

Broadband Internet Use in Rural Pennsylvania

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Project Summary

This research, conducted in 2005–2006, employed case studies to provide a qualitative description of how four sectors, specifically healthcare, local government, education and business, in rural Pennsylvania are using broadband Internet technology. The research was interested in determining whether these sectors were engaging in transactional or transformational uses of the Internet.

Introduction

Harnessing the power of the Internet is an important issue for rural Pennsylvania. The limited availability of advanced telecommunications services has long been a concern of residents, businesses, and institutions in rural areas. Policymakers with rural constituencies have historically shared similar concerns.

Over the past several years, trends indicate that telecommunications providers in rural areas are increasingly offering advanced telecommunication services—including broadband Internet services—to their rural customers. While access to technology is still far from universal in rural Pennsylvania, it has become widespread enough for academic researchers and policymakers to move beyond simply arguing that lack of access to the technology is obstructing social and economic development in rural areas.

A new set of questions for rural Pennsylvania must now be addressed. How are people in rural parts of the commonwealth using broadband? How does this use differ in different sectors of society, and among different population groups? How is the use of broadband shaping opportunities for social and economic development in rural Pennsylvania? In what ways might state policy and practice help to improve the use of broadband Internet use?

This research, which was conducted in 2005–2006, attempted to answer these questions by first reviewing

three studies, conducted nationally and in Pennsylvania, on the availability and use of broadband. The researchers then looked at the four sectors of healthcare, local government, education and business to understand how these sectors use broadband, and more specifically, whether these sectors were engaging in transactional or transformational uses of the Internet.

Transactional use is for common practices, such as using a dictionary or reading the local newspaper, while transformational use actively engages the user to customize information for their personal needs.

The researchers employed case studies to provide a qualitative description of broadband use by the four sectors mentioned above.

Studies on Broadband Use Pew and GAO Studies

The researchers examined two studies, both completed in the spring of 2006, by the Pew Internet and American Life Project and the U.S. Government Accountability Office (GAO). The two present different, though compatible, perspectives on the availability of broadband services in the U.S. Using different methodologies, both the Pew and GAO studies conclude that broadband services are increasing in availability in the U.S., and note differences in use rates by age, income, education and locality. The two studies, though similar, reflect subtle differences in the distribution and use of



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broadband services. The GAO focused on what Federal Communications Commission data revealed in terms of service coverage. The Pew study emphasized public uptake of broadband technology and changes in the type of services used.

Local Development District Study

The researchers also reviewed the draft results of a June 2006 study for the Local Development Districts (LDDs) of the Appalachian Regional Commission, which, together with the Pennsylvania Department of Community and Economic Development, sought to determine the existing availability of broadband services in Pennsylvania and to create scenarios to expand access to broadband (Baker, 2006). Five LDDs (Southwestern Pennsylvania Commission; Southern Alleghenies Planning and Development Commission; SEDA-Council of Governments; Northeastern Pennsylvania Alliance Region; and Northern Tier Regional Planning Development Commission) generated comparable survey data of service availability. Two other LDDs, while participating in the study, had an insufficient response rate to be included in the study results.

According to the survey results, businesses did not use high-speed access with the same frequency as households. The majority of household respondents indicated cost was the primary barrier to the purchase of broadband service. While the majority of businesses using dial-up indicated that cost of broadband service was the primary inhibitor, 42 percent indicated that higher speeds did not appear to be available. While similar to residential respondents, who indicated cost was a factor limiting broadband use, businesses seemed even more reluctant to use higher capability services due to cost and lack of competitive service providers.

Summary of the Findings from the Pew, GAO, and LDD Studies on Availability and Use of Broadband

The 2006 FCC and Pew Foundation research reports indicate that broadband availability is still an issue for many places in the U.S., especially in areas where landscape and population density act as inhibitors to market development.

Rural residents are the least likely to use broadband and are the most limited in terms of access to broadband service at an affordable price. The LDD report indicates that service cost, and to some extent actual availability, are constraining broadband use. This study, which is one of the few that provides current information on businesses' use of broadband, indicates that firms use broadband to a lesser degree than households. This lack of use is due to cost and, to some extent, lack

of knowledge about the opportunities associated with broadband services. Cost may be even more of an issue for small businesses, particularly given the manner in which costs are allocated in the commercial sector.

Case Studies

Local Government

To assess the ability of rural Pennsylvanians to interact with their local government (both county and municipality¹) via the Internet, the researchers evaluated selected websites based on a series of functional dimensions: information dissemination; interactive functions, such as permits, licenses, and applications; eCommerce, or the ability to pay for government services, taxes, and fines on-line; and eDemocracy, or the ability to use the Internet to provide feedback to elected officials as inputs into policy decisions. The researchers selected websites of 16 county governments that were representative of rural Pennsylvania counties, and 16 local governments (boroughs, townships, and municipalities) within those counties that were representative of all municipalities² in that county. To select the 16 counties, all rural counties² in the state were divided into one of four regions (northwest, northeast, southeast and southwest). Then, within each region, the largest and smallest rural counties (by population) adjacent to urban counties, and the largest and smallest rural counties not adjacent to urban counties, were chosen. The counties selected for analysis are shown in Table 1.

Among the counties analyzed, Internet use for transactional purposes varied considerably. It appears, for example, that being close to an urban county makes a difference in the quality of Internet interaction possible in counties. At the same time, being adjacent to an urban county is no guarantee of high transactional capability. Population size and the absolute size of a county's budget also seem to have a relationship to e-government scores. Within the sub-categories of the e-government rating, the individual item that was the most common across all websites was the availability of downloadable forms.

In analyzing the quality of e-government services among municipal governments (including boroughs, townships and cities), the most striking finding was how little local governments in rural Pennsylvania use the Internet at all, as measured by the availability of a website. The exception, a county with a strong tourism

¹ Note that use of the term municipality encompasses all classes, including boroughs, towns, townships, and cities.

² As defined by the Center for Rural Pennsylvania, a county is rural when the number of persons per square mile within the county is less than 274. Counties that have 274 persons or more per square mile are considered urban.

Table 1. Counties Selected for e-Government Analysis

County Name	Website	2000 Population	Adjacent to Urban County?
Northeast			
Monroe	http://www.co.monroe.pa.us/	138,687	Yes—Adjacent to Luzerne County
Bradford	http://www.bradfordcountypa.org/	62,761	Non-adjacent
Montour	http://www.montourco.org/	18,236	Non-adjacent
Sullivan	http://www.sullivancounty-pa.us/	6,556	Yes—Adjacent to Luzerne County
Northwest			
Crawford	http://www.co.crawford.pa.us/	90,366	Yes—Adjacent to Erie County
Venango	http://www.co.venango.pa.us/	57,565	Non-adjacent
Warren	http://www.warren-county.net/	43,863	Yes—Adjacent to Erie County
Forest	http://www.co.forest.pa.us/	4,946	Non-adjacent
Southeast			
Schuylkill	http://www.co.schuylkill.pa.us/	150,336	Yes—Adjacent to Berks County
Adams	http://www.adamscounty.us/	91,292	Yes—Adjacent to York County
Mifflin	http://www.co.mifflin.pa.us/	46,486	Non-adjacent
Snyder	http://www.snydercounty.org/	37,546	Non-adjacent
Southwest			
Lawrence	http://www.co.lawrence.pa.us/	94,643	Yes—Adjacent to Beaver County
Somerset	http://www.co.somerset.pa.us/	80,023	Yes—Adjacent to Westmoreland County
Bedford	http://bedford.pacounties.org/	49,984	Non-adjacent
Fulton		14,261	Non-adjacent

economy, had a high-level Internet presence. No relationship could be found between these e-government ratings and either the size of the municipality's population or its location. Similarly, there was no relationship between the size of the population and e-government rating. Given the overall low level of Internet use in these municipalities, and the highly fragmented structure of local government in Pennsylvania (making it difficult to interpret, for example, population size of a municipality within its broader geographic context), it is likely that a significant amount of e-government is driven by a set of factors that could only be captured through more detailed qualitative and quantitative research.

Education

The sample cases selected in this sector also used the same methodology discussed in the local government section—dividing rural counties in the state into four geographic sections and selecting four rural counties in each region (two adjacent and two nonadjacent to urban areas). For education, one school district was selected per county. In cases where the first school district selected would not speak with the research team, a

second school district was selected in the same county. In the event that an interview could not be conducted with any of the schools in a county, a different county in that region was selected. In total, 12 school districts were interviewed. The school districts that were interviewed wished to be kept anonymous in this report.

From the interviews, the researchers found that education is clearly benefiting from the availability of broadband services. Students in schools with available broadband can conduct sophisticated searches for information, communicate with students in other locations, and engage in real-time discussions. At the same time, such capability requires considerable investment in infrastructure and ongoing technology support and training access to optimize the use of technologies. Of importance is the challenge of ensuring that technology is up-to-date and that continuous broadband service is available. Access to the Internet as made available through broadband has a huge capacity to transform the learning experience, opening up the educational system to greater involvement of students and parents in curriculum development and other realms of community learning.

As with the majority of applications, broadband services need to be maintained and monitored by professional staff. This requires a high level of resources allocated to ongoing training of teachers and support staff. At the same time, fundamental technical requirements in the form of bandwidth inhibit the use of all opportunities available through and afforded by broadband technologies.

Healthcare

The researchers assessed broadband use among 12 hospitals in rural counties. To assess the hospital websites, the researchers modified the e-government assessment used for local governments. The researchers also attempted to conduct interviews with hospital staff. The research team first identified four counties per region of the state and selected one hospital facility per county. From the hospitals identified in the 16 counties, the researchers were able to conduct only four interviews. They also assessed the websites of hospitals in 12 rural counties.

In general, the researchers found that broadband services are extremely beneficial to healthcare. Configured correctly with the help of broadband, Internet technology infrastructure can provide patients and other users of healthcare access to huge amounts of information, treatment management services, and direct engagement with medical personnel. The implementation of such a level of service is more about the willingness of the practitioner to use the technology than the presence or absence of the service capability itself. Interviews reported consistently that the age of the medical practitioner was the best predictor of service utilization. "Under the age of 50" was a prevalent refrain heard from IT administrators commenting on factors to implement IT uptake. Another factor correlated with high-level service use was membership in a health maintenance organization that had many locations, since the need to communicate almost required the availability of broadband.

Small Businesses

Since broadband use in small business is different, depending on the nature of the business, the researchers decided to conduct case studies on industries that are prevalent in rural Pennsylvania with the following characteristics: a significant number of small and medium businesses; signs of competitive advantage (a condition where the business occupied a niche that was viable given the sector in which the firm competed); and broadband use is critical to the competitive success of firms in the sector. The researchers selected powdered

metal manufacturing, which is prevalent in northcentral Pennsylvania, and tourism along the Route 6 corridor.

In the powdered metal industry case study, small businesses were using the Internet primarily to identify new market opportunities, reduce cost of supplies, and communicate more effectively within supply-chain networks. Few of the interviewees in the powdered metal sector understood the potentially transformative uses of the Internet for their business.

Firms in the tourism sector, however, could clearly see the transformative potential of broadband Internet services, especially in terms of attracting and informing potential visitors, and in booking and accepting reservations. This sector clearly understood and was aware of transformational uses of the Internet. The problems in this sector were rooted in fragmentation in the industry, specifically the lack of coordination among tourism interests at the local, regional and state levels, and the varying degrees of technological skills among individual businesses.

For example, while the state coordinates a significant amount of tourism marketing through the Pennsylvania Tourism Office, and the visitPA.com website, for rural areas especially, much of the tourism marketing is conducted by the network of decentralized Tourism Promotion Agencies operating throughout various regions of the state. It is a highly decentralized system, with significant autonomy at the local level. Also, in terms of the Route 6 corridor, there is the challenge of integrating multiple, different technical systems to enable on-line reservation systems. Such systems require linking together literally hundreds of individual websites, with centralized reservation systems, and linking into these systems from multiple, different tourism promotion boards within the region. With each tourism promotion board free to pursue its own technical system for putting reservation systems in place, integration across the entire Route 6 area will be difficult. And the technological skills of each individual tourism operator will greatly affect his or her ability to integrate into the website more specific functions, such as interactive mapping and reservations.

Summary of the Case Study Findings

Across the sectors studied, transactional use was the most frequently noted capability enabled by the availability of broadband. It is making search processes easier and more efficient, reducing the need for face transactions and, in many instances, reducing the need for travel. Far less frequently observed is the use of broadband for transformative purposes. In each sector studied, transformative use is clearly tied to empowering

and enabling users to undertake an action not otherwise possible with other known technology or forms of interaction.

Proactive governments are critical to the successful uptake of broadband technologies. Government is often a key enabling factor in the availability and use of broadband, primarily through legislative action that creates opportunities and, in some cases, constructs constraints through mandates, which dictate that technology and services be provided. The role of government as an enabling and encouraging agent is particularly evident in the education and healthcare sectors. Some uses clearly have their limits, such as telesurgery, which requires excellent broadband capability, but more importantly the entire healthcare system has to be optimized to conduct complex medical procedures across long distances and without face-to-face contact.

Broadband use by businesses is growing through time. Research and anecdotal evidence suggest that business use of broadband services lags significantly behind household use. To some extent, this is the result of the cost of service. However, businesses often find that broadband services are a necessary, but not sufficient, condition for business success. Business use of broadband services varies significantly by industry. In the powdered metal industry case study, small businesses were using the Internet primarily to identify new market opportunities, reduce the cost of supplies, and communicate more effectively within supply-chain networks. Occasionally, new uses developed in response to a change in the market or regulatory environment. Yet within the industry, there seemed to be much less incidence of transformative uses of the Internet—uses that might allow new forms of collaboration between firms or between physically distant employees of the same firm. Perhaps more importantly, few of the interviewees in the powdered metal sector understood the potentially transformative uses of the Internet for their business. Firms in the tourism sector, in contrast, could clearly see the transformative potential of broadband Internet services. Most of the interviewees articulated various aspects of the ways that broadband could empower customers to book their own tours and more effectively understand regional attractions through applications such as interactive mapping and locational search functions. Here, the problems of lack of transformational use were not rooted in lack of awareness but in fragmentation/coordination and limited skills.

Education is clearly benefiting from the availability of broadband services. Students in schools with available broadband can conduct sophisticated searches for information, communicate with students in other

locations, and engage in real-time virtual realities. Basically, the Internet adds the outside world to what can otherwise be isolated locations. At the same time, such capability requires considerable investment in infrastructure and ongoing technology support and training for staff. Across the spectrum of functions, broadband enhances education for both students and staff. The challenge of ensuring that technology is up-to-date and that continuous broadband service is available is important. Access to the Internet as made available through broadband has a huge capacity to transform the learning experience, opening up the educational system to greater involvement of students and parents in curriculum development and other realms of community learning.

Healthcare offers a compelling context in which to deploy broadband services. Configured correctly with the help of broadband services, IT infrastructure can provide patients and other users of healthcare access to huge amounts of information, treatment management services, and direct engagement with medical personnel. The implementation of such a level of service is more about the willingness of the practitioner to use the technology than the presence or absence of the service capability itself. Interviews reported consistently that the age of the medical practitioner was the best predictor of service use. Another factor correlated with high-level service use was membership in a health maintenance organization in which multiple locations created a ready benefit from effective communication capability. The need to communicate across service activities almost necessitated the availability of broadband.

Transformational use of the Internet is still in its infancy. Companies are developing an awareness of how broadband-enabled capability can literally restructure the firm and its market and product, and its approach to business. Full acceptance of the efficacy of broadband requires significant investment by the entrepreneur in a profound shift to a learning organization. This jump is both challenging and costly; for many firms, it is fraught with uncertainty and perceived high levels of risk.

In sum, broadband offers many opportunities for transformational evolution on the part of all organizations that come in contact with and have reason to use the technology. Costs and absolute availability of service are still important issues. Generational constraints are somewhat mitigated by the prospect of training, but user-friendly services and equipment are still major hurdles to broad-based broadband use. While technology is necessary and not sufficient to ensure an economic future of opportunity and enhanced creativity, the absence of high-level connectivity is seen increasingly worldwide as a significant burden on future development.

Policy Recommendations

There is no silver bullet or single solution to the challenge of broadband use. As the results of this study demonstrate, unique sectoral experiences call for the need for realistic rollout of broadband by sector. A single solution to the problem of uptake is simply not evident or likely to emerge. Instead, multiple targets are required.

The majority of broadband applications that emerged during the course of this study reflect transactional interactions. Few cases of transformational interactions were evident. And yet, policy should consider ways to facilitate broadband deployment to do more than doing the same thing, only slightly better or with less face-to-face contact. The power of the Internet is not just that it assists in the performance of existing activities more efficiently; it is what it can enable users to do that matters.

With regard to education, teachers must be provided with the tools and training and have access to the required support staff to truly take advantage of the capabilities of broadband services. To do so will require considerable technical support and new reward structures that encourage and facilitate teachers' uptake of this new capability.

In the field of healthcare, there are significant opportunities to change and augment the way public health and health services are generally provided. The aim of interventions and policy programming should be to enable the consumer to have greater access to healthcare in more efficient and effective forms.

Business, and small business in particular, needs incentives and specific programming to alter status quo behavior. However, the cost of changing practices is

high. Policies should be developed to encourage groups of firms in the same sector to take up these new technologies and capabilities. Efforts to stimulate clusters of like groups offer ample opportunities to piggy-back on existing efforts to optimize firm practices.

There is a huge opportunity to facilitate the integration of new technology across a host of sectors. Optimization is the watchword; this requires cooperation across groups that currently are only loosely confederated and largely go it alone in service provision.

E-Government also has much to offer, and yet is likely to be an area in which innovation is slow to develop. Incentives and identification of joint projects can significantly influence the evolution of e-government toward actions that empower residents and businesses to learn to use the evolving technology platform. In the optimal situation, government should act as an intermediary and facilitator of broadband use.

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