

Investigating the Readiness of Broadband Continuous Usage among Rural Dwellers in the Northern Region of Malaysia

Ishola D. Muraina, Wan Rozaini Bt Sheik Osman, and Azizah Ahmad

Abstract—Broadband is simply described as the transmission capacity that is faster than primary rate Integrated Services Digital Network at 1.5 or 2.0 megabits per second. Efforts have been made by the government of Malaysia to ensure that broadband should be seen as basic need and not a luxury. However, the internet users at the remote and rural areas in the world lack behind in using broadband which is always caused by lack of technology and economic factors, while the rural areas especially in the northern region of Malaysia are not excluded. This research investigated the readiness of rural dwellers in the northern region of Malaysia towards continuous usage of broadband by using a quantitative survey technique. The total numbers of 200 questionnaires were distributed to secondary school students that are residing in the rural areas of northern region of Malaysia. The results show that the rural dwellers are readily prepared for broadband continuous usage in their localization whenever they are sensitized towards it.

Index Terms—Broadband, continuous usage, readiness, rural areas, rural dweller, UTAUT Model.

I. INTRODUCTION

Broadband is considered as the technology that provides consumers fast and always-on access to new applications, services and content with real lifestyle and productivity benefits [1]. Thus, researchers have started to look into various applications that can be applied through the

implementation of broadband which have potentially permitted high revenues in communications industries, such as the study of mobile TV acceptance in which they indicated that there are over a million subscribers only in the year 2009 in South Korea [2]. Meanwhile, the International Telecommunication Union (ITU) recommendation 1.113 of standardization sector defined broadband as “transmission capacity that is faster than primary rate Integrated Services Digital Network (ISDN) at 1.5 or 2.0 megabits per second” [3], [4]. It is stressed by the umbrella body of broadband society that a community that adopts, adapts, and absorbs the benefits of broadband enabled information and communication technology (ICT), services and applications quickly and deeply will achieve significant benefits in terms

of productivity, innovation, growth and quality of life as well as significant competitive advantage over society that do not [5].

It is indeed reported that broadband technologies are categorized into two major types; wireline broadband and wireless broadband technology. Wireline broadband technology is regarded as Digital Subscriber Line (DSL), cable modem, power line and fiber optics. Indeed, wireless broadband technology is classified as WiMax, satellite and Wi-Fi. Malaysia is the most articulate country among the developing countries in the world that boosts the ICT usage to its inhabitants through the support of their government policies and programs which target its mass population [6]. The study of Asian-Pacific Economic Cooperation shows that Malaysia’s preparedness level towards ICT usage is relatively high when comparing to other Association of South East Asian Nation (ASEAN) countries [7].

Those support have been pay off by the year 2007 while the penetration rate for the population with internet dial-up connections has jumped to 14.3% compare to 7.1% in 2000 [8]. Also, the broadband connection penetration rate jumped from 0.08% in the year 2002 which was the period that the service was introduced in Malaysia, to 5.0% in 2007 [8]. The increment in the penetration rate of broadband among Malaysian is an opportunistic issue since many of ICT applications could be accessed through the use of strong broadband connection [9]. Meanwhile, broadband has been tried to make as a basic need and not a luxury in Malaysia, making it mandatory for Malaysia government to look for many avenues that would reduce the broadband and 3G internet services fees [10].

However, most of broadband applications require minimum of access speed of 50Mbit/s, which is usually common in urban areas [11], while the broadband services in rural areas are struggling with lower speed because of predicament of high cost of provision [12]. Moreover, the internet users in the remote and rural areas are less in embracing broadband access due to the technology and economic factors leading them in continuously using low-speed dial up access in lieu of demanding for higher services while northern region of Malaysia is not excluded, making it necessary to investigate the readiness of the rural dwellers in the northern region of Malaysia towards broadband continuous usage. Indeed, the northern region of Malaysia is known as Northern Corridor Economic Region and comprises of four northernmost states that fall on the west coast of Peninsular Malaysia: Perlis, Kedah, Penang and North of Perak [13]. Many of locations in the rural areas of northern region of Malaysia have their population less than

Manuscript received June 15, 2013; revised August 20, 2013.

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10,000 people per kilometer and consist of agricultural features, forest and water bodies. Therefore, this research considers it by using Unified Theory of Acceptance and Use of Technology (UTAUT) model from [14], [15].

II. RURAL ICT AND RURAL BROADBAND

There is a widespread belief that information is vital for rural development by using information as a key issue in the information age. The real challenge of the present day is not producing information or storing information, but getting people to use information. The development in the rural areas can be improved by the use of ICT and brings about information and knowledge society [20]. The ICT is best fit for bringing about competitive and successful rural community in the effort to better the life of rural dwellers and compete with people in urban areas. ICT has been accepted nowadays to be used for bridging the gaps between urban and rural communities, rich and poor people especially in the area of information seeking. It is always stress that ICT is useful for the rural communities in dealing with government electronically (e-government) and public sectors with the required infrastructures as shown in Fig. 1.

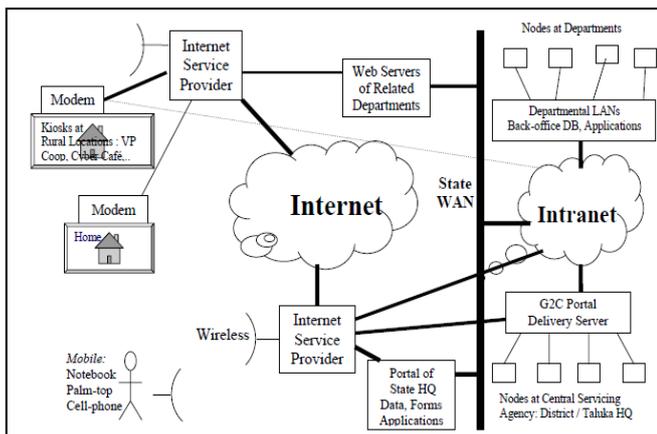


Fig. 1. Rural ICT infrastructure

The rural ICT solutions are normally offered through internet portals hosted on a delivery web server to provide access to the rural dwellers through inexpensive internet medium. The information flow between the delivery server and the other departments is accomplished through Intranet/LAN connectivity with servers of those departments which are optional. Due to non-computerization of back-end systems, the transactions are manually exchanged and response data is keyed in manually through the nodes on the delivery server. It may be noticed that the end-to-end connectivity between the central service providers (district administrations, cooperative unions, post office) and the rural dwellers is accomplished through a number of stages that involves several agencies [20].

III. LITERATURE REVIEW

The development in the rural areas can be improved by the use of ICT and brings about information and knowledge society [16]. The ICT is best fit for bringing about competitive and successful rural community in the effort to better the life of rural dwellers and compete with people in

urban areas [17]. ICT has been accepted nowadays to be used for bridging the gaps between urban and rural communities, rich and poor people especially in the area of information seeking [17]. The research of [18] stressed that ICT is useful for the rural communities in dealing with government electronically (e-government) and public sectors with the required infrastructures.

In addition, continuation of usage of technological device (broadband) by consumers creates survival for the service technology and revenue for the firms and may be triggered by the acceptance and consumer influences towards service delivery which is the antecedent of behavioral intention [19], [20]. Moreover, continuous usage of a device has to do with retention of value by the users that intend to stay and actively utilize the device for exchanging knowledge and information with others [21], [22]. Many researchers have added that continuation of usage of device or system is a way of measuring success in the implementation of information system [23], [24].

Furthermore, the development of UTAUT by [14], [15] integrated theory of reasoned action (TRA) by [25], technology acceptance model (TAM) by [26], theory of planned behavior (TPB) by [27] and the combined TAM and TPB (C-TAM-TPB) by [28]. Moreover, theory of diffusion of innovation (DOI) by [29], social cognitive theory (SCT) by [30], motivational model (MM) by [31] and the model of PC utilization (MPCU) by [32] were also used. Meanwhile, [14] derived four main determinants of behavioral intention and usage as performance expectancy, effort expectancy, and social influence.

IV. RESEARCH MODEL AND HYPOTHESIS

The research model in this study has its origin from UTAUT model due to the strength of UTAUT to explain the acceptance and usage of technology. Therefore, we adapt its constructs in order to investigate the readiness of rural dwellers of northern region of Malaysia on continuous usage of broadband and shown in Fig. 2.

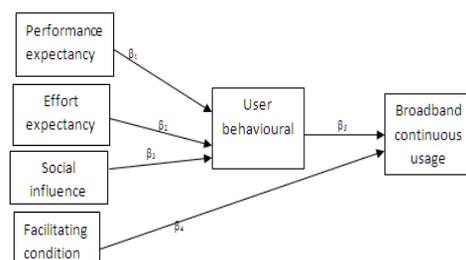


Fig. 2. Research model

The performance expectancy is described as the degree to which an individual believes that using the system or device assist to achieve the job performance [14]. Many researchers like [33], [34], [35] have agreed to the outcome derived from studies using UTAUT model and concluded that effort expectancy was found to be positively related to behavioral intention towards frequent usage of system. Moreover, effort expectancy as one of the constructs of the independent variables in UTAUT is described as the degree of ease of use of information system or devices felt by a user. Indeed, [28], [20] perceived that effort expectancy influences the

behavioral intention towards acceptance and usage of information system devices more than one time.

In addition, the degree to which an individual user feels that other people believe that he or she should be using the information system is known as social influence [14]. Besides, UTAUT model shows that social influence has a significant influence on the behavioral intention towards the frequent or continuous usage of IT devices in a community. In other words, Social influence construct is found to be precedent from there constructs of six models such as subjective norm (TRA, TAM2, TPB, C-TAM-TPB); social factors (MPCU) and image (DOI).

In fact, facilitating condition as one of the constructs of the UTAUT model is defined as the degree in which a user of technology believes that there is availability of technical infrastructure to support the use of new information technology and thus, found to have influence on the frequent usage of information technology devices [28], [14]. Consequently, behavioral intention is a measure of the strength of one's intention to perform a specified behavior and find its source from the theory of reasoned action [27]. Therefore, researchers like [35], [36] have shown that behavioral intention has a direct impact upon the individuals' actual use of a given technology. Besides, the following hypotheses were formulated based on the previous studies in order to investigate the readiness of continuous usage of broadband in the rural areas:

H₁: Performance expectancy has positive influence on the user behavioral intention towards continuous usage of broadband in the rural areas.

H₂: Effort expectancy has positive influence on the user behavioral intention towards continuous usage of broadband in the rural areas.

H₃: Social influence has positive influence on the user behavioral intention towards continuous usage of broadband in the rural areas.

H₄: Facilitating condition has positive influence on the broadband continuous usage in the rural areas.

H₅: There is a significant relationship between user behavioral intention and broadband continuous usage in the rural areas.

V. METHODOLOGY

This research uses the quantitative survey technique in order to gather data from the secondary school students in the rural areas of northern region of Malaysia. The secondary school students were chosen as sample for this research because internet is found to be part of their daily routine. The total number of 200 questionnaires were distributed to the invited secondary school students at the Pusat Internet Desa (PIDs) Selama in Perak state, Balik Pulau in Pulau Penang state, Kuala Nerang in Kedah state and Simpan Empat in Perlis state. PIDs are used as the distribution and collating centers during the data collection processes. Moreover, the simple random sampling through the fishbowl style was used in selecting the respondents among the invited secondary school students at the PIDs.

The questionnaire was designed in bilingual format (English Language and Bahasa Melayu) in order to make it easier for the respondents to attempt since they are leaving in

the rural areas, as they may not be versatile at English Language. Besides, the respondents were instructed through assistance of the PIDs managers in Zone 1 and Zone 2 in the northern region of Malaysia to indicate their perceptions on the amended UTAUT model, which included performance expectancy, effort expectancy, and social influence, facilitating conditions and behavioral intention towards continuous usage of broadband in the rural areas, by using 5 point Likert scale ranges from strongly disagree to strongly agree. The research model was tested by using statistical package for social sciences SPSS version 19 software.

VI. DATA ANALYSIS

The total number of 52.6% of the respondents was male students while 47.4% were female students with average age of 16 years. The data gathered shows that 68.4% of the respondents are in form 4-5, 18.4% in form 1-3 and 13.2% in upper 6 of the secondary school education. Moreover, 50% of the respondents are leaving with their parents during the academic session, while others are staying at the boarding house and with the legal guardians. Indeed, 57.9% of the respondents claimed that their parent possess secondary school education, 13.2% bachelor degree, 2.6% master degree, while 26.3% of the respondents' parents do not have educational background. Besides, 18.4% of the respondents' parents engage in rubber tapping activity to earn means, 21.1% engage in small scale businesses, 5.3% work in industry and 55.3% engage in other activities.

In addition, majority of 52.6% of the respondents say they do not have computer at home, while 65.8% do not have internet connectivity at home due to the high starting cost, lack of equipment and limited coverage of internet in their villages. Meanwhile, all the respondents are familiar with the usage of broadband either at home, school, PID or cybercafé. But, 47.4% are still using dial-up internet while 52.6% are using broadband internet. This indicates that rural dwellers in the northern region of Malaysia show a good respond toward the usage of broadband.

TABLE I: RELIABILITY OF UTAUT CONSTRUCT IN THE RURAL AREA

UTAUT Construct in the Rural Area	Cronbach alpha Coefficient
Performance expectancy	0.764
Effort expectancy	0.814
Social influence	0.717
Facilitating condition	0.734
User behavioural intention	0.710

Furthermore, the reliability of the five constructs of the amended UTAUT model to determine the readiness of continuous usage of broadband in the rural areas of northern region of Malaysia was checked by using Cronbach alpha coefficient in order to test the reliability of the scale constructs. The result of the reliability shows that the entire constructs have their Cronbach alpha greater than 0.7 (0.710 – 0.814). This is shown in Table I and acceptable based on the stand of [37].

VII. RESULT

A multiple regression analysis is employed to explore the predicting power of independent variables in the amended UTAUT model on the dependent variable due to the continuous form of the variables involved. The amended UTAUT model for investigating the readiness of continuous usage of broadband among rural dwellers in the rural areas contains four predictors (independent variables) and two outcomes (dependent variables). Since the intended objective is to investigate the readiness of rural dwellers on continuous usage of broadband in the rural areas of northern region of Malaysia, user behavioral intention is presented as binary outcome variable. Besides, user behavioral intention and broadband continuous usage are treated as two outcome variables. Thus, the analysis was run separately for each of the outcome variables, depicting that the analysis is of two phases.

In addition, the first phase of the analysis uses the performance expectancy (PE), effort expectancy (EE) and social influence (SI) as the predictors to predict the user behavioral intention (UBI) towards continuous usage of broadband in the rural areas. The PE, EE and SI have positive influence on the UBI towards continuous usage of broadband in the rural areas with their P values below 0.05 ($\beta_1 = 0.365$, $p < 0.006$, $\beta_2 = 0.360$, $p < 0.021$ and $\beta_3 = 0.783$, $p < 0.000$) respectively, making hypotheses H1, H2 and H3 achievable and shown in the estimated research model in Fig. 3.

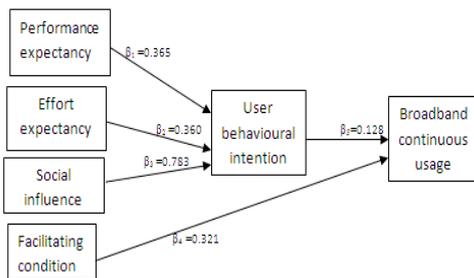


Fig. 3. Estimated research model

Besides, the second phase of the analysis uses facilitating condition (FC) and UBI as the predictors towards broadband continuous usage (BCU). Moreover, FC and UBI significantly related to the BCU in the rural areas due to their P values that less than 0.05 ($\beta_4 = 0.321$, $p < 0.002$ and $\beta_5 = 0.128$, $p < 0.036$), making the hypotheses H4 and H5 achievable and shown in Fig. 3.

VIII. DISCUSSION

The investigation of readiness of continuous usage of broadband among the rural dwellers in the rural areas of northern region of Malaysia using UTAUT model shows that performance expectancy, effort expectancy, social influence and facilitating condition represent the main object of this research. Besides, the outcomes of user behavioral intention and the facilitating condition from the amended UTAUT model shows that rural dwellers in the rural areas of northern region of Malaysia are ready to continuously using the broadband irrespective of the associated predicaments to the broadband usage in their domain and is in line with studies of [38], [35]. In addition, both of user behavioral intention and facilitating conditions were found to be significant for

broadband continuous usage in the rural areas. This explains the necessity of resources and information which may bring about support for the readiness of rural dwellers towards continuous usage of broadband.

IX. CONCLUSION

This research is established to investigate the readiness of rural dwellers towards continuous usage of broadband in the northern region of Malaysia and adapted UTAUT model for the measurements. Consequently, the result shows that all the constructs in the amended UTAUT model have their $p < 0.05$ indicating that they are readily prepared for broadband continuous usage in their localization whenever they are sensitized towards it. This research would be extending its scope in future to continuous intention of broadband usage which helps determining the gravity of continuous usage of broadband in the rural domain.

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