FACTORS INFLUENCING THE ADOPTION AND USAGE CONTINUANCE OF BROADBAND INTERNET TECHNOLOGY AMONG INDIVIDUALS

by

Ir. SARAVANAN NATHAN LURUDUSAMY

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My most profound gratitude to the superb Almighty for bestowing me with many blessings and graces.

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A heartfelt love to my dear family members and friends who have been supportive and being there for me during my turbulences in life. Those invaluable love, care, motivation, advice, prayers and understandings that made me to achieve to what I am today.

A special dedication to the bright memory of Sir Alexander Graham Bell (1847 – 1922) for introducing telephone technology to the world, which has been the seed for the development of many sophisticated telecommunication technologies that are available today.

This is my word of courage to every striving person who is coping with their own challenges in life. "Keep going! Winners are not people who never fail, but people who never quit"

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FAKTOR-FAKTOR YANG MEMPENGARUHI PENERIMAAN TEKNOLOGI INTERNET JALUR LEBAR DAN PENGGUNAAN BERTERUSANNYA DALAM KALANGAN INDIVIDU

ABSTRAK

Teknologi Internet merupakan suatu siri rangkaian komputer yang digunakan untuk tujuan perhubungan dengan menggunakan pelbagai teknologi akses. Ia memainkan peranan penting dalam pelbagai aspek bidang kehidupan manusia, seperti komunikasi, hiburan dan maklumat inovasi dan menyokong teknologi evolusi yang sentiasa membangun. Walaupun kadar penembusan teknologi Internet Jalur Lebar adalah dalam kadar yang menggalakkan di kebanyakan negara, namun penerimaannya masih menjadi suatu isu penting di Malaysia. Oleh itu, kajian ini menjurus dalam pengenalpastian dua bidang yang berkaitan dalam penyelidikan teknologi Internet jalur lebar, iaitu penerimaan awal dan penerusan penggunaan (selepas penerimaan awal) di Malaysia. Rangka kerja teori yang digunakan dalam kajian ini adalah satu model bersepadu, iaitu *Unified Theory of Acceptance and Use of Technology (UTAUT)* dan *Information Science (IS) Continuance Model* yang telah diterbitkan dengan mengintegrasikan dua lagi pembolehubah tidak bersandar, iaitu Persepsi *Playfulness* dan Persepsi Inovasi. Secara amnya, kajian ini cuba untuk menentukan hubungan di antara pembolehubah-pembolehubah tak bersandar yang akan mempengaruhi penerimaan dan tingkah laku penggunaan teknologi ini dalam kalangan individu di Malaysia. Kaji selidik telah digunakan sebagai instrumen kajian dan unit analisis adalah pelanggan sedia ada teknologi Internet jalur lebar di Malaysia. Data yang diperolehi daripada kajian ini telah dianalisis dengan

menggunakan *Partial Least Square (PLS-SEM).* Sasaran penyiasatan adalah dalam kalangan individu Malaysia yang terdiri daripada latar belakang demografi yang berbeza seperti umur, profesion, tahap pendidikan, pengalaman kerja dan lain-lain. Kajian literatur, pengesahan kandungan, *pre test* dan *pilot test* juga telah dijalankan untuk pemahaman yeang menyeluruh berkenaan dengan konsep, aliran serta kemajuan teknologi untuk menyokong kajian ini. Borang soal selidik yang telah dicetak dalam bentuk *hardcopy* telah diedarkan kepada pelanggan teknologi Internet jalur lebar yang datang ke pusat telekomunikasi. Pada masa yang sama, soal selidik telah disediakan di Internet dan pautan telah dihantar melalui email kepada pelanggan sedia ada untuk menjawab kaji selidik melalui rangkaian *web*. Bilangan respons yang diperoleh daripada rangkaian *web* adalah 89 manakala bilangan jawapan yang diperolehi daripada soal selidik *hardcopy* adalah 367. Jumlah keseluruhan respons adalah 456 tetapi hanya 450 boleh digunapakai untuk tujuan analisis seterusnya. Hasil kajian ini mendedahkan bahawa niat untuk menggunakan teknologi Internet jalur lebar mempunyai pengaruh yang positif ke atas penggunaan awal, niat untuk terus menggunakan teknologi Internet jalur lebar mempunyai pengaruh yang positif ke atas penggunaan berterusannya dan penggunaan awal Internet jalur lebar mempunyai pengaruh yang positif ke atas penggunaan berterusannya. Kajian ini turut mendapati bahawa Persepsi Prestasi , Persepsi *Playfulness* dan Kemudahan Bersyarat adalah faktor umum yang mempengaruhi, sedangkan Persepsi Usaha dan Persepsi Inovasi tidak mempengaruhi peningkatan penggunaan teknologi Internet jalur lebar serta mengekalkan pengguna sediada untuk terus menggunakan teknologi tersebut. Sumbangan teori dan praktikal hasil penyelidikan turut dibincangkan dalam kajian ini. Batasan kajian telah dijelaskan dan cadangan kajian lanjutan turut dikemukakan.

FACTORS INFLUENCING THE ADOPTION AND USAGE CONTINUANCE OF BROADBAND INTERNET TECHNOLOGY AMONG INDIVIDUALS

ABSTRACT

The Broadband Internet is simply a series of worldwide computer networks linked together, interconnecting almost instantly by using various access technologies. It is playing a major role in many areas of our lives, such as communication, entertainment and information which is supported by newer innovations and technology evolvement. While the broadband Internet penetration rate is encouraging in many countries, its adoption is still a notable issue in Malaysia. Therefore, this research is focused on identification of two relevant research streams covering broadband Internet technology, which are adoption and continuance of usage (after initial adoption) in Malaysian individual context. The theoretical framework which is utilized in this study is an integrated model of Unified Theory of Acceptance and Use of Technology (UTAUT) and Information Science Continuance Model which has been further extended by integrating another two independent variables, namely Perceived Innovativeness and Perceived Playfulness. Significantly, this study determined the relationship among the independent variables that influence the adoption and post - adoption behavior of Broadband Internet technology among Malaysian individuals. Survey was used as the research instrument and the unit of analysis are existing broadband Internet

subscribers in Malaysia, where data obtained from the survey was analyzed using Partial Least Square (PLS-SEM). The investigation targets are Malaysian individuals ranging from different demographic background such as age, profession, education level, working experience and others. Extensive literature review, content validation, pre-test and pilot tests were conducted to fully comprehend the underlying concept, trends and technology advancement to support this study. This study also includes the analysis based on data collected from a field study, which is in the form of questionnaire, which were printed in hardcopy and distributed to broadband Internet subscribers who walks in to telecommunication kiosks. At the same time, questionnaires were made available in the Internet and the link were emailed to existing subscribers to answer the web survey. The number of responses obtained from web survey is 89 and the number of responses obtained from hardcopy questionnaire is 367. This totals up 456 as the total responses of which only 450 are usable to be included in the analysis. It is revealed that intention to adopt Broadband Internet technology have a positive influence on initial usage, intention to continue using Broadband Internet technology have a positive influence on actual usage continuance and initial broadband Internet usage have a positive influence on usage continuance of Broadband Internet technology. This research found that Performance Expectancy, Perceived Playfulness and Facilitating Conditions are common factors that can facilitate, whereas Effort Expectancy and Perceived Innovativeness do not influence both the broadband Internet adoption growth and sustain existing users in continue using the technology. Theoretical and practical contributions of the research findings were also discussed in this research. Limitations of the research were explained and suggestions for future research were also presented.

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter provides the research background as it discovers the problem statement, research questions, research objectives, research significance and scope of the study. Definitions of key terms are provided at the end of the chapter, followed by thesis organization and conclusion.

1.1 Background to the study

During the industrial revolution, dependency was on motors that use muscle power but in the new Information Age, the encounter is in knowing how to make use of intelligent capacity by tapping the influence of computation and to deliver information facilities to the community at large (Hamilton, 2008).

According to Kahn and Cerf (1999), a comprehensive environment that bring the people closer have been created through the important technological advancement with the use of the Internet. It has integrated the communication technology and computation in providing a robust connectivity and information made accessible around the globe, at a very reasonable rate.

Information can be deployed in innumerable ways with Internet, which is the chains of computers being connected together, allowing instant communication via both wired and wireless access platforms.

Internet is playing a major role in many areas of our lives, such as communication and information. Newer Internet based innovations have enabled faster communication and information sharing through Internet, such as electronic facility like emails applications, online chats and search engines. Entertainment is also another usage of Internet where downloading games, online gaming, visiting chat rooms or surfing are made possible. Online services like electronic banking, job seeking, online purchasing and electronic commerce has certainly improved the quality of lifestyle among Internet users.

A country needs to be accustomed to the changes to its economical and resources structure in order to stay competitive and significant in the new economic atmosphere. With Information Technology (IT) as the foundation, the information revolution has greatly impacted the change in the function of governments and their operations methods in getting connected to the rest of the world.

Riding on this, it is viewed that Malaysia is making its way towards a new age of advancement in information, communication and multimedia services. Therefore, in realizing the 30 years plan that will bring Malaysia to a higher competency level in both economy and technology, knowledge economy (K-economy) is being recognized as the key paradigm.

According to Mustapha and Abdullah (2000), the drive towards K-economy will influence Malaysia to accomplish the viable progression rates in Gross Domestic Product (GDP). The prevailing role of knowledge in driving the country's productivity improvement and ensuring economy sustenance will push up Malaysia's CDP by many folds within a period of 20 to 25 years, as being projected by Economic Research Services Department (2000). Information and Communication skills and resources skills are to be emphasized as an impetus

towards K-economy, with Internet being the enabler and to support the demands of the Multimedia and ICT industry (MyICMS, 2006).

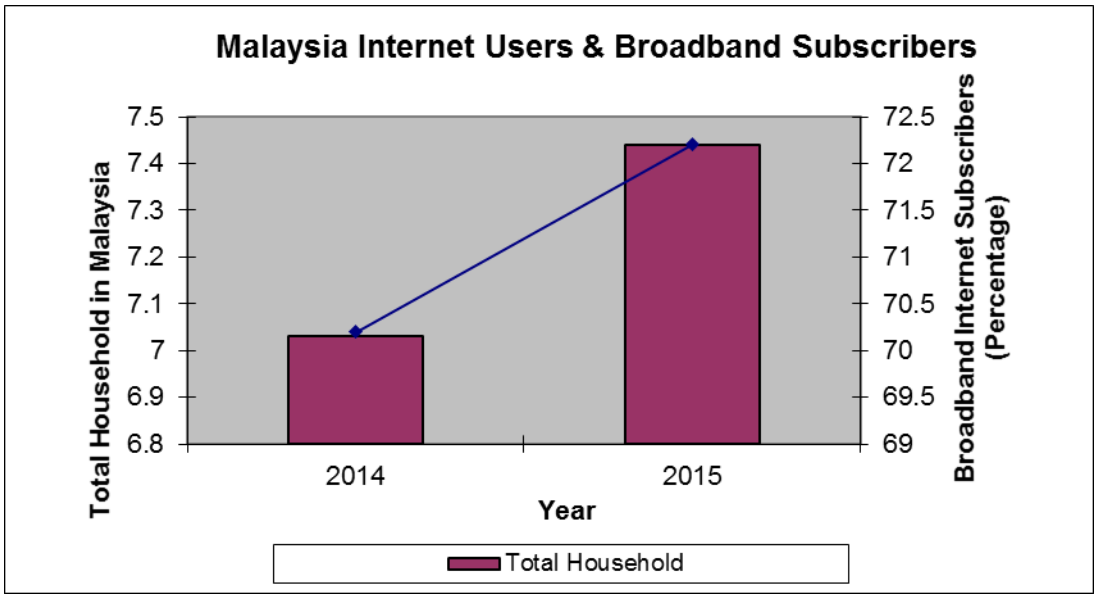
Two crucial forces that define the K-economy are knowledge strength of economical happenings and the increase in commercial affairs around the world. The increment in knowledge intensity may be contributed by integrating effect of IT revolution and the fast change of technology. On the other hand, policy and regulation due to fast changes in IT has determined globalization (Peter, 2000).

The core function of IT, which is the facility to operate, supply and transfer huge chunks of data at a very low cost is being made realized via the Internet technology, that booms the IT revolution. Instances of indispensable Internet elements such as digitization standards and systems, software advancement, identification of auxiliary technologies to support such as computation and communication system. These elements integrates together with other technologies to permeate the K-economy with inclusion of graphical technology, display systems and replication applications.

Moving on from here, the term Broadband descried the Internet as a utility that carries huge bandwidth to provide faster data connections. As defined by the Federation of Communication Commission (FCC), broadband service is a type of data transmission protocol that provides speed which is more than 200 kilobits per second (Kbps) in either downstream or upstream path. Briefly, high capacity bandwidth allows greater amount of information to be transmitted which is the essence of all applications and communications.

In the context of Malaysia, the first in the list of 10 National Policy Objectives as stated in the Communication and Multimedia Act (CMA) 1998, which reports the aspirations of turning Malaysia into a Communications and Multimedia

Global Hub. Hashim (2006) states that a secretariat has been formed to roll out the National Broadband Plan (NBP) to where the fundamental strategies to accomplish such a vision is to put in place an efficient broadband network and ensure sufficient subscription to the service among Malaysian households. Despite the fact that there are great efforts to add ICT application into the activities of students, level of usage of technology is considering low (Raman, 2011; Ramayah & Jaafar, 2008).



Source: MCMC, 2015

Figure 1.1
Statistics on Malaysian Internet users and Broadband subscribers from 2014 till 2015

Based on Figure 1.1, it is known that in 2015, there are 20.63 million Internet users in Malaysia. The total household in Malaysia is about 7.44 million and out of this, 72.2 percent of the total household are broadband Internet subscribers (MCMC, 2015).

With this inception, it is widely predicted that Internet through broadband technology will quickly penetrate the residential markets, in line with the NBP that

focuses on infrastructure readiness and market penetration, expediting the rollout of broadband Internet using both fixed and wireless access.

1.1.1 Advantages of Broadband

Broadband is different from conventional dial-up services due to its many enhanced capabilities. By using broadband, users can use phone line while surfing. This is due to the way the Internet connection is established. For dial-up services, both the voice and data lines are passing through the same channel, and each time a new web session is initiated, a new connection need to be established. This is different for broadband, whereby the connection is always on and there is no need to re-establish a connection in the event of re-establishing a new connection, regardless of the type of access technology being used. The voice and data lines are being separated by central office equipment and there is no interruption on voice while surfing.

Apart from this, broadband allows simultaneous Internet usage and allows bandwidth sharing among multiple workstations. This is certainly cost effective compared to using dial up access where each workstation requires dedicated telephone lines to get connected to the Internet.

Broadband offers easier connectivity and higher reliability to users compared to dial up. Dial up equipments are based on analog transmission that depends on many protocols such as dial tone of phone line, server response, equipment handshake and connection authorization. Thus to establish a connection, it is very much hassle and lengthy process to be adhered compared to broadband, which performs digital transmission in a simple and easy setup. This feature relates to the transmission speed capability. With dial up, the maximum transfer rate achievable is

56kbps which makes downloading and uploading very much time consuming task but with broadband, the speed can go up to 100 Mbps that results in efficient and consistent data transmission.

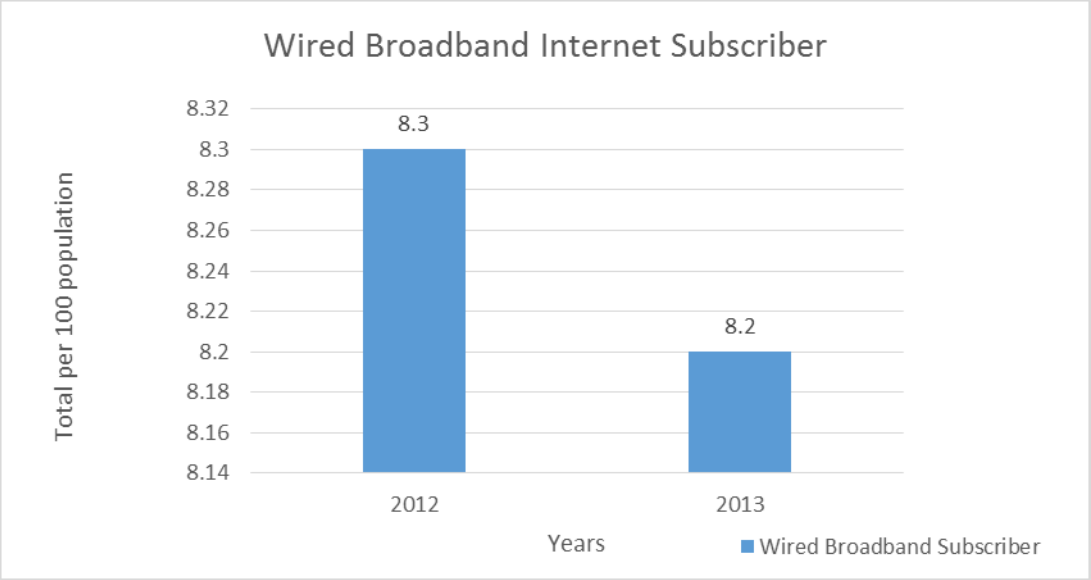
Broadband also provides access to a wide range of Internet services and applications like streaming media, internet protocol based phone, online games and many other collaborative services. Many of these current and newly developed services requires more digital bandwidth and requires large amount of data transfer at excessively fast speed, which is not viable with dial-up technology.

1.1.2 Broadband Technologies in Malaysia

In Malaysia there are numerous Application Service Provider (ASP) players who are competing with each other to reach the residential markets. TMNET, Maxis, Jaring, Digi, GreenPacket and Penangfon are some of the major companies. Denni (2005) mentioned that with the existence of different broadband companies and telecommunication players, competition will drive broadband growth. The last mile broadband connectivity is still low and needs strong intervention from the Malaysian government (Mansor, 2004).

Typically there are two ways in which broadband can be made accessible to the consumers; they are through wired technology and wireless technology. However, wired technology is still the dominant access technology to enable broadband to consumers to wireless technology (Lurudusamy & Ramayah, 2009).

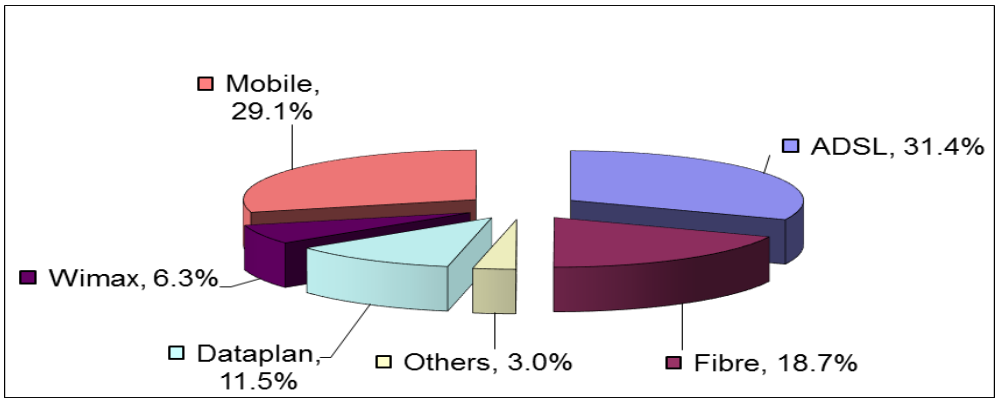
Based on MCMC survey in 2015, wired access contributes about 85 percent of total broadband subscription and wireless technology contributes to the remaining 15 percent, as being reflected in Figure 1.2 (MCMC, 2015).



Source: MCMC, 2015

Figure 1.2
Comparison between wired access technology subscribers from 2012 and 2013 (MCMC, 2015)

From the above statistic on broadband Internet subscription, it is further noted that majority of the fixed broadband Internet subscribers, concisely about 31.4 percent of the Broadband subscriber's hooks up to the Internet through ADSL, followed by 29 percent get connected to the Internet through wireless mobile Internet. Fiber access contributed about 18.7 percent, followed by WiMAX, an instance of satellite broadband access which holds 6.3 percent each (MCMC, 2014).



Source: MCMC, 2014

Figure 1.3
Breakdown of broadband service by access

a) Digital Subscriber Line

This broadband access is based on the Digital Subscriber Line (DSL) access that offers always on, data services with high data transfer feature over existing copper or fiber wires to consumers. ADSL, SDSL, HDSL, Rate Adaptive DSL and VDSL and instances of the term xDSL. Based on Dutton (2003), these access technology is getting utmost importance from Internet Service Providers (ISP) and application implementation providers due to its ability to support multiple locations with high speed data connections with reasonable adaptation to the present telecommunication infrastructures.

b) Third generation technology (3G)

3G technologies are another form of wireless broadband access. It is based on packet based transmission of text, digitized voice, video and multimedia at data rates up to and possibly higher than 2 Mbps, offering a consistent set of services to mobile computer and phone users that support mobility of users. 3G technology advances the data transmission speed up to 144 Kbps in a high speed wireless environment, 384 Kbps in a low speed moving environment, and 2Mbps in a fixed environment. This sort of access network covers a wide area for its high speed data services that enables mobile users such as notebook or mobile phone users to perform their tasks at anywhere such as office, home or even on the road. This is possible due to the roaming features and international joint ventures between the telecommunication providers.

c) Wireless Fidelity (Wi-Fi)

Wi-Fi is a wireless-based local area network (LAN) that can be used to offer "hot spot" by extending the broadband service to the Internet infrastructure via multiple access points (AP). A basic Wi-Fi antenna can support transfer of signals for mobile devices by covering distances of up to about 300 meters, and is extendable by advancing technologies in antenna design and operation techniques. Wi-Fi transmits data at 2.4 GHz or in extended cases, 5 GHz at up to 54 Mbps. The other advantage of this broadband access is the lower initial cost as compared to flexible installation. This is because of the unlicensed radio spectrum that runs on compact equipment due to lesser power consumption. This feature is advantageous for residential zones that has power supply limitations.

d) Worldwide Interoperability for Microwave Access (WiMAX)

In practical terms, WiMAX would operate similar to Wi-Fi but at higher speeds, over greater distances, and for a greater number of users. WiMAX wireless system comprises of a tower and a receiver. The tower is comparable to a mobile transmission tower and can cover big ranges to provide broadband accessibility among residential users.

A WiMAX service operates with a tower station to establish a direct link to the Internet. A microwave link, which leverages on line of sight can that can cover the radius of 3,000 square miles and is deployed to provide connectivity to remote areas.

Basically, there are two main applications of WiMAX which are fixed and mobile applications. Fixed are point-to-multipoint connections enabling broadband access to homes and businesses, whereas mobile offers the full mobility of cellular

network speeds that results in more efficient throughput, latency, spectral efficiency, and advanced antennae support. The technical difference between both is the existence or non-existence of line of sight, which influences the data transmission quality.

1.1.3 Narrowband Technologies in Malaysia

A dial-up Internet connection is simply the application of the Public Switched Telephone Network (PSTN) to carry data on behalf of the end user. It involves customer premises equipment (CPE) device sending the telephone switch a phone number to direct a connection to an Internet server and it is the most basic and therefore the slowest type of Internet connection that is available. Connection rates for dial-up modems tend to fall between 2,400 bps & 56,000 bps, which are incredibly slow for today's high speed Internet and applications. Dial-up modems are attached internally or externally to a given computer, and then connected using a standard telephone cable. All in all, dial-up Internet connections are outdated and representative of an older and more basic Internet.

Till today, dialup is still used as an economical alternative (depending on the connection requirements) to dedicated connectivity. It has important uses as backup connectivity, in case the broadband which serves as the main line goes down. Dialup also offers the flexibility to create dynamic connections as needed.

Basically, there are two types of dial-up technology used, namely Plain Old Telephone System (POTS) and Integrated Services Digital Network Basic Rate Interface (ISDN BRI).

a) Plain Old Telephone Service

In this dial up technology, the regular phone lines used in voice calls are referred to as Plain old telephone service (POTS). They are ubiquitous, familiar, and easy to obtain; local calls are normally free of charge. This is the kind of service that the phone network was built on. Sounds are carried over this service are sampled in their conversion to digital signals so that sound can be carried on a 64 kbps channel at acceptable levels. The encoding and decoding of voice is done by a piece of telecommunication gear called a CODEC. The CODEC was needed to allow backward-compatibility with the old analog phones that were already in widespread use when the digital network was introduced. Thus, most phones found in the home are simple analog devices.

Dialup connectivity across POTS lines has historically been limited to about 33,600 bps via modem which is often referred to as V.34 speeds. Recent improvements have increased the speed at which data can be sent from a digital source to a modem on a POTS line, but using POTS lines on both ends of the connection still results in V.34 connectivity in both directions.

b) Basic Rate Interface

Intended for home use, this application of ISDN uses the same copper as a POTS line, but it offers direct digital connectivity to the telephone network. A special piece of equipment known as a terminal adapter is required (although, depending on the country, it may be integrated into the router or DCE device).

Normally, a Basic rate interface (BRI) interface has two B (bearer) channels to carry data, and one D (delta) channel to carry control and signaling information. Local telephone carriers may have different plans to suit local needs. Each B

channel is a 64 K line. The BRI interface is a dedicated connection to the switch and will remain up even if no calls are placed.

1.1.4 Difference between dialup and broadband Internet connection

The fundamental difference that distinguishes between dialup and broadband Internet is the method of connection from a computer or workstation to the Internet. Comparing to the broadband technology, dialup service functions at a speed of 56kbps in maximum connection to the Internet that leverages on a telephone cable.

Broadband refers to a connection of data transfer speeds of 256kbps that has capacity to transmit large amount of data at high speed. This type of connection are derived on the data delivery method such as satellite, cable or telephone wire.

Traditionally, telephony system were designed to carry voice which is an analogue signal, and has been adapted to decode into digital signal via passing the signals through a modem. Therefore, in a dialup connection, subscribers will be imposed the local call charges depending on the frequency of dialing to the Internet. During the period of being connected to the Internet, the line will be on engaged mode. On the contrary, in broadband connection, the same line can operate simultaneously for both Internet connection and phone usage, with no additional cost. However, the transmission protocol between the user devices such as PC towards the telephony exchange will result in bottleneck issue in dialup connections and this results in difficulty in end user experiencing delays in downloading media rich applications such as video, online games and others.

Broadband typically does not impede the use of a telephone line for voice usage due to its usage of another frequency spectrum of the line. This is an advantage because the digital signal need not to be converted to analog signal or

vice versa; that permits browsing or multimedia download activity is performed faster.

Another significant difference between dial-up and broadband Internet technology is in the requirement of devices for the connection establishment. Broadband connection needs a special modem to support the high speed data transfer which is external equipment but dial-up uses an embedded modem which comes by the default in consumer electronic goods.

1.2 Problem statement

This research focuses on adoption of Broadband Internet technology and usage continuance among existing subscribers. Firstly, the adoption and deployment of broadband Internet technology in Malaysia has not grown as expected. There has been numerous initiative to boost the individual uptake of Broadband Internet service such a providing the service at reasonable price.

Malaysia's broadband penetration rate is about 72.2 percent per household, a reasonable achievement compared to other countries around the globe despite Malaysia undertaking efforts and activities in the Asia in making Malaysia as a leading IT hub as well as in supporting the Multimedia Super Corridor project. Despite of the nation's effort in deploying various initiatives in broadband access uptake as a mean to attract foreign investments by multi-national corporations, the wider community has not really embraced this technology (Selamat et al., 2008).

During the inception of the rollout strategies, this issue of the slow broadband Internet penetration has been considered earnestly by the government of Malaysia as the constantly revise their policy and regulations in accordance to the nations adoption rate. Based on the latest survey conducted by MCMC on

broadband penetration in 2015, it is evident that nearly 91.7 people per 100 inhabitants are using Broadband, compared to only 15 people per every 100 inhabitants in 2007. Looking back, the penetration rate was very much lower then and it was impossible to achieve the target set by Malaysian government with the current growth rate which is insignificant continues (Lim, 2007).

Research by Haring et al. (2002) suggests that the delivery of broadband facility in a country is more 'demand constrained' than 'supply constrained'. Previous researches in broadband has mainly focused on supply side such as cost, access infrastructure, but delimiting the significance of the demand side such as focusing into use and factors that may influence the adoption at individual level. In other words, to ensure consistent diffusion of broadband Internet, the understanding on the factors that influence the broadband uptake decision by an individual need to be emphasized (Crabtree, 2003; Oh et al., 2003; Stanton, 2004), considering the cognitive aspects from the user perspective.

Davis, Bagozzi, & Warshaw (1989) reported that effectiveness of IS depends on its acceptance by users with previous studies that have examined the factors that affect the technology acceptance by user. Following this suggestion, Venkatesh et al. (2003) concluded that UTAUT is a conclusive model that synthesizes what is known and provides a foundation to guide future research in user acceptance area. By encompassing the combined explanatory power of the individual models and key moderating influences, UTAUT advances cumulative theory while retaining a parsimonious structure and be able to account for 70% of the variance in usage intention. The UTAUT model integrates the theories and researches on individual acceptance of information technology into a unified theoretical model that captures the essential elements of eight previously established models (i.e. Theory of

Reasoned Action, the TAM, the Motivational Model, the Theory of Planned Behavior, a model combining the TAM and the Theory of Planned Behavior, the Model of Personal Computer Utilization, the Innovation Diffusion Theory, and the Social Cognitive Theory). Four constructs were identified as direct determinants of user acceptance and usage behavior: (1) performance expectancy, (2) effort expectancy, (3) social influence, and (4) facilitating conditions. The theoretical definitions of these variables are as follows.

Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003). In the present context, performance expectancy refers to the perception that using broadband Internet will help users to attain benefits in their daily life.

Effort expectancy is defined as the degree of ease associated with the use of the system, which refers to the usability of the broadband Internet, which is transaction based application (Dillon and Morris, 1996; Loo, Yeow, and Chong, 2009).

Social influence is defined as the degree to which an individual perceives the importance of the beliefs of others that he or she should use the new system (Venkatesh et al., 2003). In the context of broadband, social influence refers to the social pressure influencing the intentions of Internet users to use broadband.

Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003). In the present context, facilitating conditions refer to the objective factors in the environment that make an act of use easy to accomplish. For the broadband adoption, these factors include providing cable

connection to residential areas to support broadband infrastructure; campaign organized by local ISP's to promote broadband awareness, and etc (Lee and Kim, 2009).

Personal Innovativeness has received considerable attention in past research on consumer behaviour (eg. Agarwal & Prasad, 1998; Hirschman, 1990a; Hurt, Joseph, & Cook, 1977; Midgley & Dowling, 1978; Robertson, 1971; Rogers, 1982) in light of its relevance as a factor in the adoption of a new product (Agarwal, Ahuja, Carter, & Gans, 1998; Robertson & Kennedy, 1968) or a purchase behavior (Citrin, Sprott, Silverman, & Stem, 2000). However, in an effort to gauge the exact nature of this variable, many different conceptualizations of innovativeness have been proposed in the literature. Rogers and Shoemaker (1971) define innovativeness as "the degree to which an individual is relatively earlier in adopting new ideas than other members of his social system." According to the approach proposed by Bass (1969), Midgley and Dowling (1978) criticize this temporal perspective because it ignores the social and communication processes that characterize the diffusion of an innovation, and they affirm that this concept reflects the "degree to which the individual is receptive to new ideas and makes innovation decisions independently of the communicated experience of others." In general, innovativeness is considered an inborn characteristic that all individuals have at a higher or lower level but which is subject to a series of contributing social factors (Hirschman, 1980a; Rogers, 1983, 1995).

As argued by Agarwal and Prasad (1998), an individual develop beliefs about new technologies by synthesizing information from a variety of media. For the same exposure to different types of media, individuals with higher personal innovativeness are expected to develop more positive belief s about the target

technology. Based on this research, it is believed that most proximate influence on an individual's cognitive interpretation of IT is factors related to the individual. Individuals with higher levels of personal innovativeness are expected to develop more positive perceptions about the innovation in terms of the advantage, ease of use, and have more positive intentions towards the use of an Information Technology/ Information Science (IT/IS) (Lu, Yao, and Yu, 2005).

Previous researchers have not seriously tackled the issues of broadband Internet in the areas of consumer's adoption and the impact on the post adoption (Carriere et al., 2000). Studies conducted on broadband adoption also highlight the need to understand adoption of broadband at consumer level (Oh et al., 2003, Choudrie & Dwivedi, 2004). Research has demonstrated that it costs about 6 times as much to recruit new subscriber as to maintain an old one, in paid membership context, particularly in telecommunication applications, such as Broadband Internet (Spiller et al., 2007).

An interesting fact to commemorate this is that the survey conducted by MCMC in 2009 on Broadband Internet penetration survey predicted that in 2010, Malaysian household Internet penetration rate will reach only 34.2 percent. In another survey by MCMC on Malaysian Customer Satisfaction Index (CSI) on Internet usage, it was highlighted that the performance rating was only 3.55 out of scale of 10. This poor rating on subscriber satisfaction indicates that confirmation of expectation plays a substantial role in the satisfaction of current subscription and this greatly impact the post-adoption behavior of the current adopters.

In line with this, it is proved that the ultimate viability of an IT system is dependent on individuals' continued usage of the IT (Karahanna et al., 1999; Bhattacherjee, 2001b). If the enthusiasm over the initial adoption of an IT

diminishes after individuals gain experience from using it, then the IT will suffer from decreased usage and may even fall into disuse subsequently. When this happens, organizations that developed the IT or built their services around the IT would need to write-off their significant investments in developing and implementing the IT.

While the usage of typical IT innovations in prior IS research are well defined, simple and of limited function (e.g., word processor (Davis et al., 1989) and email (Gefen & Straub, 1997), the interaction of broadband Internet technology services with their users is far more complex and varied to support diversified needs and expectations. As suggested by previous studies, perceived usefulness plays an important role in predicting user's intentions (Legris, et al., 2003; Liu, et al. 2000) and playfulness is significantly associated with total web use (Atkinson & Kydd, 1997). Perceived playfulness is an important variable in determining user retention in the area of broadband Internet and this is further supported by Gefen, Karahanna, and Straub (2003) since understanding the role of perceived playfulness over time is an important avenue of research to pursue. Furthermore, research by Webster and Martocchio (1992) revealed that an individual who are highly playful with computer system should experience higher satisfaction during usage than individuals low in playfulness.

Research into consumers' post adoption behavioral processes is a dominant theme in the consumer behavior literature (Churchill & Surprenant, 1982). Based on this literature, a research framework that is commonly used in different post-purchase contexts to investigate consumers' satisfaction and re-purchase decisions is the expectancy-confirmation1 paradigm (e.g., Churchill & Surprenant, 1982; Oliver & DeSarbo, 1988; Yi, 1990; Anderson & Sullivan, 1993; Oliver, 1993). The

expectation-confirmation paradigm hypothesizes that a consumer's level of satisfaction with a product/ service determines re-purchase intention. In turn, the consumer's level of satisfaction with the product/service is determined by the consumer's initial expectations (pre-purchase expectations) on a product/service, and discrepancies between expectations and product/service performance (disconfirmation). Even before the purchase decision, a consumer develops expectations about the product/service. After the purchase has been made, the consumer gains experience from using the product/service and develops perceptions about its performance. This leads to the consumer either confirming or disconfirming the pre-purchase expectations, after assessing perceived performance against the earlier frame of reference. The consumer's expectations are confirmed when the product/service performs as much as expected; negatively disconfirmed when it performs worse than expected; and positively disconfirmed when it performs better than expected (Churchill & Surprenant, 1982).

In the IT context, Bhattacherjee (2001b) proposed an Expectation Confirmation Model (ECM) of Information Technology (IT) continuance based on the congruence between individuals' continued IT usage decisions and consumers' repeat purchase decisions. The ECM posits that an individual's intention to continue IT usage is dependent on three variables which depends on the user's level of satisfaction with the IT, the extent of user's confirmation of expectations and post-adoption expectations (Thong, Hong, & Tham, 2006).

The following section describes the research objectives and research questions that is used in this research.

1.3 Research Objectives

Significantly this study determines the relationship among many independent variables that influence the adoption and post - adoption behavior of Broadband Internet among Malaysian individuals. In this research, Unified Theory of Technology Acceptance and Use of Technology (UTAUT) model is used as the standard model with adaptation from Expectation Confirmation Model (ECM).

The study objectives are as follows:-

a. To determine the relationship between Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Personal Innovativeness, Perceived Playfulness and intention to adopt Broadband Internet technology.

b. To determine the relationship between Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Personal Innovativeness, Perceived Playfulness and intention to continue using Broadband Internet technology.

c. To determine the relationship between satisfaction and Broadband Internet technology continuance intention.

d. To determine the relationship between continuance intention, initial usage and continuous usage of Broadband Internet technology.

e. To determine the relationship between behavioral intention on Broadband Internet technology adoption and initial usage.

1.4 Research Questions

From the above discussion, the research questions stated in this study are:

1. Do Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Perceived Innovativeness and Perceived Playfulness influence broadband Internet technology adoption intention among Malaysian Individuals?
2. Do Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Perceived Innovativeness and Perceived Playfulness influence broadband Internet technology continuance intention among Malaysian Individuals?
3. Does broadband Internet technology adoption intention influence actual usage?
4. Does broadband Internet technology continuance intention influence actual continuance?
5. Does initial usage of broadband Internet technology determine the Broadband Internet continuance?
6. Does confirmation influence Performance Expectancy, Perceived Playfulness and satisfaction level of broadband Internet technology usage?
7. Does satisfaction influence broadband Internet technology continuance intention?

1.5 Significance of the study

This research tries to identify two relevant research streams covering broadband adoption and continuance (after initial adoption in Malaysia).

Since broadband diffusion is viewed as a measure of international competitiveness (BSG, 2004; Langdale, 1997; Oh et al., 2003; Sawyer et al., 2003), many governments around the world have set ambitious targets for the deployment of broadband services (BAG, 2003; National Broadband Task Force, 2001; Office of the e-Envoy, 2001; Office of Technology Policy, 2002). This is because the high penetration rate of broadband is perceived to have a positive impact on the growth and development of the Internet, electronic commerce (e-commerce), and the information economy (Lee et al., 2003; Sawyer et al., 2003).

As technology changes and community lifestyle varies, broadband becomes the important element in an individual's life, as it encompasses many aspects of a more quality life. Through the outcome, it is anticipated that this study will be able to assist policy makers, the government, broadband agents and others who are involved in broadband be able to develop relevant policies and marketing strategies to boost the broadband penetration growth. This is in line with our NBP target which emphasizes 75% of broadband household penetration by 2010 (MyICMS 2006), as the main aim is that more individuals to adopt Broadband Internet technology and current Broadband Internet subscribers will continue their subscription. Post-adoption behaviors are crucial as for ISP's an extra 1% retention can add as much as 5% to the bottom line of the business. Existing subscribers provide base revenue, eliminate the need to search for and acquire new customers, create opportunities for cross-promotion and sales, and generate referrals (Spiller et al., 2007).

Apart from the industrial benefits, this study certainly contributes to the knowledge of operations management, where the proposed model used in this study will overcome the current knowledge gap. It is suggested that UTAUT would profit from including cognitive aspects within cognitive dissonance theory (CDT) better to

explain changes in attitudes and beliefs over time. If this is accomplished, the UTAUT will truly be a unifying theory and this research is performed towards that accomplishment (Brevik, 2005). With this research, it lengthens the application of this original theory to study the adoption and continuance intention and post-adoption of Broadband Internet among individuals.

1.6 Scope of the study

The domain of this research is factors that influence adoption and continuance of Broadband Internet subscription among Malaysian individuals. The investigation targets are Malaysian individuals ranging from different demographic background such as age, profession, education level, working experience and others.

Extensive literature review is conducted to fully comprehend the underlying concept, trends and technology advancement to support this study. The basis for this research is UTAUT and ECM which has been further extended by integrating 2 Independent Variables, namely Personal Innovativeness and Perceived Playfulness.

This study also includes the analysis based on data collected from a field study, which is in the form of questionnaire. This study concludes with a discussion or direction for future research in this area of technology adoption and continuance.

1.7 Definition of key terms

For the purpose of this research study, the following terms are being used:

1. Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003).

2. Effort Expectancy refers to the degree of ease associated with the use of the system (Venkatesh et al., 2003).
3. Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new system (Venkatesh et al., 2003).
4. Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh et al., 2003).
5. Perceived Playfulness can be defined as the extent to which the individual perceives that his or her attention is focused on the interaction with the technology; is curious during the interaction; and finds the interaction intrinsically enjoyable or interesting (Agarwal & Prasad, 1998)
6. Personal innovativeness is defined as the degree to which an individual is relatively earlier in adopting new ideas than other members of his social system (Moon & Kim, 2001).
7. Fixed line or landline (or land phone or main line) refers to a telephone line which travels through a solid medium, normally through metal wire (International Telecommunication Union (ITU), 2010)
8. Dial-up Internet access is a form of Internet access that uses the facilities of the public switched telephone network (PSTN) to establish a dialed connection to an Internet service provider (ISP) via telephone lines (International Telecommunication Union (ITU), 2010).
9. Confirmation is defined as users' perception of the congruence between expected and actual performance of broadband Internet technology (Bhattacherjee, 2001).