

Broadband Adoption Barriers and Impacts:

A look at reasons why households choose not to subscribe to broadband, the social and economic implications of adoption and non-adoption, and recommendations for overcoming deleterious broadband barriers.

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The spread of internet technology is hailed as an unprecedented advance in societal communication which promotes new forms of social identity, decentralizes power relations, and creates a foundation for new forms of social organization (Martin and Robinson 2007). With the advent and dispersion of broadband technology, these opportunities among countless other boons have gained an amazing momentum in the day-to-day functioning of our nation and communities. Broadband brings so much economic and social potential, that inequality in broadband access could further polarize economic or other opportunities. Marginalized individuals have fewer opportunities to access and use computers and the internet, and those who take advantage of broadband possess more information than others. Studies show that low income leads to non-use of the internet which “in turn can lead to lower income in a mutually reinforcing pattern of economic isolation” (Martin & Robinson 2007).

As Future Generations Graduate School moves forward with the West Virginia Broadband Opportunities Program, an understanding of the dynamics of broadband adoption, access, usage, and impact are crucial for empowering rural and economically disadvantaged communities across the state.

Broadband Adoption Factors, Trends, and Barriers

Even as large investments continue to be made in broadband infrastructure, the majority of countries and nations have seen adoption rates slow dramatically in the past few years (Dwivedi 2008: 4). The demand for broadband has not increased as anticipated despite the increasing access and more affordable prices. Researchers such as Dwivedi, Howick & Whalley, suggest that broadband adoption is more constrained by demand than supply (Dwivedi 2008, Howick & Whalley 2008). In order to encourage widespread adoption and reduce the digital divide, it is necessary to focus on understanding the factors that influence the consumers’ decisions on a household level.

Trends

A study from the Economic Research Service found that by 2007 most urban households (84%) with in-home internet access used a broadband connection, whereas only 70% of rural households with in-home internet have a broadband connection (Stenburg & Cromartie 2009). According to the Pew Research Center (2004), the likelihood of internet use from 2000 to 2004 changed most slowly within the low-income groups and have significantly slowed down in the lowest education group (high school drop-outs).

The National Telecommunications Cooperation Association conducted a 2010 survey among their members (570 locally-owned telecommunication cooperatives and commercial companies) and found that their broadband take rate was at 55% compared to the 38% of 2009. 47% of survey respondents’ service areas are 500 square miles or larger and 31% have customer densities of two residential customers per mile or less (NTCA 2010).

Martin and Robinson (2007), in their study, examine recent US Census data to test the hypothesis that the diffusion of the internet is becoming more polarized rather than less by family income determined through multiple logistic regression and other odds-based analyses. When Martin and

Robinson (2007) compare a internet diffusion between income groups in European countries, they found that the inequality is not nearly so pronounced as in the US.

In order to address some distribution of services and broadband access, some municipalities have attempted to offer broadband and promote adoption. In his legal essay, Matthew Dunne looks at various court cases where municipalities were taken to court for providing broadband to their communities. Dunne states that the Federal Communications Commission (FCC) should preempt laws that prohibit municipalities from providing broadband service, since deployment of the technology is sometimes slow and inequitably distributed (Dunne 2007). Projects, such as the Wireless Philadelphia Plan would have addressed the digital divide and promoted inclusion among low-income communities (Dunne 2007).

Adoption Influences and Perception Barriers

Pew Institute's Internet & American Life Project synthesizes some of the raw factors that influence broadband adoption. In Pew's Internet & American Life Project (2005), the survey data shows that dial-up users are not attracted to switching to broadband because they are older, have lower incomes, are less educated, or are relatively apathetic about internet use. The report also revealed that broadband adoption is growing but slowing, since many of those who are likely to switch to broadband have already done so or will do so soon (Pew 2005). The findings and studies described below look into the current adoption trends and give objective analyses on the cause of current broadband adoption behaviors.

Yogesh Kumar Dwivedi produced the book Consumer Adoption and Usage of Broadband to examine the consumer-level factors driving broadband adoption and to understand the usage and impact of broadband on its subscribers. After a comprehensive literature study technology adoption, he conducted a nationwide survey in the United Kingdom to provide stakeholders, service providers, and content-providers with accurate analysis to contribute to the diffusion of innovations and services (Dwivedi 2008; 2).

In Dwivedi's literature research, he found that six key factors are responsible for driving saturation of broadband adoption: the government's vision, strategy and commitment, facilities-based competition, pricing, the PC Bang phenomenon, culture and geography, and demographics (Dwivedi 2008: 6). Dwivedi examined a study by Oh et al., (2003), that looked at individual level factors influencing the adoption of broadband in South Korea by combining factors taken from Rogers' diffusion theory and the technology acceptance model (Oh et al., 2003). "The findings of this study suggest that congruent experiences and opportunities in adopting a new technology affect users' attitudes through the three extended technology acceptance model constructs, namely perceived usefulness, perceived ease of use, and perceived resources (Oh et al., 2003).

Howick and Whalley use casual models and quantitative simulation to indicate how the various drivers of broadband adoption interact with one another by looking at the case of rural Scotland as a model for rural communities worldwide (Howick & Whalley 2008). Both of their models show that past policy initiatives have impacted the rate of adoption, and they, therefore, posit that the "greatest impact could be achieved if future policy initiatives target those people who show no interest in adopting broadband" (Howick & Whalley 2008). They agree with other researchers that widespread broadband availability does not automatically lead to widespread adoption. Howick & Whalley make the point that although monthly cost is an accepted factor in rural broadband adoption, the overall cost is greater for those who must invest in a computer to use broadband. Besides cost, attributes of broadband such as speed, service reliability, and the always-on feature influence adoption are of more value to those with higher income and education (Howick & Whalley 2008).

Social context provides another set of factors in broadband adoption; households with a higher income, college education, and multiple computers are most likely to adopt broadband (Howick & Whalley 2008). Howick & Whalley (2008) recommend intervention in broadband adoption to increase the perceived usefulness of the technology. A household can only adopt broadband if the

infrastructure is available to them and they know that it is available to them (Howick & Whalley 2008). Like Dwivedi (2008), Howick and Whalley (2008) agree that although word of mouth through other adopters is a powerful influence, secondary influences of mass media and advertising do have a positive influence on adoption rates. Howick and Whalley (2008) point out that policies that could potentially have the largest impact on adoption are those “that could target and reduce the number of households and businesses that believe that they do not want the internet, or in fact, a PC, at all.”

Dwivedi found that broadband adoption behaviors are influenced by four attitudinal factors: hedonic outcomes, utilitarian outcomes, relative advantage, and service quality (Dwivedi 2008: 173). The relative advantage refers to the faster, un-metered, always-on access to the internet which was found to be much more significant with broadband than dial-up (Dwivedi 2008: 175). Utilitarian outcomes refer to how the technology enhances the “effectiveness of household activities such as budgeting, homework, and office work.” Hedonic outcomes relate to the pleasure derived from the technology such as games and entertainment. The service quality is less of a significant factor depending on the level of Internet Service Provider competition in a given geographical area. Dwivedi also examines the social influences on adoption behavior such as community, family, friends, and colleagues/peers. He considers these social influences to comprise the “primary influence” to help determine an individual’s attitude towards broadband adoption; the “secondary influences” are disseminated through mass media and advertisement to influence a consumer’s decisions (Dwivedi 2008; 179). According to his research, Dwivedi found that the greater the awareness of benefits of the innovation amongst the consumers and users, the more likely it is that the innovation gets adopted (Dwivedi 2008; 181). The other significant factor that influences broadband adoption is self-efficacy or the pre-existing skill set to utilize and navigate relevant technology (Dwivedi 2008; 182).

Similar to Howick and Whalley’s work, Dwivedi examined five socio-economic attributes that he hypothesized would influence broadband adoption: age, education, income, occupation, and gender. The first four proved significant, and gender proved non-significant (Dwivedi 2008; 184). He found the majority of adopters between the ages of 25-54 years of age, which is also the most economically active group with higher disposable income (Dwivedi 2008; 184). However, the study found that there still remained a high number of non-adopters in this age category. The majority of adopters also held a degree in higher education (Dwivedi 2008; 185). In occupation, Dwivedi surprisingly found that the largest number of broadband adopters belonged to a category, which encompasses unskilled, temporary, or unemployed workers. His explanation for that this category of workers might need to access broadband more frequently to find work or gain new skills (Dwivedi 2008; 185).

Looking at the Impacts of Broadband

An Economic Research Service (ERS) study for the USDA in 2007, found that investment in rural broadband internet access seems to lead to a more competitive rural economy and rural economic growth, helping create a rural digital economy (Stenburg & Cromartie 2009). The ERS study compares a group of rural counties that had broadband access by 2000 with a group of counties that did not, in order to assess the economic impacts of high-speed connection. The United Kingdom Broadband Stakeholder Group (BSG) produced a report in 2004 that highlighted the benefits of broadband in order to, “help the UK to become a truly competitive knowledge-based economy...and to help the UK’s citizens become healthier, better educated, and more engaged in their communities and society” (BSG, 2004). Dwivedi also quoted the BSG’s assumption that broadband could facilitate electronic services in the public sector that will reduce the cost of delivery, increase the quality of healthcare, and thereby increase the citizens’ trust and confidence in public services and generally, in the government (BSG, 2004).

Social Behavior Changes and Benefits

Kwak, Poor, Skoric, and Williams compared two theoretical models that attempt to understand the societal roles that broadband plays. The first, linear model posits that the benefits and drawbacks that were introduced through narrowband internet will further develop with the adoption of broadband technology. The second model of differential gains posits that changes originating from advances to different stages of internet technology should be unique to each technological advance. The study found that the differential gains model is true of “hard engagement” such as political discussion, hard knowledge, and civic participation, but that the linear model explains changes in “soft engagement” such as informal socializing and soft knowledge (Kwak & Williams 2004).

One of the benefits of broadband thought to encourage adoption is the two-way flow of information, which provides new opportunities for a more participatory form of democracy (Kwak & Williams 2004). For better or worse, broadband users engage in more interpersonal socializing than narrowband users, and narrowband users socialize slightly more than nonusers (Kwak & Williams 2004). Looking at the drawbacks of broadband use and connection, studies have found that the more advanced internet technology individuals adopted, the less likely they were to participate in volunteer or other cooperative activities (Kwak & Williams 2004).

Some of the significant social benefits of broadband are access to tele-medicine, tele-education, and allowing dispersed families to remain in communication (Howick & Whalley 2008). Equipping the younger generations in rural areas with technological skills for the future job market, will be of great benefit to geographically isolated communities (Stenberg & Cromartie 2009).

According to his study, Dwivedi found that broadband users use the online facilities for longer periods of time (duration) and use services or applications more often (frequency) than dial-up users (Dwivedi 2008; 187). To examine broadband use and activities, Dwivedi divided online use into 41 activities which fall under nine categories of services and application: communications, information-seeking, information-producing, downloading, media-streaming, e-commerce, entertainment activities, social and personal, and e-government (Dwivedi 2008; 188). The study found that broadband users use an average of 22.41 activities compared to the narrowband (dial-up) user who uses an average of 17 online activities.

Dwivedi suggests that because broadband offers an alternative to ways of working and accessing entertainment and consumes time that would usually be spent on other activities, that broadband will alter time-use patterns of a user’s daily routine (Dwivedi 2008; 189). His study found that broadband subscribers compared to narrowband subscribers spent less time shopping in a store, increased job-related work at home, decreased time working in an office and commuting in traffic, and also decreased time spent reading books and newspapers (Dwivedi 2008; 189).

Economic Benefits

As expected, the ERS study found that broadband had a positive influence on the economic vitality of a rural area, shown by the faster growth in nonfarm proprietors and jobs in counties with broadband in 2000 (Stenberg & Cromartie 2009). They also found that wages and incomes were higher in counties with earlier broadband adoption. According to the ERS, “evidence suggests that the widespread availability of broadband internet can enhance community interaction, improve access to health and educational services, increase household income prospects through telework activities, and provide rural businesses with access to broader markets for their goods” (Stenberg & Cromartie 2009).

The FCC sees broadband as an important driver of economic growth and job creation because it creates access to online commerce and allows businesses to locate facilities in inexpensive or undervalued locations (Dunne 2007). It is seen as a basic assumption that even the most rudimentary internet connection can generate significant economic and social value for households or small business (Beard & Stern 2010).

Recommendations

Of all the suggestions to policy-makers and service providers on how to improve adoption rates, Howick and Whalley (2008) encapsulate all of these and more in the following recommendations:

- 1) Marketing campaigns that focus on groups with low adoption rates
- 2) Finding local champions to promote the benefits of broadband
- 3) Providing cost incentives such as waived installment fees, discount computers, or stratified tiers of speed and service
- 4) Move more public services online to force the adoption of broadband: taxes, benefits, etc.
- 5) Understand the needs of those who are not interested in broadband, and uncover how to make it most attractive

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