

# Promoting Broadband Internet Use in Rural Areas Through Rural Business Clusters

**Charles Steinfield**

*Michigan State University*

*steinfie@msu.edu*

**Robert LaRose**

*Michigan State University*

*larose@msu.edu*

## 1 INTRODUCTION

Rural areas continue to be a disadvantaged population in the Information Society. In the United States, for example, the rural-urban gap in basic Internet access is closing but a new gap in broadband access has opened (Bell, Reddy, & Rainie, 2004; NTIA, 2004). As in many developed countries, this has led to a concerted effort throughout the U.S. to increase access to broadband throughout rural America, using both wired and wireless platforms (Pigg & Crank, 2005). While providing the basic technical means of access is an obvious and important first step that has received most of the attention to date (Strover, 2003), access alone is not enough. Rural areas lag behind urban ones in broadband access even after adjusting for urban-rural demographic differences (Prieger, 2003). Education and income are significant factors when explaining household-level urban-rural differences in Internet adoption (Mills & Whitacre, 2003). In addition, rural residents tend to be older, make less money, and attain a lower level of education when compared to urban residents, factors that may also limit broadband adoption (Bell, Reddy, & Rainie, 2004). These findings suggesting that infrastructure improvements alone may not be the answer to closing the urban-rural broadband divide. Despite this, in the U.S., the public sector has begun to subsidize the extension of broadband access to rural homes through grants to rural broadband providers, funded by the Rural Utilities Service and other federal and state initiatives (Pigg & Crank, 2005; Pittman, 2002). But will these investments

stimulate broadband adoption and improve rural life or should resources for broadband development be directed elsewhere in rural communities?

In this short position paper, we suggest that one way to improve the adoption and use of broadband in rural areas is take a cluster approach. We suggest that in order to achieve ubiquitous access and the social and economic benefits it may convey to rural residents, policy makers should concentrate on ensuring broadband adoption by businesses in rural communities. Recent research suggests that the most important correlate of dial-up Internet adoption in rural homes is Internet usage in the workplace (Hollifield & Donnermeyer, 2003) and this appears to hold up for broadband as well (LaRose et al., 2005; LaRose et al., 2006). And, within the business community, we argue that for many of the same reasons that regional clusters seem to convey competitive advantages on their members, cluster members are more likely to gain from their use of broadband. Positive experience with broadband at work can then stimulate take-up at home.

## 2 RURAL BUSINESS CLUSTERS AND GAINS FROM BROADBAND

Since exposure to broadband Internet connections in the work place is the “prime mover” in this scenario, the question becomes how to stimulate their adoption by rural businesses. We propose that the adoption and use of broadband in rural communities will be more successful when it occurs within the context of a well-functioning regional cluster. A considerable literature has focused on the pivotal role of business clusters found in cities and regions as drivers of economic health (Porter, 1990). Clusters are groups of companies in a common industry located in the same geographic area, often including a range of supporting players such as local trade associations, and education and research organizations.

Normally considered an urban or suburban phenomenon, recent work has explored the value of clusters in rural contexts (RTS, 2003; Gibbs & Bernat, 1996). Rural business clusters have been identified as a key economic development strategy for rural areas (Rosenfeld, 2001). Examples span the nation, from an aquaculture cluster on the coast of Maine, to a wood products cluster in Oregon (RTS, 2003). One important aspect of rural clusters is that they are largely comprised of small businesses, which has implications for their ability to adopt and successfully use information and communication technologies.

Despite the disadvantages from limited resources, small businesses may still be able to benefit from their broadband use if embedded within a well-functioning cluster (Steinfeld & Scupola, 2006). We propose that the combination of broadband access by rural businesses embedded within a cluster yields greater economic benefit than rural business use of broadband without the support of a cluster. The mechanisms through which clusters convey advantage in the use of

broadband include such factors as enhanced coordination among companies, learning effects, and trade/export benefits through e-commerce that are enhanced by client recognition of the cluster even without explicit prior knowledge of individual businesses. As these advantages become known to rural entrepreneurs they may be expected to cause further deployment of broadband connections and inspire innovative business plans and new business creation. In this perspective, businesses ultimately serve in the role as “change agents” for broadband adoption by the larger community only if they profit from Internet-based business innovations. A variety of factors are related to the success of electronic business (e-business) technologies adopted by small firms (Windrum & de Berranger, 2002) including the size of the organization, its experience with e-business technologies, in house skills, training, financial resources, management resources, and the time available to implement new systems (Steinfeld and Whitten, 1999). Support from CEOs, their age, experience, innovativeness, and effective use of internal and external experts also play a role. Finally, the nature of an enterprise is also important. Service industries and technology-intensive manufacturing terms are inherently more likely than others to benefit from network connections, for example (Windrum & de Berranger, 2002). Relatively new and smaller information service businesses are especially likely to benefit from Internet connections (Traxler & Luger, 2000).

Membership in a business cluster can amplify the relative advantage of broadband connections for rural enterprises. The classical economic explanation for this phenomenon is that clustering endows certain localities with resource advantages, such as a pool of trained IT professionals, and the pressure of nearby competition sparks innovation (Breschi & Malerba, 2001; Pratt, 2000, Porter, 2000). An alternative view is that proximity can stimulate innovation activities where there is an institutional network that facilitates interactions among firms, customers, suppliers and knowledge centers (Maskell, 2001; Morgan, 1997). Proximity also is highly related to the notion of “embeddedness,” whereby social relations among neighboring firms in a common industry encourage norms of reciprocity, as well as informational and economic exchanges for mutual benefit (Granovetter, 1985; Uzzi, 1997). Rural clusters may aggregate around enterprises involved in producing similar products, enhancing the competitiveness of local firms, especially regarding their ability to export goods and services outside the region (Porter, 2004). Similar effects due to proximity may also result from online associations among firms in disparate industries that are located in a specified area but organized through online forums in which information and communication technology applications are discussed (Deakens, Galloway & Mochrie, 2004; Traxler & Luger, 2000). Finally, there is some evidence to suggest that firms in a cluster gain more benefit from their use of the Internet, especially as the cluster itself develops a reputation (Yukawa, 2004; Steinfield & Scupola, 2006). This may not only arise from the social capital benefits arising

from proximity and interaction (Steinfeld, 2004), but also because the cluster's reputation may transfer to the individual members, improving their e-commerce prospects outside the region (Steinfeld & Scupola, 2006).

### 3 BROADBAND EFFECTS ON CLUSTERING?

Electronic linkages among firms may also stimulate the formation of business clusters in rural areas that can improve the performance of firms (Porter, 2004) and boost rural economies. In a global economy, the emphasis in rural economic development must shift from "smokestack chasing" to cultivating rural entrepreneurs and the telecommunications infrastructure is an important element of that strategy (Drabenstott, Novack, & Abraham, 2003). Reliable broadband connections could allow rural residents to hold down jobs with urban enterprises while they reside in rural communities, creating new economic opportunities that can reduce out-migration (Speare, Kobrin & Kinckade, 1982). Such connections can also link rural entrepreneurs to remote sources of expertise, including former business partners and research collaborators (Saxenian and Hsu, 2001). However, there is as yet no reliable evidence that advanced Internet technologies in fact cause economic development (cf. Pigg & Crank, 2005).

### 4 CONCLUSIONS AND IMPLICATIONS

Our brief position paper has argued that the degree to which a business is located within a cluster can affect the success of Internet-based e-business applications. The clustering phenomenon is also of interest from a policy perspective since it could provide a cost effective means of stimulating the adoption of broadband Internet connections by small firms without offering financial incentives such as tax credits or government subsidized services. Communities benefit as well as firms from clustering, as both employment and wages rise among the clustered firms (Gibbs & Bernat, 1997).

Social outcomes and economic ones are intertwined (Laudeman, 2005). Rural quality of life issues (Kellogg Foundation, 2001) lead to the exodus of young rural residents, with more educated young adults showing a particularly high propensity to leave (Mills & Hazarika, 2001). Expanded educational and entertainment opportunities might stem the out-migration of young rural residents and attract new residents and enterprises from urban areas. Quality of life issues also have an impact on relocating firms to rural areas and retaining existing ones (Johnson & Rasker, 1995). Broadband users are more likely than dial up users to use the Internet for entertainment and to bank, buy products, obtain the news, search for health information, interact with government agencies, and search for a job online than dial up users (NTIA, 2004). So, broadband access might improve social and

economic conditions beyond levels achievable with basic Internet access. Broadband networks could attract entrepreneurs from urban areas and stimulate return migration (Malecki, 2003).

## 5 REFERENCES

- Anderson, J.R. (1983) *The architecture of cognition*. Cambridge MA : Harvard University Press.
- Bannon, L.J. & Kuutti, K. (1996) Shifting perspectives on organizational memory : from storage to active remembering. *IEEE HICSS'96*, Hawai, January, 1996.
- Bartlett, F.C. (1932) *Remembering*. Cambridge : Cambridge University Press.
- Chi, M.T.H., de Leeuw, N., Chiu, M.-H. & LaVancher, C. (1994) Eliciting self-explanations improves knowledge. *Cognitive Science*, 18, 439-477.
- Falzon, P., Sauvagnac, C. & Chatigny, C. (1996) Collective knowledge elaboration. In *Group COOP (Ed) COOP'96, Second international conference on the design of cooperative systems*. INRIA Press, Rocquencourt.
- Suchman, L. (1998). Distributed agency : Is there any other kind ? In F. Darses & P. Zaraté (Eds), *COOP'98, Third international Conference on the design of cooperatives systems*, INRIA Press, Rocquencourt.
- Bell, P., Reddy, P., & Rainie L. (2004). *Rural areas and the Internet*. Washington, DC: Pew Internet & American Life Project. Retrieved May 30, 2005, from [http://www.pewinternet.org/pdfs/PIP\\_Rural\\_Report.pdf](http://www.pewinternet.org/pdfs/PIP_Rural_Report.pdf).
- Breschi, S. and F. Malerba (2001). The geography of innovation and economic clustering: Some introductory notes. *Industrial and Corporate Change*, 10(4), 817-834.
- Deakens, D., Galloway, L., & Mochrie, R. (2004). *The Use and Effect of ICT on Scotland's Rural Business Community*. Stirling, Scotland: University of Stirling. Downloaded from the *W e b o n D e c e m b e r 1 , 2 0 0 4* , Available: <http://www.scotecon.net/publications/Deakins%20Full%20Report.pdf>.
- Drabenstott, M., Novack, N., & Abraham, B. (2003). Main streets of tomorrow: Growing and financing rural entrepreneurs-a conference summary. *Economic Review – Federal Reserve Bank of Kansas City*, 88(3), 73.
- Gibbs, R. & Bernat, A. (1996). Rural industry clusters raise local earnings. *Rural Development Perspectives*, 12 (3).
- Granovetter, M. (1985). Economic action and social structure: The problem of embeddedness. *American Journal of Sociology*, 91(3), 481-510.
- Hollifield, C. A., & Donnermeyer, J. F. (2003). Creating demand: influencing information technology diffusion in rural communities. *Government Information Quarterly*, 20(2), 135-150.
- Johnson, J. D., & Rasker, R. (1995). The role of economic and quality of life values in rural business location. *Journal of Rural Studies*, 11(4), 405-416
- Kellogg Foundation (2001). *Perceptions of rural America*. Battle Creek, MI: Author.
- LaRose, R., Carpenter, S., Stover, S., Struabhaar, J. & Gregg, J. (2005). *Internet Generations in Place: Exploring the Rural Broadband Gap*. Paper presented to the Association for Internet Researchers, Chicago, October 8.

- LaRose, R., Carpenter, S., Strover, S., Struabhaar, J. & Gregg, J. (2006). Understanding the rural broadband gap. Poster presented to the USDA project director's meeting. Washington, D.C., February 12.
- Laudeman, G. (2005). Information technology and community-level socio-economic development. *Journal of the Community Development Society*, 36 (1), 41.
- Malecki, E.J. (2003). Digital development in rural areas: Potentials and pitfalls. *Journal of Rural Studies*, 19 (2), 201-214.
- Maskell, P. (2001). Towards a knowledge-based theory of the geographical cluster. *Industrial and Corporate Change*, 10 (4), 921-944.
- Mills, B. F. & Hazarika, G. (2001). The Migration of Young Adults from Non-Metropolitan Counties. *American Journal of Agricultural Economics*, 83(2), 329-340.
- Mills, B. F., & Whitacre, B. E. (2003). Understanding the non-metropolitan-metropolitan digital divide. *Growth and Change*, 34 (2), 219-243.
- Morgan, K., 1997, The learning region, institutions, innovations and regional renewal, *Regional Studies*, 31, 491-503.
- NTIA (National Telecommunications and Information Administration) (2004). A Nation Online: Entering the Broadband Age. Downloaded from the Web November 25, 2004: <http://www.ntia.doc.gov/ntiahome/dn/html/toc.htm>
- Pigg, K. and Crank, L. (2005). Do information and communication technologies promote rural economic development? *Journal of the Community Development Society*, 36 (1), 65- 76.
- Pittman, D. (2002) Broadband pilot program: RUS celebrates second anniversary. *Rural Telecommunications*, 21 (5), 32-35.
- Porter, M. (1990). *The Competitive Advantage of Nations*. New York: Free Press. Porter, M. E. (2000). Location, competition, and economic development: Local clusters in a global economy. *Economic Development Quarterly*, 14 (1), 15-34.
- Porter, M.E. (2004). Competitiveness in rural U.S. regions: Learning and research agenda. Cambridge, MA: Institute for Strategy and Competitiveness, Harvard University. Downloaded from the Web November 25, 2004: [http://www.eda.gov/ImageCache/EDAPublic/documents/pdfdocs/eda\\_5frural\\_5fregions\\_5ffinal\\_2epdf/v1/eda\\_5frural\\_5fregions\\_5ffinal.pdf](http://www.eda.gov/ImageCache/EDAPublic/documents/pdfdocs/eda_5frural_5fregions_5ffinal_2epdf/v1/eda_5frural_5fregions_5ffinal.pdf)
- Pratt, A.C. (2000). New media, the new economy and new spaces. *Geoforum*, 31, 425-436.
- Prieger, J. E. (2003). The supply side of the digital divide: Is there equal availability in the broadband Internet access market? *Economic Inquiry*, 41(2), 346-363.
- Rosenfeld, S. A. (2001, Sept). Networks and Clusters: the Yin and Yang of Rural Development. Exploring Policy Options for a New Rural America Kansas City, MO: Federal Reserve Bank of Kansas City: Center for the Study of Rural America.
- RTS (Regional Technology Strategies) (2003). Snapshots of rural innovation: A compendium of rural industry cluster vignettes. Minneapolis, MN: Author. Downloaded from the Web January 22, 2005: [http://www.rtsinc.org/rc/rc\\_home.html](http://www.rtsinc.org/rc/rc_home.html).
- Saxenian, A., & Hsu, J. Y. (2001). The Silicon Valley-Hsinchu connection: Technical communities and industrial upgrading. *Industrial and Corporate Change*, 10 (4), 893-920.
- Speare, A. Jr., Kobrin, F., & Kingkade, W. (1982). The influence of socioeconomic bonds and satisfaction on interstate migration. *Social Forces*, 61 (2), 551-574.

- Steinfeld, C. (2004). Explaining the underutilization of in business to business e-commerce in geographically defined business clusters: The role of social capital. V. Wulf. *Social Capital and IT*. Cambridge, MA: MIT Press, 209-229.
- Steinfeld, C. and Scupola, A. (2006). Explaining ICT infrastructure and e-commerce uses and benefits in industrial clusters: Evidence from a biotech cluster. *Proceedings of the 39<sup>th</sup> Hawai'i International Conference On System Sciences (CD-ROM)*, January 4-7, 2006, Computer Society Press, 2006, 10 pages.
- Steinfeld, C. and P. Whitten (1999). Community level socio-economic impacts of electronic commerce. *Journal of Computer Mediated Communication*, 5 (2).
- Strover, S. (2003). The prospects for broadband deployment in rural America. *Government Information Quarterly*, 20 (2), 95-106.
- Traxler, T., & Luger, M.I. (2000). Businesses and the internet: implications for firm location and clustering. *Journal of Comparative Policy Analysis*. 2 (3), 279-300.
- Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*. 42(March), 35-67.
- Windrum, P., & de Berranger, P. (2002). The adoption of e-business technology by SMEs. Maastricht, Netherlands: Maastricht Economic Research Institute on Innovation and Technology. Downloaded from the Web November 30, 2000: <http://www.merit.unimaas.nl/publications/rmpdf/2002/rm2002-023.pdf>
- Yukawa, K. (2004). *Internet Companies in Japan after the Collapse of the Internet Bubble – An Analysis of Internet Companies and their Cluster*. Tokyo: Fujitsu Research Institute Economic Research Center: 47.