopters of broadband include respondents accessing the Internet utilising narrowband (dial-up) at home and those who do not have Internet access at all. Of the 87.1 percent non-adopters category, 70 percent possessed a narrowband connection and 24.3 percent stated that they do not to have any means of Internet access at home (Table 1).

Age		Gender	
<=16 Years	5.7%	Male	61.4%
17-24 Years	55.7%	Female	38.6%
25-34 Years	28.6%	PC at Home	
35-44 Years	10.0%	Yes	94.3%
		No	5.7%
Education		The Internet via Broadband at Home	
GCSE/High School/ 10th Standard	7.1%	Yes	12.9%
A Level/Intermediate/10+2	40.0%	No	87.1%
Diploma	1.4%	The Internet via Dial-up at Home	
Degree	24.3%	Yes	70.0%
Postgraduate/Research	25.7%	No	24.3%
Not Replied	1.4%		

Table 1. Respondents Profile

Adoption of Broadband

Reliability test

Table 2 illustrates the Cronbach's coefficient alpha values that were estimated to examine the internal consistency of the measure. Cronbach's α varied between 0.89 for the facilitating condition resources and 0.57 for secondary influence construct. Both relative advantage and skills possessed a reliability value of 0.63. Cronbach's α for the remaining five constructs varied between for hedonic outcomes 0.69 and for behavioural intentions 0.83. Two constructs, namely attitude and utilitarian outcomes, had Cronbach's α at 0.76 and for primary influence the value of alpha was 0.80. Hinton et al. (2004) have suggested four cut-off points for reliability, which includes excellent reliability (0.90 and above), high reliability (0.70-0.90), moderate reliability (0.50-0.70) and low reliability (0.50 and below) (Hinton et al 2004). The aforementioned values suggest that of the nine constructs, five possess high reliability and the remaining four illustrate moderate reliability. None of the constructs demonstrated a low reliability (Table 2). The high Cronbach's α values for all constructs imply that they are internally consistent. That means all items of each constructs are measuring the same content universe (i.e. construct). For example, both the items of BI are measuring the same content universe of behavioural intention. Similarly, all six items of

UO are measuring the content universe of utilitarian outcomes construct. In brief, the higher the Cronbach’s α value of a construct, the higher the reliability is of measuring the same construct.

Constructs	N	Number of Items	Cronbach’s Alpha (α)
Behavioural Intentions	70	2	.8300
Attitude	70	2	.7659
Relative Advantage	70	4	.6368
Utilitarian Outcomes	70	6	.7685
Hedonic Outcomes	70	2	.6988
Primary Influence	70	3	.8033
Secondary Influence	70	2	.5799
Facilitating Conditions Resources	70	2	.8962
Skills	70	2	.6378

Table 2. Reliability of Measurements

Regression analysis I: Influence of relative advantage (AVARA), utilitarian outcomes (AVAUO) and hedonic outcomes (AVAHO) on attitude of consumers

The regression analysis was performed with attitude as the dependent variable and relative advantage, utilitarian outcomes and hedonic outcomes as the predictor variables. A total of 70 cases were analyzed. From the analysis, a significant model emerged ($F(3, 70) = 24.567, p < .001$). The adjusted R square was 0.506 (Table 3).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.726 ^(a)	.528	.506	.63396

Table 3. Regression Analysis I: Model Summary

^aPredictors: (Constant), AVARA, AVAUO, AVAHO

From the three independent variables only one variable namely relative advantage ($\beta = .479, p < .001$) included in the analysis was found to be significant (Table 4). Both utilitarian outcomes ($\beta = .155, p = .204$) and hedonic outcomes ($\beta = .195, p = .131$) as predictor variables were not found to be significant (Table 4).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.051	.591		1.779	.080
	AVARA	.519	.118	.479	4.400	.000
	AVAUO	.138	.107	.155	1.284	.204
	AVAHO	.148	.097	.195	1.529	.131

Table 4. Regression Analysis I: Coefficients (Dependent variable: Attitude)

Regression analysis II: Influence of attitude (AVAA), primary influence (AVAPI), secondary influence (AVASI), facilitating conditions resources (AVAFCR) and skills (AVASK on behavioural intentions (BI)

The regression analysis was performed with behavioural intentions as the dependent variable and attitude, primary influence, secondary influence, facilitating conditions resources and skills as the predictor variables. A total of 70 cases were analyzed. From the analysis, a significant model emerged ($F(5, 70) = 18.239, p < .001$) (Table 6). The adjusted R square was 0.555 (Table 5). Four predictor variables included in the analysis were found to be significant (Table 7). These include AVAFCR ($\beta = .244, p = .009$), A ($\beta = .518, p < .001$), PI ($\beta = .369, p = .001$) and SI ($\beta = .326, p = .002$). Only skill as a predictor variable was not found to be significant ($\beta = .175, p = .100$) (Table 7).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.767 ^(a)	.588	.555	.84566

Table 5. Regression Analysis II: Model Summary

^aPredictors: (Constant), AVASK, AVAFCR, AVASI, AVAA, AVAPI

As illustrated in Table 7, the constructs are arranged according to their size of β values in decreasing order. The size of β suggests that attitude construct has the largest impact in the explanation of variations of BI. This is followed by the primary

influence construct and then secondary influence. The facilitating condition resources construct from the control category contributed the fourth largest variance of BI.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	65.217	5	13.043	18.239	.000(a)
	Residual	45.769	64	.715		
	Total	110.986	69			

Table 6. Regression Analysis II: ANOVA (Dependent Variable: AVABI)

^a Predictors: (Constant), AVASK, AVAFCR, AVASI, AVAA, AVAPI

When performing a regression analysis, an important cause of concern is the existence of multicollinearity amongst the independent variables such as AVAA, AVAPI, AVAFCR and AVASI. It is likely to exist when the independent variables included in the analysis are not truly independent and measure redundant information (Myers, 1990). The existence of multicollinearity negatively affects the predictive ability of the regression model (Myers, 1990) and causes problems when attempting to draw inferences about the relative contribution of each predictor variable to the success of a model (Brace *et al*, 2003). Therefore, it is important to examine whether the problem of multicollinearity exists in this research. SPSS provides two options to estimate the tolerance and variance inflation factor (VIF) to trace if data suffers with the problem of multicollinearity (Brace *et al*, 2003, Myers, 1990).

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.412	.697		-.592	.556		
	AVAA	.729	.143	.518	5.110	.000	.626	1.596
	AVAPI	.272	.080	.369	3.424	.001	.554	1.804
	AVASI	-.277	.088	.326	-3.149	.002	.600	1.666
	AVAFCR	.124	.046	.244	2.695	.009	.785	1.274
	AVASK	.138	.083	.175	1.671	.100	.591	1.693

Table 7. Regression Analysis II: Coefficients (Dependent Variable: Behavioural Intentions)

In order to detect multicollinearity in this research, both the VIF and tolerance that were estimated are shown in Table 7. Values obtained for both VIF and tolerance indicate that there is no problem of multicollinearity in this research. Table 7 illustrates that the VIF for this model varied between 1.274 for facilitating condition resources construct and 1.804 for primary influence construct, which are much below the recommended level (Brace *et al*, 2003, Myers, 1990). Table 7 also illustrates that all the predictors have a high tolerance of more than 0.55. Therefore, both the VIF and tolerance values suggest that the independent variables included in this study do not suffer from the problem of multicollinearity.

Logistic regression analysis: measuring the influence of behavioural intentions (AVABI) and control factors (AVACC) on adoption behaviour

A logistic regression analysis was performed with broadband adoption as the dependent variable and behavioural intention and facilitating conditions resources as the predictor variables. The dependent variable, which measures the broadband adoption behaviour, is categorical in nature and represented by Yes and No. Yes is equal to 1 if the respondent possesses broadband and 0 if they do not have broadband. It was also possible to employ the ordinary Least Squares Regression to fit a linear probability model. However, the limitation of the linear probability model is that it may predict probability values beyond the 0.1 range; therefore, the logistic regression model was found most appropriate to estimate the factors which influence broadband adoption behaviour (Green, 1997). A total of 70 cases were analyzed and the full model was considered to be significantly reliable ($\chi^2(2, N = 70) = 13.082, p = .001$). This model accounted for between 17.3% and 33.7% of the variance in broadband adoption (Table 8), and overall, 91.3% of the predictions were accurate.

Step	Cox & Snell R ²	Nagelkerke R ²
1	.173	.337

Table 8. Logistic Regression: Model Summary

Table 9 offers the coefficients, Wald statistics, associated degrees of freedom and probability values for each of the predictor variables. This shows that both the behavioural intentions (BI) and overall control constructs reliably predicted broadband adoption. The values of the coefficients reveal that each unit increases in BI and the Control Construct score is associated with an increase in the odds of broadband adoption by a factor of .192 and 2.998 respectively (Table 9). This means that control constructs has a larger part in explaining actual adoption than BI.

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1	AVABI	-1.650	.602	7.510	1	.006	.192
	AVACC	1.098	.499	4.848	1	.028	2.998
	Constant	5.437	2.453	4.912	1	.027	229.743

Table 9. Logistic Regression: Variables in the Equation

Usage of Internet in Bangladesh

Figure 2 illustrates the total duration of the Internet subscription by all Internet users (i.e. both narrowband and broadband users). The results indicate that the highest percentage (45.7%) of respondents subscribed the Internet more than 36 months. This was followed by 12-24 months category that had 24.3% respondents.

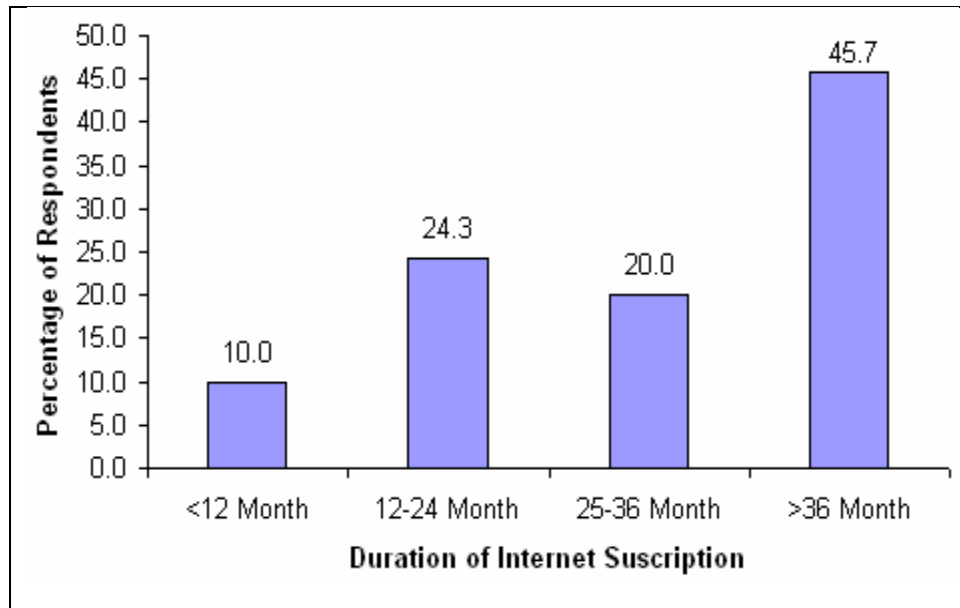


Figure 2. Duration of Internet Subscription

Figure 3 illustrates the total time spent on a daily basis by all Internet users (i.e. both narrowband and broadband users). The results indicate that the highest percentage (37.1%) of respondents used the Internet less than 1 hour. This was followed by about 1 hour category that had 27.1% respondents.

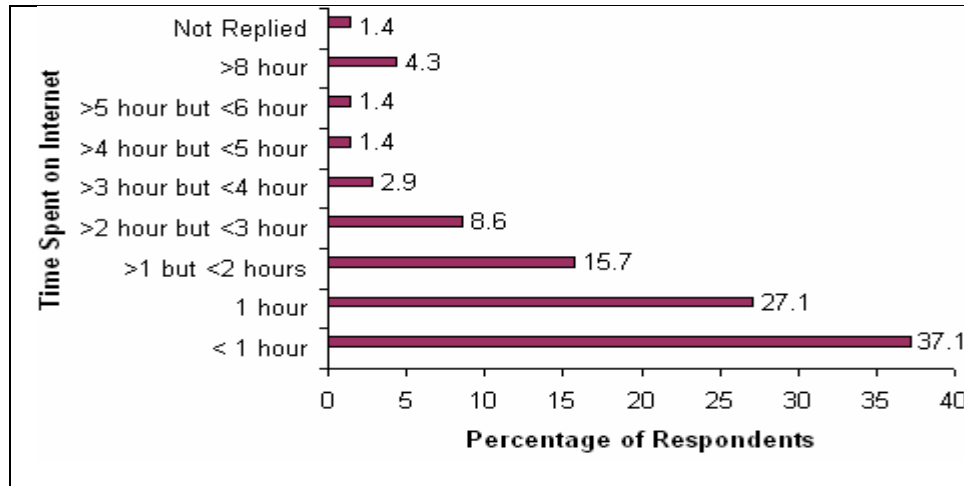


Figure 3. How Long Do You Spend on the Internet Everyday?

Figure 4 illustrates the cumulative frequency of Internet access by both narrowband and broadband consumers. Further, it can be learnt that the majority of respondents (40%) accessed the Internet several times a day. This was followed by those who accessed the Internet about ‘once a day’ (31.4%). However, 1.4% respondents also accessed Internet less often than even once in a every few weeks.

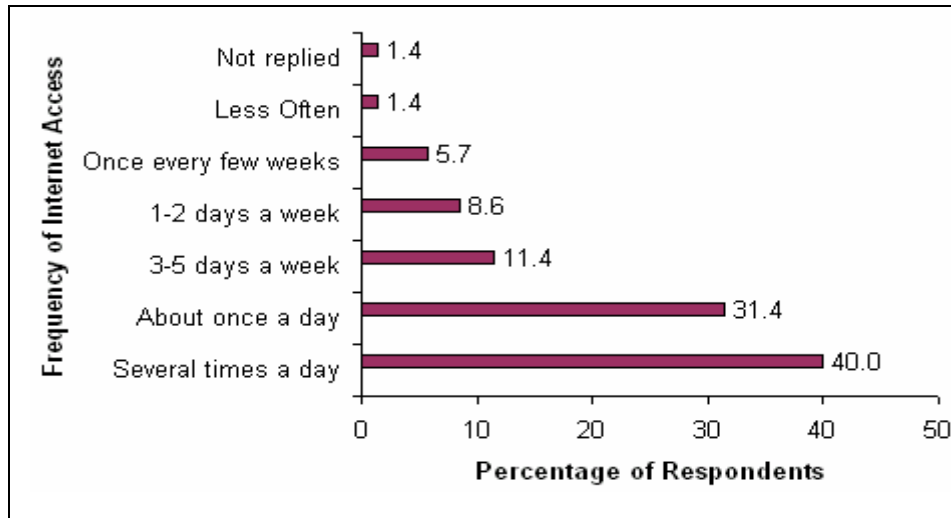


Figure 4. How Often Do You Access the Internet?

Employing open-ended question respondents were asked about their use of Internet. Question that was posed to respondents: What are the activities do you perform using the Internet? Please remember and list the activities (such as email) you performed within last 7 days. 9 percent respondents did not reply anything for this question. The remaining respondents reported use of 9 different online activities that are illustrated in Figure 5. The maximum percentage of respondents (91%) had sent an email in the last 7 days, which was followed by online chat (57%). Search was conducted by 53% of respondents followed by browsing the Internet (39%). Only 13 percent respondents downloaded either music or software applications and 4% respondents played online games. A very small percentage of respondents also used VoIP (1%), messenger (1%) and VPN access (1%). However, none of respondents reported any e-commerce activity such as buy or sell product over Internet.

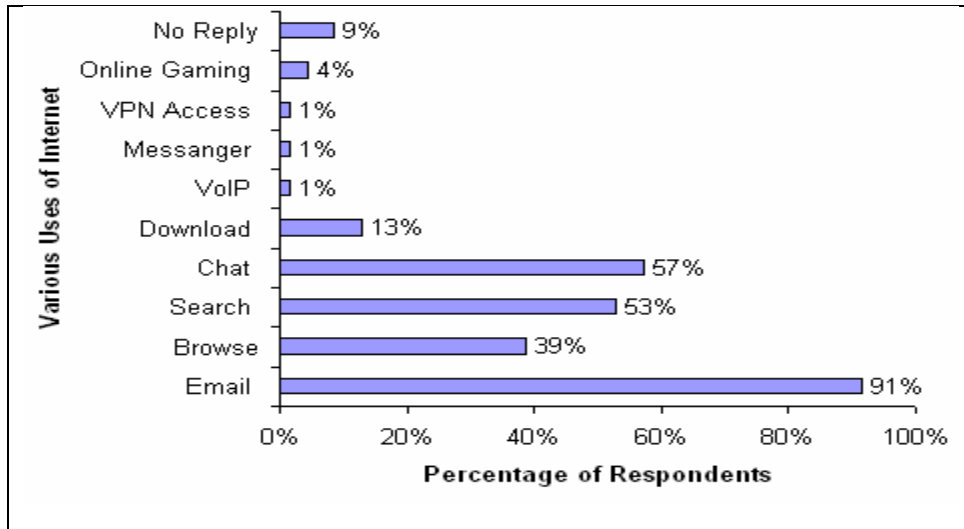


Figure 5. Online Activities Performed on Internet

Similar to previous one employing open-ended question respondents were asked to list most important benefit they obtain from using Internet. Question that was posed to respondents: Please list three major benefits of Internet for you and your family members? 9 percent respondents did not reply anything for this question.

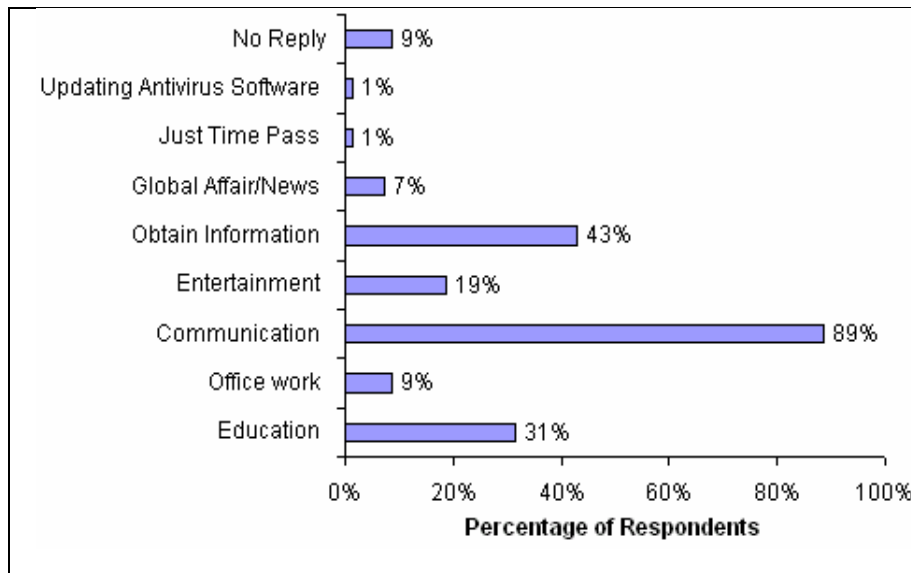


Figure 6. Benefits Drawn from Consumers' Internet Use

Remaining respondents reported use of 8 different benefits that are illustrated in Figure 6. Largest percentage of respondents (89%) reported that main benefits of using Internet is better communication with friends, family and relative especially if they are living abroad. This was followed by usefulness of Internet for obtaining desirable information. Third largest percentage of respondents (31%) was found Internet beneficial for educational purposes such as doing coursework, which was followed by Internet as an entertainment medium. Other benefits that small percentage of respondents reported includes usefulness of Internet for conducting office work (9%), stay updated with global affairs (7%), just time pass (1%) and updating anti virus software (1%). Similar to above none of respondents reported benefits of Internet for conducting e-commerce activities.

DISCUSSION

The internal consistency of measures was assessed utilizing a reliability test (i.e. Cronbach's α). Straub *et al* (2004) suggested that, for an exploratory study, reliability should be equal to or above 0.60. Reliability or the Cronbach's α value of various constructs in this research varies between 0.5799 and 0.8962 and only one construct possess the reliability slightly below the

recommended level of .60 (Table 2). This means that all but one constructs possessed reliability values above the minimum recommended level (Table 2). This suggests that measures of this study demonstrate an appropriate level of internal consistency.

Consistent with the relationship between independent and dependent variables illustrated in Figure 1, except skill all other four independent constructs were significantly explained the behavioural intention to adopt broadband. As it was illustrated in Figure 1, the attitude construct significantly explained BI. Also, paths from the first normative construct that is primary influence to BI were significant. The second normative construct (secondary influences) was also significantly related to the behavioural intention. Of the two control constructs, one, namely facilitating conditions resources was significantly related to BI. However, the path from the second control construct (i.e. skill) to BI was not significant. This may be because respondents who completed the questionnaire were efficient in using the Internet and if the questionnaire had been administered randomly it would be more likely that skill construct would emerge as a significant construct. This means that all three dimensions of the determinants of BI, (i.e. attitudinal, normative and control construct), are significantly related to BI. Finally, both BI and the overall control construct were significant determinants of the actual behaviour of adopting broadband. The predictive power of the adoption model of this research can be compared to guiding model of broadband adoption (Dwivedi, 2005). The comparison of previous study (Dwivedi, 2005) for the adjusted R^2 obtained for both behavioural intention and actual behaviour clearly demonstrates that the adoption model of this research performed as well as the previous study (Dwivedi, 2005). With regards to the behavioural intention value of the adjusted R^2 reported in Dwivedi (2005) study was 0.43, the adjusted R^2 for this study is found to be 0.555 (Table 3), which suggests the appropriate level of explained variance. This means that independent variables considered in this study are important for understanding a consumer's behavioural intention to adopt broadband in Bangladesh. In terms of behaviour, the adjusted R^2 reported in previous study was .40 (Dwivedi, 2005). Since the adjusted R^2 value for this study revealed the similar variance in behaviour to be 0.33 (Table 8), it suggests the appropriate level of explained variance. Therefore, similar to behavioural intention, behaviour also sufficiently explains the variance in broadband adoption by household consumers in Bangladesh.

This study also suggest that in terms of both duration of Internet access that is, how long consumers spent online and frequency, that is how many times consumers access the Internet on a daily basis the Internet users behavior differs considerably from the UK broadband users (Dwivedi, 2005) as they use Internet for very small duration (mainly <1 hour). Similar to the rate of use, the Internet users in Bangladesh also differ from the UK Internet users (Dwivedi, 2005) in terms of the variety of Internet use. Variety in this context means the types of online services and/or accessed applications. In a previous study, a total of 41 online services that belonged to nine different categories were examined the variety of Internet use. Dwivedi (2005) suggests that of the 41 activities that belonged to nine different categories, broadband consumers on average used 22.41 activities that significantly exceeded the narrowband users who utilised an average of 17 online activities from home. Contrastingly, this study suggests that Bangladesh Internet users reported using only 9 activities which is much lower than what reported in the Dwivedi (2005) study.

CONCLUSION

This study examined empirically the factors affecting adoption and usage of the broadband Internet in a developing country in this instance Bangladesh. The following main conclusions are drawn from this research and are based on underlying research assumption made in Section 3. A total of five constructs (attitude, primary influence, secondary influence, skills and facilitating conditions resources) were expected to be correlated to the BI of consumers when adopting Internet in Bangladesh. Of the aforementioned five constructs, four including attitude, primary influence, secondary influence and facilitating conditions resources significantly correlated to the BI of consumers. The only one that did not was skills. In terms of the size of the effect of the four aforementioned constructs that contributed significantly to the behavioural intentions, attitude exhibited largest ($\beta = 0.518$) and facilitating conditions resources ($\beta = 0.244$) demonstrated the least variance to the BI when adopting broadband in the UK households. Primary influence explained the second largest variance ($\beta = 0.368$), which was followed by secondary influence ($\beta = 0.326$). Both BI and the control construct significantly correlated to the Internet adoption behaviour. In terms of relative impact of the two aforementioned constructs that contributed significantly to the BAB, control constructs had much higher impacts (Exp (B) = 2.99) than the BI (Exp (B) = .192). In terms usage this study concludes that Internet users in Bangladesh are very light users of Internet, they access it for very short duration and less frequently. Also, Internet users in Bangladesh undertook a very limited number of online activities.

As broadband technologies enable a range of communication and Internet services, studying individuals from Bangladesh provides a useful starting point for understanding the adoption and usage of broadband in developing countries. This research presents one of the initial efforts towards understanding the adoption and usage behaviour of Internet consumer in developing country perspective for this instance Bangladesh. The findings are specifically useful for ISPs and policy makers of Bangladesh. Factors that are reported significant are utmost important and need attention in order to encourage further adoption and usage of Internet in the country. Although the infrastructure problem is the most predominant in developing

countries when it comes to broadband adoption, the usage patterns are also important as the technologies are gradually put in place. Additionally the cost of using the traditional telephone network is very high so broadband Internet can be used as a replacement for offering communication services such as instant messaging or IP telephony. The most important theoretical contribution of this research is that it integrates the appropriate information systems (IS) literature in order to enhance the knowledge of technology adoption from the consumer perspectives in context of a developing country.

The first limitation of this research is the generalization of findings, which is highlighted below. The generalization of this study required collecting the random data from across the Bangladesh. Furthermore, this research had to supplement the questionnaire data with interviews, which was not possible due to the shortage of time and resources. The data for this research has been collected within a short period of time and provides a snapshot. This can, however, be expanded over a longer period of time in order to provide longitudinal data. This will then eliminate any variables that may have produced anomalies in the subsequent result. Further research requires confirming if the usage of Internet is different from narrowband consumers from broadband ones. It may also be interesting to examine if in developing country perspective broadband is contributing to increase in time spent on-line, Internet access pattern, and increase in number of Internet activities, as was case reported from developed world.

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