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ANALYSING THE FACTORS OF BROADBAND ADOPTION IN THE HOUSEHOLD

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Abstract

This research paper is an empirical investigation of the adoption rates and factors of broadband adoption in a local community (the London Borough of Hillingdon) in the UK. The aim of this research was to identify what are the challenges from the demand side that the Internet Service Providers (ISPs) face when deploying broadband. The study was conducted using a mail survey on a total of 172 household consumers from the London Borough of Hillingdon. The theoretical aspect of the literature was based upon the decomposed theory of planned behaviour (Taylor & Todd, 1995) and a model of adoption of technology in the household (Venkatesh and Brown, 2001). The results of this research found that broadband adoption in the household is driven by relative advantage such as faster access, utility outcomes, such as the uses of broadband for work purposes, and hedonic outcomes that refers to use of broadband for entertainment purposes. The main factors for the non-adopters were identified to be, high costs and lack of needs. The gradual adoption of broadband by the consumers is not only an industry concern, but government aim as well. Therefore this research should offer a substantial contribution to all interested stakeholders including the ISPs and government.

Keywords: Broadband, Adoption, Survey, Borough of Hillingdon, Consumer Behaviour, Household.

1   INTRODUCTION

Since the emergence of the Internet, Broadband is being viewed as the most significant evolutionary step. It is considered to be a technology that will offer end users with fast 'always on' access to new services, applications and content with real lifestyle and productivity benefits (Sawyer et al., 2003). However, the shift to broadband requires massive investments in terms of new networks and infrastructure along with the development of new content, services, applications and business models in order to achieve a return on investment. Although the initial investments into the technology did not acknowledge the potential economic benefits of it, the significances became rapidly evident. This led many governments around the world to set ambitious targets for the deployment of broadband services (BAG, 2003; National Broadband Task Force, 2001; Office of Technology Policy, 2002; Office of the e-Envoy, 2001; Computer Science and Telecommunications Board, 2002). As the most advanced country in terms of broadband penetration, Korea presents an interesting case in its successful launch of broadband.

Before proceeding further, a term frequented within this paper is 'broadband' and a short explanation of it is provided. The umbrella term of broadband technology embraces a variety of high-speed access technologies including ADSL (Asymmetric Digital Subscriber Line), cable modems, satellite, and Wi-Fi (Wireless Fixed) Networks. The term broadband has no established definition. It varies from country to country (Firth and Kelly, 2001) and evolves over time as the underlying transmission and routing technologies continuously advance: yesterday's broadband is today's 'narrowband'. Given the variations in defining 'broadband', the Broadband Advisory Group, Australia's expert body on broadband issues reporting to the Federal Government, defines broadband as '*the ability of a single access line or wireless or satellite link, connected to a telecommunications network, to provide support for fast, always-on access to digital content, applications and a range of services, some or all of which can occur simultaneously*' (BAG, 2003). The definition is technology neutral, that is, less to do with technical speed, and focuses on functionality, that is, more to do with what a user can do with broadband. BAG also suggests that while broadband currently means always-on data services of 200 Kbps or more, a third generation of services with 10 Mbps needs to be considered for future transitions to next generation broadband services. Given the broadband services available in Australia, this proposed research uses a working definition of broadband as 'always-on data services of 200 Kbps or more', following the BAG's suggestion.

The UK government established a target to make UK the most competitive and extensive broadband market in the G7 by 2005 (Office of the e-Envoy, 2001). However, the reported rate of broadband adoption in the UK is unexpectedly slow given the early rollout of infrastructure competition (OECD, 2001). The slow adoption of broadband in many countries including the UK generates considerable academic and public debate. Despite the provision of broadband access at affordable prices the demand for broadband has not increased as expected in many countries around the globe. Researchers are suggesting that the provision of broadband is more 'demand constrained' than 'supply constrained' (Haring et al, 2002). This means that focus of research in this area is now transferring from the supply side to the development of the content (and applications to manipulate content) that will entice users to utilizing broadband (Lee and Choudrie, 2002). Previous research undertaken on the adoption of technology has emphasized a demand perspective as well (Venkatesh and Brown, 2001). When examining the deployment of broadband it was found that such perspective is limiting. Therefore, to widen the scope of research in the broadband deployment area from the consumers' perspective the aim of this research was to conduct systematic research of the adoption of broadband by consumers within a household. This was undertaken by identifying and determining the various factors that are significant for explaining the adoption of broadband in the context of a household within the UK. Specifically, this research aims to achieve two main objectives: (1) Identification of the factors that lead to broadband adoption in the household; and (2) Determine the factors influencing adoption or rejection of broadband in the household.

Bearing aforementioned views in mind it can be seen that the contributions of this research are immense. The policy makers and the providers of the innovation, in this case the telecommunications industry holds a particular and large interest. Policy makers are currently investigating how to increase the diffusion of broadband within their own country, and so information on other countries' experiences might be useful. The telecommunications industry is interested in determining how to improve their current strategies. Academics might offer an unbiased and less distorted view of the diffusion strategies pursued by various countries. Currently there is little research published in this area.

This paper offers a brief theoretical understanding of the founding used in the model applied in this research in section 2. Thereafter, explanations related to the proposed model of broadband adoption are discussed in section 3. Section 4 provides a brief discussion of the research method and tool that were used to conduct the survey. The findings are presented and discussed in the Section 5 and 6. The limitations and future directions of this research are offered in section 6. Finally, to conclude the research section 7 is provided.

2 THEORETICAL FOUNDATIONS AND PREVIOUS RESEARCH

Researchers in the Information Systems (IS) field have been studying the adoption and impacts of Information and Communication Technologies (ICTs) at the organizational and individual level. However, studies related to household adoption and the impacts of ICT are largely overlooked. One of the first studies within the IS field to examine the adoption of Personal Computers (PC) in the household was undertaken by Venkatesh and Brown (2001). The findings of their research revealed that the decisions of the adopters and non-adopters are significantly different. Whilst the adopters were influenced by social factors, non-adopters were partial to changes in technology. To continue the aforementioned research but in different country and subject area Anckar (2003) offered an understanding of the drivers and inhibitors to E-commerce adoption within the households located in Finland. Although such studies are becoming prevalent, they have not yet been extended to examine the adoption of emerging ICTs such as broadband. This is due to the technology in question, which is broadband is still taking off. It can be found that the majority of the research associated with the topic of broadband is exploratory in nature, mainly focusing on the usage of the technology and provides little insight into consumer adoption or rejection determinants. Further research on broadband adoption has mainly been undertaken on the users in an industrial context using the survey method. These studies mainly examined broadband user behaviour in comparison to narrowband users. The results from these surveys suggest that Internet users behave differently when they have broadband access. Broadband users are online longer, use more services or applications and in a more frequent manner. The majority of broadband users rate their on-line experience as compelling (Carriere, et al 2000, Horrigan, et al 2001, Anderson et al 2002, Dwivedi, et al 2003a, Lebo 2001and2003). Survey's conducted on broadband users also suggest that they undertake more frequent on line purchases, and procure an increasingly diverse range of product in comparison to the narrowband users (Carriere, et al, 2000; Dwivedi, et al 2003b).

Whilst the aforementioned studies on broadband focused upon the behavioural patterns of the users there have been studies undertaken on its adoption. Previous adoption studies of broadband technologies have mainly focused on exploring the macro factors that explains the success or slow uptake of broadband deployment. Using South Korea as a case study, Lee et al (2001) found three major factors that explained the high rate of broadband adoption in the country. A recent study suggested that there are six success factors that are responsible for achieving the highest penetration rate of broadband in South Korean households (Lee et al, 2002, and Choudrie et al 2003). Dwivedi et al, (2003c), who examined the Internet Service Providers opinion upon the deployment of broadband, offered a different perspective. The findings suggest that a high price, lack of content, and lack of awareness are amongst the major factors that have severely affected the uptake of broadband in the UK households (Dwivedi, et al, 2003c). The South Korean and UK studies are not the only contexts

that have been investigated for broadband adoption at the national levels. Other exploratory studies conducted on different countries are those of Shim, et al (2003)- Sweden; Gardner, (2003); Chang et al (2003)- Australia and Canada. These studies are valuable in recognizing the macro factors; however they provide little insights on broadband adoption at consumer level. Sawyer, et al. (2003) argued, "The differential rates of use and growth, suggest that understanding broadband connectivity is a complex milieu". Therefore, systematic research on the adoption of broadband in households necessitates the identification of all the possible factors, which is a view founded on similar research that has been undertaken on PC adoption (Venkatesh and Brown, 2001).

3   RESEARCH MODEL

The research model of broadband adoption used in this research is directly derived from Venkatesh and Brown (2001), which is based on the decomposed Theory of Planned Behaviour (decomposed TPB) (Taylor and Todd, 1995) and a subset of the diffusion of innovation theory (Rogers, 1995). The decomposed belief structure for household broadband adoption was adopted from Taylor and Todd (1995), since it offered a better predictive power (Tan, et al, 2000) in comparison to the other available models such as the theory of planned behavior (Ajzen, 1991) and the Technology Acceptance Model (Davis, 1989). The limitation of the decomposed TPB detailed constructs for this research was that they did not examine the adoption of a technology in the context of the household. This is because the decomposed TPB was developed to examine 'users' adoption of IT within organizational settings. Contrastingly, this study focused on the 'consumer' adoption of broadband in the household setting. Therefore, the model of technology adoption in households (MATH) (Venkatesh and Brown, 2001), which is specifically developed to investigate 'consumer' adoption of technology in household, was considered most appropriate for this research. According to the MATH model, technology (PC) adoption in the household is determined by a number of factors (Venkatesh and Brown, 2001). This includes, the attitudinal belief structure such as utilitarian outcomes, hedonic outcomes, and social outcomes, normative belief structure such as the influence of friends, family, secondary information sources, and a control belief structure that consists of three barriers, namely knowledge, difficulty of use, and cost. Since a PC is different to the network technologies such as broadband- in terms of cost, durability, observability and use. The aforementioned reasoning therefore provides an added reason for not employing the MATH model as such to examine the adoption of broadband technology in the household.

The proposed model postulates that consumers' adoption of broadband at homes is determined by three independent variables (Taylor and Todd, 1995; Venkatesh and Brown, 2001) (Figure1). These are: (1) **attitude**, which describes the perception towards broadband technologies; (2) **subjective norms**, which describes the social influences that may affect the intention to adopt broadband; (3) **perceived behavioural control** that describes the beliefs about having the necessary resources and opportunities to adopt broadband in the home. A brief description of the aforementioned factors is described below.

Attitude

According to Venkatesh and Brown (2001) the different magnitudes of attitudinal belief towards the adoption of PC in the household can be measured using three main constructs, namely, utilitarian outcomes, hedonic outcomes, and social outcomes. When examining broadband adoption in the household, this research adopted hedonic outcomes, utilitarian outcomes (Venkatesh and Brown, 2001) and relative advantage (Rogers, 1995) as factors to consider. Since broadband is not a directly observable product, the social outcome construct of the model of adoption of technology in the household was considered irrelevant to this study.

Subjective norms

Venkatesh and Brown (2001) have considered the social influence of family, friends, TV, and newspaper as constructs that can be used to measure subjective norms. These findings also suggest

that social influences are significant determinants of the purchasing behaviour of consumers when purchasing PCs. Similarly, it is expected that households with broadband connections are likely to influence their relatives and friends by informing them about the benefits and conveniences offered by broadband. Therefore, it is appropriate to consider social influence as a measure of subjective norm for broadband adoption in the household.

Perceived behavioural control

Venkatesh and Brown (2001) identified and validated five specific barriers that can inhibit the adoption of PCs in the household. These include, a rapid change in technology, declining costs, the high cost of PCs, ease or difficulty of use and a requisite knowledge of the use of PCs. Since the subscription costs of broadband access are stable and technology is not changing rapidly, the declining cost and rapid changes in technology were considered irrelevant factors for the adoption of broadband technologies; therefore not included in this research. This study considered the factors of high costs, the ease/difficulty of PCs and Internet use, the lack of knowledge of broadband benefits, and lack of needs as barriers to the adoption of broadband.
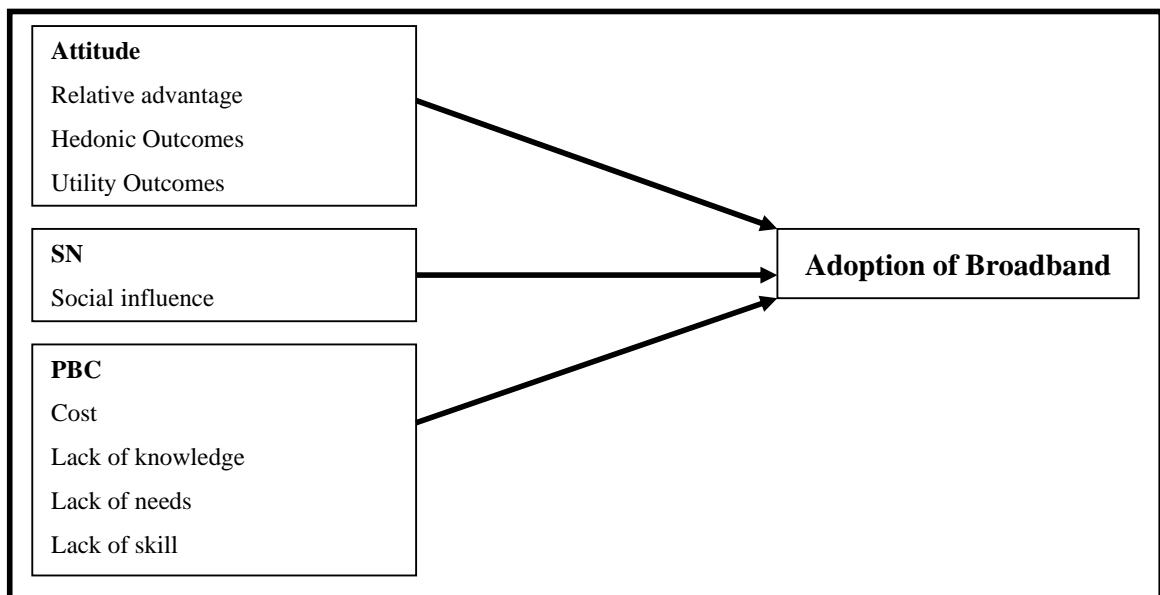

Figure 1.   Model for the adoption of Broadband in the household

4   RESEARCH METHOD

Since this is an initial and exploratory study of the adoption of broadband, the survey method was considered to be the most suitable research method for this investigation. Previous research has revealed that the survey method is most appropriate when investigating technology and e-commerce adoption (Tan, et al. 2000;Venkatesh, et al. 2000; Venkatesh and Brown, 2001; Anckar, 2003).

4.1   Determining the sample

The previous discussed factors were confirmed using the data collected from the household consumers living in local vicinity, the London Borough of Hillingdon. This locality is considered to be one of the most prosperous and ICT connected borough within region. The selection of the target population was made according to the availability of the sample frame. Since a reliable sample frame that is, the electoral register was not easily available for whole of London or the UK population, it was decided to

conduct a survey within the London Borough of Hillingdon. The structure of the sample frame (Electoral Register) necessitated the adoption of a stratified random sampling approach to collect representative data from the target population. The whole locality was divided into various wards and sub wards in Electoral Register. The sample size for each sub ward was determined according to the total population. Then unique random numbers for each sub ward were generated using research randomizer software. Respondents corresponding random numbers were then selected for data collection from the sample frame (Electoral Register).

4.2   Questionnaire development, pilot study and data collection

In order to collect a representative data for the target population within a limited time frame and resources, a self-administered questionnaire was considered to be the most appropriate primary survey instrument in this investigation. This is because it addresses the issue of reliability of information by reducing and eliminating differences in the way in which questions are asked (Cornford and Smithson, 1996) and facilitates the collection of data within a short period of time from the majority of respondents (Hall and Hall, 1996).

The questionnaire used in this research contained a total of 17 questions. These questions were divided into two broad categories: (1) multiple choice questions addressing the social attributes (demographic variables) including age, gender, education, and income; and (2) Likert scale questions that were designed to address the issues related to the factors of broadband adoption. Close-ended multiple-choice questions were included in the questionnaire in order to obtain a high response rate. This is due to instances where respondents preferred to answer close-ended questions within instances of non-interactive, self-administered questionnaires (Fowler, 1993). To evaluate the appropriateness of the questionnaire during the initial stages, the questionnaire was sent to a small number of experts within industry and academia. The feedback responses from the experts led us to make minor changes to the questionnaire; for instance, the categories for demographic variables. Following this, a pilot was conducted to determine the response rate, make requests for any constructive comments and to obtain advice on the format and structure of the questionnaire from the respondents. Additionally, we learnt of the estimated time that would be required to complete the questionnaire. The pilot questionnaire was delivered via post to a total of randomly selected 100 participants from the electoral register. A total of 30 questionnaires were obtained from the respondents within the specified duration. The majority of the respondents reported that the questionnaire was easily understandable and required only 8 to 10 minutes to complete. Further, the respondents validated the content of the questionnaire; however, minor changes to the final design of the questionnaire were undertaken based upon the received feedback. The final questionnaire was sent using the postal service. A covering letter and a prepaid return envelope were administered to a total of 700 household heads in the London Borough of Hillingdon in the period between August and September 2003.

4.3   Data analysis

The collected data was analyzed using SPSS version 10.1. The analysis at first focused upon the demographic variable, thus the response frequencies and percentages were calculated. Thereafter, importance to the detailed factors associated with consumers' attitude, subjective norms and perceived behavioural control were estimated using the means and standard deviations. This strategy was pursued since IS researchers have recently employed the aforementioned analysis tools to analyze and present research findings using response frequencies, percentage (Webster 1998) means and standard deviations (Venkatesh and Brown, 2001). Whilst the aforementioned tools are prevalent in the IS area, the researchers also pursued this route because they were more familiar to them and afforded simplicity and clarity.

5   RESEARCH FINDINGS

From a total of 700, 200 questionnaires were returned within the specified periods. Of these, 172 questionnaires were usable for the analysis, whilst 28 were both undelivered and not completed questionnaires. This yielded response rate of 25.6%.

5.1   Demographic data

The demographic data revealed that the least numbers of respondents belonged to the age group of 17-24 years (11%) and above 75 years (7.0%). The age groups 45-54 years represented the maximum number of respondents (17.4%). This was followed by the 55-64 years (16.9%). The age groups 25-34 and 35-44 years both represented a similar number of respondents- that is 28 (16.3%). Both the male and female genders were represented almost equally in the returned sample. A total of 87 (50.58%) male consumers completed and returned the questionnaire, whilst the female consumers were represented by a slightly lower number of 85 (49.41%). The maximum number of respondents (42.5 %) possessed an education level equal to or below the A levels, which includes the GCSE, GNVQ and Diploma levels. 34 (19.8%) respondents had degree level education, followed by 22 (12.8%) postgraduates. A total of 50 (29%) respondents stated that their annual household income fell between the ranges of 20-39 K (K= £1000). In comparison, 39 (22.6%) respondents had an annual household income below 19 K (See Table 1).

Variable	Category	Frequency	Percentage
Age Group	17-24	19	11.0
	25-34	28	16.3
	35-44	28	16.3
	45-54	30	17.4
	55-64	29	16.9
	65-74	26	15.1
	Above 75	12	7.0
Gender	Male	87	50.58
	Female	85	49.41
Education Levels	GCSE	38	22.1
	A Level	24	14.0
	GNVQ/Diploma	11	6.4
	Degree	34	19.8
	Postgraduate/Research	22	12.8
	Others	29	16.9
	Missing	14	8.1
Annual Household Income	<10 K	19	11.0
	10-19 K	20	11.6
	20-29 K	25	14.5
	30-39 K	25	14.5
	40-49 K	15	8.7
	50-59 K	17	9.9
	60-69 K	12	7.0
	=>70 K	16	9.3
	Missing	23	13.4

Table 1.   The demographic profile of respondents (Total number of respondents [N]= 172)

5.2   Computers (PC), dial-up and broadband adoption: Current level and future projections

Using the collected data we categorised the percentage of households into those who possess computers, dial-up Internet and broadband connection. Table 2 illustrates these findings. The results indicate that 76% respondents of this sample possess the computers in home. Of the 76% respondents, 30% of those who possessed the computers also accepted that they have subscribed to broadband. Of the remaining 46% respondents, 39% stated that they accessed the Internet using dial-up and only 9% did not have any access to the Internet at all. Also, the households with a dial-up Internet access (39%) were asked about their intent to subscribe the broadband. Only 16% of 39% indicated that they were planning to shift from dial-up to the broadband. In contrast 40% of the respondents revealed that they were not intending to subscribe to broadband in the near future.

	PC	Broadband	Dial-up
Yes	76%	30%	39%
No	24%	47%	9%
Not Applicable	0%	24%	52%

Table 2.   Percentage of households with and without PC, Broadband and Dial-up

5.3   Summary statistics: The importance of household broadband adoption and rejection factors

As mentioned previously there has been research (Venkatesh and Brown, 2001) that determined the importance of various adoption and rejection factors using the mean and standard deviation (SD). Using that reasoning, this research also followed the same path. The results are illustrated in Table 3. It was found that the high monthly cost was a key barrier preventing consumers from subscribing to broadband (Mean= 4.29 on a five point scale and lowest SD=1.21). The second most important rejection factor was the perceived lack of needs to subscribe broadband (M=3.87 and SD=1.33). The third most important factor inhibiting adoption was the cost of purchasing a new computer or upgrading the existing one in order to subscribe to broadband (M=3.22 and SD=1.67). The fourth important rejection factor was lack of content and applications with the existing broadband packages. Two rejection factors namely, the lack of knowledge about broadband and its usage and benefits were considered less influential in terms of inhibiting respondents from subscribing to broadband. Since the estimated mean (2.2 on a five point scale) related to the lack of skills when using the computer and Internet was below average, this was the only rejection factor that had no importance in terms of inhibiting respondents to subscribe to broadband, hence were considered irrelevant to this research.

Amongst, the adoption factors that can also be identified as the significant drivers of broadband subscription rates were, relative advantage (faster access, faster file download, un-metered access and always on access), utility outcomes (to perform job related task, attain educational material, perform personal and household activities, and to communicate with family and friends) and hedonic outcomes (for entertainment such as downloading and playing music and movies). Contrastingly, the social outcomes (Attitude) and social influence (Subjective norms) factors were not considered important for driving the adoption of broadband. The estimated means of these two factors were below the average on a 5-point scale.

Adoption/Rejection factors	Mean	SD
Indicators for broadband subscription rejection (N=95)		
BARRIER: cost of purchasing/upgrading the computer	3.22	1.67
BARRIER: high monthly cost of broadband subscription	4.29	1.21
BARRIER: lack of content/applications with broadband	2.74	1.40
BARRIER: lack of knowledge about broadband	2.54	1.55
BARRIER: lack of knowledge about broadband usage and benefits	2.60	1.54
BARRIER: lack of need to subscribe the broadband	3.87	1.33

BARRIER: lack of skills to use computer and Internet	2.23	1.63
Indicators for broadband subscription adoption (N=68)		
ADOPTION: Faster access to the Internet	4.85	.35
ADOPTION: Always-on access to the Internet	4.01	1.11
ADOPTION: Free home phone line	3.29	1.67
ADOPTION: Un-metered access to Internet	4.30	1.04
ADOPTION: To perform job-related tasks	3.16	1.54
ADOPTION: To find educational/research materials	3.47	1.19
ADOPTION: To perform home business	2.67	1.46
ADOPTION: To download files faster	4.16	1.20
ADOPTION: To help with children's homework	2.38	1.54
ADOPTION: To perform the personal & household	2.84	1.34
ADOPTION: To play online games	1.72	1.13
ADOPTION: For entertainment such as music and movies	2.73	1.42
ADOPTION: To communicate with family, friends and relatives	2.97	1.47
ADOPTION: Influence from family members and relatives	2.34	1.83
ADOPTION: Influence from friends	2.26	1.71
ADOPTION: Influence from TV/News advert	2.40	1.69
ADOPTION: Influence from Kids	2.21	1.86
ADOPTION: Having broadband enhances my social status	1.37	.90

Total number of non-adopters (N)= 95 and Total number of adopters (N) = 68

Table3.   Summary statistics for adoption/rejection drivers

6   DISCUSSIONS

From this research it was discovered that the adoption of broadband in households can be predicted from the attitudinal and perceived behavioural control factors. Contrastingly, the subjective norm factor that can be described by the social influences from family, friends, and relatives, failed to explain the adoption of broadband. Using previous research as a means of analysing the empirical evidence, it can be found that Tan and Teo (2000) reported similar findings:-the intention to adopt Internet banking services can be predicted from the attitudinal and perceived behavioural control factors, and not from the subjective norms.

However, when examining the adoption of the Internet within the household and that too, within the context of the American households, these findings are not parallel. Venkatesh and Brown (2001) found that within the American household, the factors associated to the subjective norm have an important role when explaining the adoption rates. However, it was found that the attitudinal factors that were identified as being important in this research as well were in line with those of Venkatesh and Brown (2001). The attitudinal factors include relative advantage (faster access, faster download, un-metered access and always on access), utility outcome (broadband needed to perform job related tasks, to attain educational material, perform business activities from home and function household related activities) and the hedonic outcomes (broadband used for entertainment purposes). Amongst the perceived behavioural control factors, all except for the lack of skills when using computers and the Internet were found to be important in terms of explaining the non-adoption of broadband by household consumers. The strongest factors that explain the behaviour of consumers not subscribing to broadband are the high monthly cost, cost of purchasing new computer or upgrading the old computers and perceived lack of needs to subscribe to broadband. The factors with moderate affects include the perceived lack of contents or applications and lack of knowledge about broadband, its benefits and usage.

6.1 Limitations and future directions

The generalization of this study required collecting data from across the whole of the UK. However, this was not possible due to the unavailability of a suitable sample frame for the population of the whole country. In the future this research intends to examine whether the findings obtained in this sampled vicinity, are specific to the whole of the UK. Further, if similar results are achieved in the UK, are the results also going to be the same in other countries. With regards to the questionnaire findings, these would have been strengthened had it been possible to also supplement them using interviews. This supporting tool had to be abandoned due to the limitations of time and manpower. The findings could also have been reinforced if the research had been a longitudinal one. The data for this research has been collected within a short period of time and it only provides a snapshot. However, this can be expanded over a longer period of time to offer a longitudinal study. Further justification for undertaking a longitudinal study is the reasoning that the elimination of any variables that can produce anomalies in the obtained results can occur. Within this study a generalized perspective regarding the demographics was pursued. The research of Venkatesh and Brown (2001) called for further research that investigated the impact of demographic variables upon the adoption factors. This research also intends to follow that path in the future.

6.2 Theoretical contributions and implications

This research on broadband differs from previous works and offers an advanced and forward-looking perspective to previous research. Whilst the research by Venkatesh and Brown (2001) was important and similar to this research (the identification of the factors that are necessary for PC adoption within the household) that was where the similarity ended. This research was contrary to that of the aforementioned researchers in that it was found that the subjective norm factor is not important when determining the adoption of broadband technology.

The role of the attitudinal and perceived behavioural control factors were considered essential for broadband technology and were imperative for the adoption of technology in the findings of both Tan and Teo (2000), and Anchor (2003). The research by Tan and Teo (2000) found that the subjective norm was not an important factor for predicting the adoption of Internet banking; however adoption and non-adoption were strongly predicted by the attitudinal factors and perceived behavioural control factors. Similarly, this research indicates that subjective norm is not an important independent variable in predicting broadband adoption in UK households. The study by Anchor (2003) also suggests that the barriers that are critical for e-commerce consumer adoption are different to the factors that determine the adoption of computers in the American household (Venkatesh and Brown, 2001).

Similarly, this research provides a theoretical contribution by identifying and determining detailed factors such as faster access, always-on access, un-metered access, the lack of content and applications, and the lack of needs specific to the adoption of broadband in the household. Such factors were not included in the previously undertaken PC adoption study (Venkatesh and Brown, 2001). Furthermore, this research also offers a contribution by confirming the irrelevance of factors such as social outcomes, social influence, lack of skills for predicting broadband adoption. This is important since previous research has revealed that these factors are important in predicting the adoption of the PC in the household (Venkatesh and Brown, 2001).

6.3 Implications for practice

This study illustrates that there are two important factors that are impacting consumer decision-making, the high costs and lack of needs. The household consumers perceived that the current monthly cost of broadband subscription is high. The second factor that emerged from this research is that consumers believed that they do not require broadband, as the ISDN dial-up connection was sufficient enough when performing their desired activities. Therefore, the broadband supply side stakeholders

including the government and Internet Service Providers face two major challenges, namely cost and consumer awareness. Concerned stakeholders need to review their strategies to answer three important questions. First, how to reduce the broadband subscription price and also how to reduce the existing price gap between broadband and dial-up? Second, how should consumer's awareness of the benefits and usage of broadband be increased? Third, what content and applications can be integrated to differentiate broadband from dial-up? Since the results of the survey suggest that a small proportion of existing dial-up users are planning to have a broadband connection installed. It is critical to answer the aforementioned questions for further development of the broadband market and to motivate and encourage future broadband consumers subscription rates. Since, the study found that hedonic outcomes are important drivers of adoption, the key implication for content providing organisations is to develop content and applications specific to home entertainment.

7. CONCLUSIONS

This research was an initial and exploratory study of an emerging issue related to broadband adoption in the household context. The study found that as other similar home technologies such as computers, the attitudinal factors of relative advantage (faster access and un-metered access); utilitarian outcomes (using broadband for work and education purposes); and hedonic outcomes (broadband used for entertainment) have an imperative role in explaining the adoption of broadband in the household. However, factors related to the subjective norms had no significant role. This study also suggests that the non-adoption of broadband in the household is driven by mainly, high subscription costs and the perceived lack of needs. We discussed key challenges to those stakeholders who are involved in promoting the adoption of broadband in the households.

References

Anderson, B. Gale, C., Jones, M.L.R., and McWilliam, A. (2002). Domesticating broadband-what consumers really do with flat rate, always-on and fast Internet access. BT Technology Journal, 20 (1), 103-114.

Anckar, B. (2003). Drivers and inhibitors to E-commerce adoption: Exploring the rationality of consumer behaviour in the electronic marketplace. In Proceedings of the 11th ECIS on New Paradigms in Organizations, Markets and Society (Ciborra, C. et al. Ed.), Napoli, Italy.

Ajzen, I. (1991). The theory of planned behaviour: Organisational behaviour and human decision processes, 50 (2), 179-211.

B.A.G. (2003). Australia's broadband connectivity, Available From: http://www.noie.gov.au/publications/NOIE/BAG/report/index.htm

Carriere, R., Rose, J., Sirois, L., Turcotte, N. and Christian, Z. (2000). Broadband changes everything, McKinsey & Company, Available From: http://www.mckinsey.de/_downloads/knowmatters/telecommunications/broadband_changes.pdf

Chang, S., Lee, H. and Middleton, C. (2003) The deployment of broadband Internet in Australia: Areas for attention and implications from Canada and Korea. In Proceedings of the ITS Asia-Australasian Regional Conference (Cooper, R. et al. Ed.), Perth, Australia

Choudrie, et al. (2003). Applying stakeholder theory to analyse the diffusion of broadband in South Korea: The importance of the government's role. In Proceedings of the 11th ECIS on New Paradigms in Organizations, Markets and Society (Ciborra, C. et al. Ed.), Napoli, Italy.

Computer Science and Telecommunications Board (2002). Broadband: Bringing Home the Bits. Washington, DC: National Academy Press.

Cornford, T. and Smithson, S. (1996). Project Research in Information Systems: A Student's Guide. Information Systems Series. Macmillan Press Ltd, London.

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13 (3), 319-340.

Dwivedi, Y.K. and Choudrie, J. (2003a). The impact of broadband on the consumer online habit and usage of Internet activities. In Proceedings of the 8th (UKAIS) Annual Conference on Co-ordination and Co-opetition: the IS role (Levy, M et al. Ed.), Warwick, UK

Dwivedi, Y.K. and Choudrie, J. (2003b). Considering the impact of broadband upon the growth and development of B-2-C electronic commerce. In Proceedings of the ITS Asia- Australasian Regional Conference (Cooper, R. et al. Ed.), Perth, Australia

Dwivedi, Y.K., Choudrie, J. and U. Gopal (2003c). Broadband stakeholders analysis: ISPs perspective. In Proceedings of the ITS Asia- Australasian Regional Conference (Cooper, R. et al. Ed.), Perth, Australia.

Firth, L. and Kelly, T. 2001. Broadband briefing paper, ITU, Geneva, Accessed from: www.itu.int/broadband

Fowler, Floyd J. (1993). Survey Research Methods. 2nd Edition. SAGE Publications Inc., London.

Gardner, K. (2003). Australian broadband industry. In Proceedings of the ITS Asia- Australasian Regional Conference (Cooper, R. et al. Ed.), Perth, Australia.

Hall, D. and Hall, I. (1996). Practical Social Research: Project Work in the Community. Macmillan Press Ltd, London.

Haring, J., Rohlfs, J. and Shooshan, H. (2002). Propelling the Broadband Bandwagon. Strategic Policy Research, Maryland.

Horrigan, J.B. and Rainie, L. (2001) Online Communities: Networks that nurture long-distance relationship and local ties. Pew Internet and American Life Project. Accessed from: http://www.pewinternet.org/reports/pdfs/PIP_Communities_Report.pdf

Lebo, H. (2001). Surveying the digital future: Year two, the UCLA Internet report, Accessed From: http://ccp.ucla.edu/pdf/UCLA-Internet-Report-2001.pdf

Lee, H. et al. (2001). The growth of broadband Internet connections in South Korea: Contributing factors, 14th Bled Electronic Commerce Conference, Bled, Slovenia.

Lee, H. and Choudrie, J. (2002). Investigating broadband technology deployment in South Korea, Brunel- DTI International Technology Services Mission to South Korea, DISC, Brunel University, Uxbridge, UK, (JULY).

National Broadband Task Force (2001). The New National Dream: Networking the Nation for Broadband Access. Ottawa Industry, Canada.

OECD Report (2001). Working party on telecommunication and information services policies: The development of broadband access in OECD countries (29TH October).

Office of the e-Envoy (2001). UK Online: The Broadband Future.

Office of Technology Policy (2002). Understanding Broadband Demand: A Review of Critical Issues. Washington, DC: U.S. Department of Commerce.

Rogers, E.M. (1995). Diffusion of Innovations. 4th Edition, Free Press, New York

Shim, Y. Lee, H. and K. Yun (2003). The Growth of Broadband Internet in Sweden: Contributing factors. In Proceedings of the ITS Asia- Australasian Regional Conference (Cooper, R. et al. Ed.), Perth, Australia.

Sawyer, S. Allen, J.P. and Heejin, L. (2003). Broadband and mobile opportunities: a socio-technical perspective. Journal of Information Technology, 18 (2), 121-136

Tan, M and Teo, T.S.H. (2000) Factors Influencing the adoption of Internet Banking, Journal of the Association for the Information Systems, 1

Taylor, S. and Todd, P. A. (1995) Understanding Information Technology Usage: A Test of Competing Models, Information Systems Research, 6 (2), pp. 44-176

Venkatesh, A. et al. (2000). A longitudinal analysis of computing in the home census data 1984-1997. In Home informatics and Telematics: Information, Technology and Society. Eds. Sloane   and Felix van Rijn pp 205-215

Venkatesh, V. and Brown, S. (2001). A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges. MIS Quarterly, 25 (1), pp 71-102

Webster, J. (1998). Desktop Videoconferencing: Experiences of complete users, wary users, and non-users. MIS Quarterly, 22 (3), 257-286.