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# **Impact of New Information Technologies on Rural Development**

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There is considerable discussion in the government, press, business, and academics on the information superhighway and its impact on our life. As we move to a "information society" it is but rare that any of us are not affected by computer and communications technologies. Telecommunications technology, or "information superhighway", is being touted as the technology that can break through the distance and lack of infrastructure barriers and pull isolated rural areas into the mainstream of American social and economic activity. A question that is often raised by many in rural communities is "Does new telecommunication and information technologies encourage economic growth in rural areas, or does it hasten decline?". Rural communities are worried if these new technologies will create selective economic development as it happened with the interstate roadways infrastructure. Telecommunications technologies have the potential to encourage economic development in rural communities by removing some of the geographic location barriers through better communications technologies. On the other hand they also have the potential to further isolate the rural areas if adequate telecommunications infrastructure does not exist. Hence, a coordinated long term strategy involving various agencies including federal, state and local governments, regulatory agencies, telecommunications providers, local communities, and local businesses, needs to be developed to ensure that rural communities are not left out in the information age.

Iowa is well positioned in telecommunications infrastructure with the state owned Iowa Communications Network (ICN), a fiber optic backbone connecting all counties. It is currently being used by the school system and universities to offer classes and hospitals for rural telemedicine. Iowa State University, has an extension network that connects all extension offices in the state and is well positioned to provide online extension services. Hence, Iowa has a very good telecommunications infrastructure for pioneering major changes in rural communities. States such as Iowa, Nebraska, and North Carolina have invested significant amounts of money in developing the infrastructure with the hope that it will improve the rural areas and attract businesses. It is necessary to evaluate if these infrastructures attract new businesses to rural areas and thereby foster rural economic development.

Although much has been written in popular press on the topic, there has been very little systematic, rigorous research to determine what factors and policies are useful to support the successful adoption and diffusion of these technologies within communities. A few studies have used the case study approach to examine the issues (Parker and Hudson, 1992, 1989; Wilson, 1992). This study will examine how rural communities benefit from

easier access to information, what impact it has on businesses in terms of attracting new businesses and retaining existing ones, and what kind of telecommunications infrastructure is required in the future. It will also examine the telecommunications facilities in schools, libraries, local telephone companies, and what be required in the future.

This is an interdisciplinary project comprising of researchers from business, sociology, technology and social change, and education. As a representative from the business school my focus on the project will be to examine the business implications of the technology. In the information age access to some of the latest information technologies (IT) becomes a critical necessity for most businesses. Some of the benefits from these technologies are:

- a) decentralization of the operations by attracting business to cheaper rural communities
- b) cost and energy savings from reduced travel enabled through better communications technologies such as teleconferencing, email, etc.
- c) improved response time to customers/ suppliers through direct access to order, production, shipping information regardless of geographic location and time zones
- d) reduced inventory in the entire manufacturing and delivery cycle through justintime production enabled through better communication of inventory information
- e) improved decision making at various levels in the organization through better access to current information on markets, production, supplies etc.
- f) ability to relocate service businesses such as travel reservations, telemarketing, telecommuting, etc. to low cost rural communities through improved communications technologies.

Telecommunications technology reduces location barriers and provides equal opportunity for both rural and urban areas. However, the level of infrastructure widely varies between the two areas. For example, the state of Iowa has 200 small local telephone providers, apart from USWest, servicing the rural communities. Many telephone companies are reluctant to make major investments in high capacity fiber optic lines in rural communities for lack of demand, while not realizing that traffic may be lost or not generated because of absence of fiber optic lines. Research studies have found that telecommunications provides significant benefits to businesses, much in excess of the cost incurred in the investment (ITU, 1988). However, telecommunications providers do not take into account the indirect benefits when making decisions on infrastructure. Decisions on infrastructure based on initial estimates of revenue generation invariably

result in unfavorable decisions for rural communities. This could lead to further isolation of rural communities.

The specific objectives of this study are:

- a) to examine the level of adoption/ diffusion of new IT in local business organizations
- b) to identify the factors that influence the adoption/ diffusion of new IT in organizations
- c) to identify information technologies that have the maximum potential for rural business
- d) to examine the interactions between business organizations and community agencies
- e) to evaluate the impact of business firm on the community and the community on the business firm in terms of adoption and diffusion of IT
- f) to identify strategies of business leaders and community agencies that lead to successful use of new IT.

This study will examine the adoption and diffusion of new Information Technology (IT) at two levels, business organization and the community. At the organizational level the study will examine the factors that influence the adoption and diffusion of IT in organizations. At the community level it will examine the various interlinkages between the business organizations and the community, the impact of business organizations on community in facilitating the community's adoption of new IT, and the community's impact on the organization's adoption of new IT. This two pronged study, along with other studies on the community in terms of agencies involved in IT, the communication networks among the agencies, the presence of gatekeepers, the vertical and horizontal linkages in the community, and the existence of other technical and economic facilitators and inhibitors within a community should provide a comprehensive picture of a community and help in rich comparisons between communities.

### **Organization Level study**

The innovation-diffusion and IT implementation literature provides the research base for identifying factors that facilitate the adoption of IT (Tornatzky and Klein, 1982). The primary driving force for most innovation adoption is the awareness and the need for the innovation (demandpull) to overcome existing performance gaps/deficiencies or exploit new opportunities. It is important for the innovation to be compatible with the firm's beliefs/ value systems and its work practices, be not too complex for the users, and be justifiable in terms of benefits and costs. Studies on IT implementation have found top management and user involvement in the implementation decision very critical for

successful implementation. Also, existence of a product champion within the organization to create an awareness for IT and oversee the adoption of IT, and adequate IS expertise and resources to manage the technology and deliver the products/ services has been found to very important. In technologies that require interorganizational cooperation, such as electronic data interchange (EDI), competitive pressures from external trading partners have been found to have a significant influence on the adoption of IT. These highlighted organizational factors are expected to influence the adoption and use of these technologies.

### **Community Level Study**

In small communities active interactions exist between community agencies and business organizations. New technologies may be introduced in communities through active intervention/facilitation by the business firms in the community or by the community agencies. Business organizations based on their expertise with IT can take the lead in diffusing these technologies to the community. Senior management can be change agents and provide leadership role in various community agencies that are involved in economic development and IT implementation. The availability of technical expertise in firms with advanced IT will benefit the local community in education and creating pilot projects.

A small firm may not have adequate volume for economical telecommunications services. Businesses could pool their information communication needs to create the "critical mass" (or demand) to lure technology providers to offer advanced services in small communities. Business organizations because of their better links to the external world are in a better position to acquire relevant information for making sound decisions on new technologies. These information could come from their vertical linkages to corporate offices that may have done detailed technology analysis, or from providers of these information technologies, or from their trade associations.

In some communities, rather than business organizations, it could be the community agencies that take a leadership role in introducing new IT and facilitating its adoption among business units within the community. This is particularly true for firms that do not have the necessary expertise to use these new IT. The agencies could provide training, subsidies and other incentives for using IT. A centralized office could deal with external agencies on various aspects of IT adoption (providers, state regulatory agencies, consultants etc.). The agencies could provide education program for entrepreneurs, information support services that provide technical assistance to local businesses, create telecottages, encourage privatepublic partnerships for facilitating IT diffusion. The direction of flow of information and support in this case is in the opposite direction.

We could expect interactions in both directions in a community some firms providing leadership role and actively facilitating the adoption of new IT and others using the support from community agencies to introduce IT. A detailed analysis of the interactions would help in identifying the factors that make a firm take a proactive role in the community and strategies for successful diffusion of the technology within the community.

## **Research Methodology**

The data for the study is being collected through semistructured interviews of key persons followed by a detailed survey. Four communities in Iowa were selected based on population, availability of technologies, and level of community development. There were four major sources for access to communications technologies in these communities - the state-wide fiber optic communications network primarily in schools for tele-education, internet access at libraries, extension network providing access to internet in the extension offices, and the telephone companies link to the on-line and internet services. We chose communities that had at least two of these four technologies. Two communities had populations around 2000 and the other two communities had population around 7000. They were not very close to any urban communities that could possibly impact the results of the study. In each community researchers from each of the subdisciplines visited the relevant organizations and collected the data. For example, the researchers in business collected data from business organizations, the education researchers from schools and community colleges, and the sociologists from the community development agencies. All the researchers collected some common information that will be used to perform "network analysis". This analysis will model the communications patterns within the community and help to understand the interaction among the various players in the community and their role in diffusing the technologies.

## **Status of Project**

The research variables were identified and the survey instrument for semistructured interviews and fieldsurvey were developed in March. The data collection is under progress in the four communities. The results of the data analysis will be presented at the AIS conference.

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Detailed references provided upon request.