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Can Telecommunications Help Rural Areas Overcome Obstacles to Development?

Telecommunications can help to reduce rural isolation, improve access to services, and increase business efficiency. However, metro and international competition may limit the benefits of telecommunications for rural areas and possibly widen the development gap. Still, telecommunications are essential for full nonmetro participation in the national and international economies and are an essential part of an overall rural development strategy.

The potential for telecommunications to spur rural development depends less on the specific facilities and equipment (infrastructure) than on the services—the transfer of information—they provide. Enhanced telecommunications allow more information to be transferred faster, in more forms, and at a higher quality than plain old telephone service. Through enhanced access to information, rural communities may be able to overcome some of the obstacles to development and improve their economic and social well-being by increasing the range and level of their economic activity, improving the quality of education and health care, and providing new opportunities for residents (see box, "Effects of Enhanced Telecommunications...").

Telecommunications Can Reduce Distance and Rural Isolation

Many of the obstacles to rural development (low population density and

long distances between settlements) are rooted in the characteristics that define rural areas. The physical distance and, often, social isolation that separate rural areas from urban hinder their full participation in national and global affairs, economic or otherwise. The small size of rural communities also contributes to their isolation.

The interstate highway system, almost universal telephone service, and television have improved links between rural and urban America. These links might be strengthened by processing voice, data, and video information and reducing the time (and cost) required for its transfer to distant locations. Enhanced telecommunications can, in essence, reduce the distance between rural and urban areas.

But the processing and transfer of voice, data, and video transmissions does not remove all distance-related limitations in rural areas. Rural areas are more likely to house production than management or research-and-development activities, increasing the importance of access to input and output markets for tangible goods. Therefore, distance, highway conditions, and limited access to air, rail, and bus service still contribute to rural isolation. The transportation of freight and people, while perhaps made more efficient by telecommunications in passenger reservations, vehicle routing, and inventory control, still requires physical travel.

Cultural isolation is another factor not readily overcome with telecommunications. While some rural areas may be rich in scenic and recreational amenities, most lack the range of cultural and entertainment opportunities available in large urban places. Some types of amenities (library holdings, for example) can be accessed via tele-

communications, but others (like musical performances) will be limited to electronic transmission.

To date, evidence of reduced rural isolation via enhanced telecommunications is inconclusive at best. While it is true that rural telemarketing firms in Nebraska and rural mail-order stores in Maine have succeeded, a major shift of information-intensive activities to rural areas does not appear to be under way.

Enhanced Telecommunications May Create More Job Opportunities in Rural Areas

Unlike the 1970's, when branch manufacturing plants moved to rural areas to take advantage of low-cost labor for their assembly-line operations, the labor force is no longer a strong selling point for rural areas. Continuing innovation in production technology has allowed manufacturing plants to substitute capital equipment for labor, while advances in communications technology have enabled firms to locate certain functions in developing countries where they can take advantage of even lower cost labor. The manufacturing jobs remaining in rural areas are mostly in what researchers call "routine" occupations (for example, mass-produced goods that require minimal intellectual input from the worker), while urban areas are gaining employment in more "complex" manufacturing (for example, custom or semi-custom goods that require workers to adjust processes and make changes in the assembly line). As the names suggest, complex manufacturing activities pay higher wages and are carried out by employees with higher education and more technical skills than those employed in routine manufacturing activities.

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Many kinds of employment opportunities in rural America are declining, and the jobs that remain often require less skill and pay less than urban jobs. Can enhanced telecommunications offset this trend? Telecommunications render many services-producing firms "footloose," or able to locate almost anywhere, so they, like manufacturers in the 1970's, may be drawn to rural areas because of the low-cost, reliable labor supply. Anecdotal evidence (see following article by Leistritz) indicates that rural areas can compete in several services-producing industries, most notably telemarketing, travel arrangements, and back-office functions for insurance and other industries.

Enhanced telecommunications can also increase business efficiency by reducing the time required for many functions, such as inventory ordering, customer order processing, and customer billing. Rural areas may be able

to provide such services to U.S. manufacturers whereas an overseas location cannot. In particular, just-in-time production systems require more careful inventory management, which rural service firms, armed with enhanced telecommunications, may be in good shape to provide.

Enhanced telecommunications may open new markets for rural firms, but may also subject rural firms to competition from urban firms. Just as, for example, a rural accountant could serve urban clients via telecommunications, an urban accountant could serve rural clients. Telecommunications is a two-edged sword. On the positive side, computerized trading in stock, bond, and commodity markets has made it possible for brokerage services to locate in rural areas. The absolute increase in employment in rural brokerage services is not high, but rural residents can have greater access

to investment services. On the negative side, enhanced telecommunications has allowed banks to serve rural markets through branch banks and automated teller machines, thus reducing ties between the institution and the community and possibly reducing some kinds of credit availability.

These same phenomena can be seen in wholesale and retail trade as well as in other services-producing industries in rural areas. While enhanced telecommunications has the potential to increase job opportunities in rural areas, it also allows urban firms to compete more effectively in rural markets, taking jobs away from rural residents. Rural jobs lost through the adoption of new production equipment (such as robotics and computers) and communications technology are not likely to be replaced by firms relocating to rural areas to take advantage of enhanced telecommunications.

Effects of Enhanced Telecommunications on Rural Development Obstacles

Rural development obstacle	Benefits from telecommunications	Drawbacks of telecommunications
Geographic isolation	<ul style="list-style-type: none"> • reduces time for information transfer • may reduce need for travel 	<ul style="list-style-type: none"> • does not reduce time for passenger and cargo transfer, which are especially important in rural areas • may increase need for travel
Declining job opportunities	<ul style="list-style-type: none"> • may decentralize service jobs to rural areas • opens urban markets to rural business • increases business efficiency 	<ul style="list-style-type: none"> • may concentrate service jobs in urban areas • jobs that do decentralize tend to be low-wage • opens rural markets to urban business • allows firms to bypass rural areas, locating in developing countries instead • increased efficiency may eliminate jobs
Lack of human capital	<ul style="list-style-type: none"> • provides access to education and training at lower costs 	<ul style="list-style-type: none"> • may not reach those most in need • may widen gap between information-rich and poor • quality of remote learning may be less • must overcome lack of familiarity and hesitancy to adopt
Lack of institutional capacity	<ul style="list-style-type: none"> • provides access to information and advice 	<ul style="list-style-type: none"> • must overcome lack of familiarity and hesitancy to adopt
Lack of services	<ul style="list-style-type: none"> • provides access to education and training • provides access to medical services outside of the area • increases efficiency of service delivery 	<ul style="list-style-type: none"> • must overcome lack of familiarity and hesitancy to adopt
Lack of urban amenities	<ul style="list-style-type: none"> • provides access to electronic media amenities 	<ul style="list-style-type: none"> • does not address lack of nonelectronic amenities

Telecommunications Technologies

The Congressional Office of Technology Assessment divides information-age technology into information technologies, access and transmission technologies, and switching and networking technologies.

Information technologies enable us to store, process, and organize information. Examples include personal computers, modems, fax machines, and telephone-answering machines. These technologies are not part of the public system, through which they are connected, but rather are supplied by the end user. To take advantage of enhanced telecommunications, rural customers must be familiar with and able to afford information technology equipment.

Access and transmission technologies provide the means to send and receive information. Copper wire, coaxial cable,

fiber optic cable, microwave, and satellites are examples of this technology. The telephone system is the largest and most important user of these technologies. The cost of access and transmission facilities tends to be higher in rural areas than in urban because of low-density populations and low-volume traffic. Quality is also often lower in rural areas.

Switching and networking technologies enable us to manage and route information and to interconnect with other users and systems. Among these technologies, digital switching and fast packet-switching are two of the most important. Digital switching is necessary for many of the new networking services and call-management services, while fast packet-switching is needed to switch voice, data, and visual images in an integrated manner and at a much faster rate.

Electronic Link May Expand Rural Educational Opportunities

Improvements in education and training of rural workers are essential if they are to compete with workers in developing countries without accepting wage cuts or reducing their standard of living. Rural workers must have access to quality education and training to function adequately in today's workplace. Yet, youth in rural areas that depend on low-skill industries may see little connection between education and local economic opportunity. And rural taxpayers may have little incentive to invest in education since most of their young educated people migrate to urban areas to work or to continue their education.

Telecommunications programs, such as the Kansas Fiber-Optic Communication and Instructional System and the Big Sky Telegraph in Montana, link rural schools to universities and other resources. Over two-thirds of the States were promoting distance learning links in 1988. Through such links, schools can offer courses for which there otherwise are not sufficient students, qualified teachers, or funds. These courses, taught by university professors, are transmitted live via two-way interactive video to rural schools. (One-way video's results are generally less satisfactory.) This technology can also provide ongoing training for the rural workforce and forums for community education/information. Interactive video may allow for retraining of older workers, many of whom have been displaced from manufacturing and primary-sector jobs.

The downside of such an approach is that many information systems are designed to meet the needs of the upper classes. Therefore, telecommunications can widen the gap between urban and rural people, rich and poor, highly educated and less educated. The rural/urban gap may also widen because of the cost of telecommunications technology (if, for example, only the rich can afford it), complexity of the new technologies (which limits adoption by the unfamiliar), and low demand among the information underclass (the information-rich, because they are familiar with the technology, tend to have higher demand for its services). The Office of Technology Assessment concludes "...the people most likely to be adversely affected [*by changes in telecommunications*] are those whom the new communications technologies could help the most—the poor, the educationally disadvantaged, the *geographically* and technologically *isolated*, and the struggling small and medium-sized business" (emphasis added). Thus, the potential exists for rural residents to be underserved, compared with urban residents.

Telecommunications May Increase Capacity of Rural Institutions and Improve Rural Public Services

The lower capacity of institutions (governmental and nongovernmental) in rural than in urban areas can sometimes act as a barrier to development. Rural communities rely on small and often dwindling tax bases for funding; civic leaders may serve only part time and often as volunteers. Without

strong, local institutional capacity, rural areas are hindered in their efforts to promote and sustain development.

Telecommunications services provide access to education, training, information, expertise, and advice for dealing with governmental and institutional decisionmaking. Personal computers equipped with modems link community leaders in Wisconsin to a central database and information system. However, the use of some enhanced services requires familiarity with the system and skills that may be lacking in many rural areas. Under those circumstances, the potential benefits are reduced.

Enhanced telecommunications in rural areas could even provide access to better medical service. Programs such as medical networks of the Texas Tech University Health Sciences Center provide rural health care professionals with access to patient care information, educational programs, and medical specialists. Medical diagnostic services would also be available through enhanced telecommunications, allowing doctors in rural areas to confer with medical specialists in urban areas when difficult cases arise. Telecommunications can also improve service functions such as emergency vehicle response and routing of maintenance crews through fast, reliable, and constant communication between headquarters and field operations.

Barriers to Demand and Supply Hinder Adoption of Enhanced Telecommunications

The demand for and use of enhanced telecommunications services depends

on the skills, education, and entrepreneurial initiative of the rural citizenry. Shortfalls in any of those areas may retard its diffusion in rural areas. One must distinguish between diffusion of the infrastructure and diffusion of the knowledge necessary to use it. The infrastructure is capable of providing many types of services (such as two-way interactive video teaching), but infrastructure alone is not enough to create demand for these services. Consumers must know about a product before they can demand it (see box, "Effects of Enhanced Telecommunications..."). Local businesspeople and residents must know what enhanced telecommunications can do for their businesses and quality of life.

Another barrier to increased demand for enhanced telecommunications is the price. Although many telecommunications services are available in rural areas, particularly to a user with a personal computer and modem, subscription fees are often very high in remote, low-density rural areas. In addition to the fee for service use, there may be a long-distance telephone charge.

Barriers to the supply of enhanced telecommunications to rural areas are functions of both the market and regu-

latory structure of the telecommunications industry. Perhaps the most obvious and largest barrier to supply is the high cost of providing enhanced telecommunications facilities and services to remote, low-density, low-demand areas. Market forces are unlikely to provide services to such areas without government intervention. The shape of that governmental intervention is in flux as a result of regulatory changes and the breakup of AT&T.

The constant evolution of telecommunications technology is another barrier to the use of telecommunications for development. The time needed to market and regulate telecommunications services is substantially longer than that required to invent new services and, in some cases, for technology to become obsolete.

Conclusions

Telecommunications debuted as a rural development tool with passage of the Communications Act of 1934, designed to provide all Americans with reasonably priced access to a national communications system. This goal has been largely met by a national, private telephone monopoly and Federal assistance at the local, rural level

through the Rural Electrification Administration. However, access to the next generation of communications services is hindered by recent regulatory changes in the telecommunications industry and the cost and price of supplying infrastructure to low-density regions. All levels of government have acted to overcome these hindrances. At the Federal level, the Rural Development Act of 1990 authorizes grants and loans to rural communities for advanced telecommunications services and computer networks to improve medical care, education, and business opportunities. States have begun tying telecommunications policy to economic development efforts. Kentucky, for example, is studying the feasibility of rural telecommuting centers to serve public and private sector clients. Individual towns are also getting into the act, exploring ways to "hook up" to the new technology.

Some obstacles to rural development can be overcome through enhanced telecommunications, but negative effects may also result. The positive effects are limited by obstacles to rural development that remain unaffected by telecommunications (for example, transportation system deficiencies).

Foreign Approaches

Other countries are also pursuing economic development through telecommunications: Japan's Teletopia, Scandinavia's Telecottage program, Australia's Rural and Remote Area Program, France's MINITEL. The concept behind the program in Scandinavia is perhaps most transferable to rural areas in the United States. Scandinavian telecottages are set up in a central municipal building such as a town hall or secondary school, equipped with modem communications and computer technology, and administered by a "caretaker" or computer expert who teaches courses and offers advice to local businesses. Qvortrup (1989) cites two main reasons to establish a telecottage in a specific rural community:

"A telecottage should provide existing businesses (farmers, small local firms) and citizens with better and/or cheaper access to information and communication services. It should attract new jobs and new businesses by providing distance-working facilities and by offering advanced information and communication services for new firms."

(Distance-working facilities are remote computer facilities that allow local residents to perform data entry or other computer-oriented work for an employer who is located some distance from the remote site. These local residents are employees who "telecommute," or come to work by

computer and telecommunications lines rather than in person.)

The telecottages receive initial support from a variety of sources, both within and outside of the national government. Many are set up as stock companies with the rural residents as shareholders, while others are set up as foundations or co-op associations. All are intended to be self-supporting after the initial capital expenditure, and many are expected to earn a profit for shareholders.

In the United States, a central telecommunications hookup could be provided in rural communities financed through private grants and donations, sale of shares of stock to local and nonlocal residents, State funding, Federal funding, or some combination of the above. A resident telecommunications expert could be hired, both to offer courses on personal computing and telecommunications use and to provide information on potential business uses. The benefits of this type of investment may go well beyond the local community. Like the village pay phone of old, enhanced telecommunications equipment and services supplied at a central location and available for all to use (on a fee or free basis) are likely to create demand for personal or business services. If sufficient demand is generated, the market would then take over and supply the enhanced telecommunications infrastructure and services.

What Type of Policy Would Best Promote Rural Development Through Enhanced Telecommunications?

Competitive Market Approach. A competitive market approach would rely on market forces and private suppliers to provide telecommunications services. Under this option, there is pressure for each market to "pay its own way." Such a policy would meet the requirement that development be locally driven, since local demand would have to be sufficient to warrant provision. However, until rural communities are exposed to enhanced services and become familiar with their uses, costs, and benefits, there is likely to be insufficient demand. Thus, the market will allocate investment to high-volume, high-profit, urban areas. Rural areas would not receive comparable services and would fall further behind.

Federal Responsibility. Responsibility for enhanced telecommunications diffusion would be in the hands of the Federal Government. While this approach would likely ensure that rural areas are served in a reasonable period of time, it too has problems. First, such a policy would be prohibitively expensive. In addition, it is not clear that every rural area will benefit from the adoption of enhanced telecommunications. Some critics of this approach suggest that many customers (rural or urban) want nothing more than their existing level of telephone service and should not be required to pay (through taxes or other mechanisms) for enhanced telecommunications services they do not want. Furthermore, providing enhanced telecommunications on a broad scale to rural areas before they are ready for them (have the knowledge to use them) as expressed by their demand, could open rural areas to increased competition from urban firms that are prepared to use the enhanced services.

Combined Approach. This option would blend competitive market forces with Federal, State, and local government support. This combination seems to address the two major problems with diffusion of enhanced telecommunications to rural areas—infrastructure cost and demand for services (which includes the ability and desire to use the services). This hybrid approach would provide enhanced telecommunications in pilot communities to familiarize rural residents with the services so that they may determine the usefulness of the new technology in their homes and businesses.

Barriers to the demand and supply of telecommunications for rural development further limit the positive effects. Still, without enhanced telecommunications, rural areas will be unable to participate fully in the national and international economy (see box, "Foreign Approaches") and will fall further behind. Therefore, we conclude that, as with other types of infrastructure (as well as other types of rural development programs), enhanced telecommunications, while necessary, are insufficient to singlehandedly promote rural development.

The real question then is not "Can telecommunications promote rural development?" Rather it is "Given these pluses and minuses, how should telecommunications be incorporated into a rural development strategy?" It is a question of coupling telecommunications investment with other components of a rural development strategy: attempting to improve education and human capital by providing distance-learning facilities; acquiring transmission quality suitable for sending and receiving data to help business development efforts; and linking rural health

providers with larger facilities to improve local health care.

There is room in this "incorporation" effort for all levels of government as well as for the private sector. However, if rural development is to result, much of the effort will have to be by the rural communities themselves. Development, through the use of telecommunications or any other means, cannot be mandated from above. The diversity of rural America, the need for rural areas to be self-reliant and able to adapt, and the fact that successful strategies for development require local participation preclude a one-size-fits-all policy (see box, "What Type of Policy..."). Development must be locally driven, and policies to promote rural development through enhanced telecommunications must reflect locally determined goals.

For Additional Reading...

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