

# **Why Telecommunications Technology is Not Just An Option To Think About For Rural Economic Development**

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The overriding theme in rural areas since the 1950s has been the changes in the employment base of rural America from agriculture and natural resources to manufacturing, and more recently to services. These well-documented changes seem to strike relentlessly at the economic bases of rural areas. After a brief respite in the 1970s, secular decline returned in the 1980s, and prospects do not seem to have improved for the 1990s (Reid and Long 1988; Falk and Lyson 1991; Henry 1993). The continuing concern—in the rural communities, by government and development organizations at all levels, and in academic studies—is about the ability of rural areas to successfully adjust to these changes in economic structure; to enhance and maintain an employment base and a viable and dynamic economy. A specific focus is what underlies rural economic growth, and how can barriers to growth be removed.

Addressing the issues of adaptation to change and barriers to growth requires assessing the factors necessary to maintain, attract, and generate economic activity in rural areas in the new economic environment. An issue that is receiving increasing attention is telecommunications. Contemporary telecommunications and information technology has become a necessary part of the infrastructure for a modern and dynamic economy.

The purpose of this paper is to examine the role of telecommunications in rural economic development. This will be done by discussing the changing conditions that affect the rural economy, and what these changes imply for the role of telecommunications. The main topics to be addressed are (1) the changing nature of the economy, (2) the changing economic structure in rural areas, (3) changes in what business does and how it is done, (4) the opening of local markets to wider competition, and (5) the potential sources of rural economic growth. The discussion also will include examples of the role of telecommunications and information technology in the rural economy.

## **The Changing Rural Economy**

The structural shifts of national economies has been a topic of investigation for decades. In the course of economic development, a sequential shift of

employment occurs from agriculture and other extractive industries to manufacturing, and finally to services (Singlemann 1978). According to Fisher (1935), such shifts of employment are the inescapable reflection of economic progress. Clark (1940) found a firmly established generalization within countries that a high average level of real income per head was always associated with a high proportion of the working population engaged in tertiary, or service, industries.

Kuznets (1966) and Singlemann (1978) extended this research to the post-World War II industrial economies. Kuznets found modern economic growth was characterized by rapid shifts in the industrial structure of production, and consequently by rapid shifts in shares of labor attached to various sectors (p. 493). He concluded these shifts are necessary to attain high rates of economic growth. Singlemann concurred, concluding that in advanced industrial countries after World War II, the level of per capita income is primarily associated with an increase in the proportion employed in social and producer services. Thus, the implication is that a “successful” modern economy is positively related to shifts away from the previous structure, particularly the extractive industries, and also later away from manufacturing.

The changes in economic structure documented at the national and international levels have been equally as great in rural areas of the United States. Historically, the “rural problem” has stemmed from the long run decline in agriculture and other natural resource-based industries, on which rural economies initially were based. The declining employment trends in these industries continued into the 1990s (Economic Research Service 1993). However, the nature of the rural economy had changed so much that the principal cause of economic stress in much of nonmetropolitan America in the 1980s was attributed to the poor performance of rural manufacturing (Brown and Deavers 1988; Long 1988; Reid and Long 1988).

After World War II, rural communities relied upon manufacturing to replace declining agricultural and other extractive employment sources. However, trends in manufacturing employment reversed after the late 1970s. Many manufacturing firms relocated to other regions or other countries. Rural manufacturing also was highly vulnerable to labor-saving technological change, which was enhanced by computer technology. The result was that rural workers were once again displaced. During the recession of the 1980s, for example, rural areas, which accounted for about a quarter of all manufacturing employment before the recession, absorbed half of all manufacturing job losses (Reed, 1989). In Pennsylvania, the prototype “rust belt” state, the nonmetro counties lost more than 50,000 manufacturing jobs in the 1980s, and another 12,000 from 1990-1993, versus a loss of about 4,000 jobs in production agriculture (Smith 1991; Smith and Fuller 1993).

Shifts in industrial structure have continued, with service industries now dominating the national and rural economies (Bender et al 1985; Cook and Hady 1993; Smith 1993; Krehling 1994).<sup>1</sup> Discussion of the service sector also must include a distinction between consumer and producer services. Consumer services are dependent on the distribution of population. They serve final demand, people and their needs. Producer services provide the specialized inputs used by other industries in the process of producing a final good or service. Table 1 provides a summary picture of the change in economic structure in the United States from 1955 to 1990, with projections to the year 2000. Even in the mid-1950s, over half the nation's employment was in service-producing industries. By 1990, service-producing industries provided 75 percent of the jobs, and manufacturing had dropped to the third largest single industry sector, behind retail trade and the services sectors. The projections are for these trends to continue.

The broad trends of service sector growth have been similar in nonmetro areas (Table 2). From 1975 to 1989, 89 percent of the net employment growth in nonmetropolitan counties was in service-producing industries. The service sector contribution increased in the 1980s, resulting in two-thirds of non-metropolitan employment being in services. Despite this growth in service employment, nonmetropolitan counties did not keep up with metropolitan areas in service employment growth in the 1980s. The picture for Pennsylvania in 1990 mirrored the nation almost exactly (Smith and Fuller 1993), with further shifts toward services through 1996 (Fuller, Miller and Smith 1997).

Although services have grown considerably in nonmetro as well as metro areas, the types of services attracted to each region are quite different. Generally, the types of services that locate in rural areas have been low-wage, consumer-oriented, and often only part-time. Porterfield (1990) shows that during the 1980s, rural areas gained in lower-paying service sectors. The higher-paying, dynamic producer services tend to agglomerate in urban areas, where an adequate market and specialized labor can be found (Miller and Bluestone, 1988). Thus, it appears that most rural areas and residents are missing out on the growth of high-paying service jobs, and are left with few other opportunities. The issue, however, is not that services are "bad," but how can rural areas take advantage of this shift and not be marginalized from the modern economy.

**Footnote:**

<sup>1</sup>The term services can be a source of confusion. First, it is used to designate specific industry groupings in the standard industrial classification (SIC) manual (SIC categories 70 to 89). Second, it also is used to encompass all service-producing industries (SIC categories 40 and above). I will use the terms services, service-producing, and service sector interchangeably to refer to the entire range of industries.

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Thus, addressing rural employment generation has become even more problematic, and observers seem to be uniformly pessimistic about future sources of jobs for rural people. McGranahan (1988) concludes that the long run employment decline in resource-based industries (farming, forestry, mining) cannot be expected to end soon, and when it does, employment will be at a very low level. Data through the 1980s and into the 1990s bear this out (Economic Research Service 1993; Smith and Fuller 1994). Henry (1993) also does not see these industries as contributing much to the future of rural areas. In addition, the movement of manufacturing from the Rust Belt states is likely to continue (Crandall 1993).

Furthermore, rural areas are not expected to benefit much from the growth sectors of the economy—services, particularly producer services, and high tech manufacturing. There is considerable evidence that the historical concentration of services in and around metropolitan areas continues, and may be increasing (Bender 1987; Glasmeier and Howland 1994; Hirschl and McReynolds 1989; Miller and Bluestone 1988). And with respect to high-tech manufacturing, Glasmeier (1993) maintains skill requirements are limiting industrial movement toward rural areas; the truly dynamic high-tech industries remain fundamentally metropolitan, and rural areas cannot compete.

### **What Determines Location of Economic Activity?**

Historically, the main factors determining where industry located and where maximum profits would be generated, were the firm's market, labor supply, transportation costs, personal reasons of owners and managers, and raw materials (Blair and Premus 1987; Epping 1982; Milward and Newman 1989; Schmenner 1982). Firms will locate where there is an ample supply of factors relevant to their production process. For the types of manufacturing upon which rural areas traditionally have relied, the key location factors were cheap, semi-skilled labor and cheap land. However, with the changes in the economic environment—a service-oriented economy, high-technology manufacturing, a more global economy, just-in-time manufacturing, an information-driven economy—the relative role of many location factors has changed.

Traditional location factors appear to play a lesser role in the location of high-technology firms. Costs of raw materials, energy, and transportation were found not to influence the location of high technology firms (Blair and Premus 1987). Factors such as the availability of technical labor, proximity to a university system, and attributes of a community were important considerations for high-tech firms (Barkley, Smith and Coupal 1991). Markusen et al (1986) also found that good amenities, such as climate and educational options, had positive influences on the growth of high tech industries between 1972 and 1977.



Because of these location preferences, high-tech industries, particularly those heavily dependent on research and development, have generally tended to agglomerate in metro areas where they can benefit from a common resource pool of skilled labor and easy access to information (Markusen et al 1986). The types of high-tech manufacturing establishments that do locate in non-metro areas tend to be routine assembly operations (Barkley 1988; Glasmeier 1993). The most important location factors for high-tech industries in rural communities were found to be amenities, followed closely by telecommunications and transportation (Barkley, Smith and Coupal 1991).

The location of the growing service sector activities is even less determined by historical location factors. Information and knowledge are the key inputs for many services, especially the growing and dynamic producer services. Thus, the location of service activity can best be determined within the context of the demand for and supply of information (Daniels 1985). Daniels' key points are that the availability of information is spatially biased, and this information generally is sought from nearby existing contacts or sources. Assuming that information is a critical input, then the location and growth of services requiring information will be oriented to where it can be obtained completely and efficiently. After examining the evidence, Smith (1993) concluded large scale decentralization of producer services to rural areas is not likely. Metropolitan areas have the key locational advantages, and these advantages will not likely disappear in the near future. More recent research shows that the location pattern of producer services around metropolitan areas is being maintained (Bodenman 1991; Whelchel 1997).

## **Changing Nature of the Modern Economy**

The changing nature of the modern economy—changes in what businesses do and how they do it—underlie much of the concern for the rural economy. It is these changes that have influenced much of the changing structure of the economy; the location of economic activity; the potential for economic growth.

A major feature is captured in the phrase that has become commonplace, but is true. *We now are living in an information economy and an information society.* Communication and information always have been important to the economic development and growth of regions in the United States. The early development of ship canals and railroads provided rural areas with new economic opportunities in agriculture, mining, forestry and manufacturing. In this century, access to highways and air transportation conferred competitive advantages on certain communities and regions. These infrastructure developments were accompanied by telegraph, telephone and enhanced postal and shipping services. Telecommunications now has become a necessary part of

this basic economic infrastructure. For rural areas to compete in the modern economy, modern telecommunications technology is necessary. This is true not only for the range of service businesses, but for the economy as a whole, including manufacturing and agriculture.

The growth of the service sector of the economy is seen as being directly related to information needs and the availability of the technology to provide it. Daniels (1985) and Kutscher (1988) found the main reasons for producer services growth are (1) the structural and organizational changes taking place in the economy, and (2) changes in business practices. One such practice is called "unbundling." This is the practice of manufacturing firms, and increasingly other service firms, purchasing services they previously provided internally. This does not completely explain the large growth of producer services, however, as producer service occupations have continued to increase within manufacturing along with rapid growth in producer services employment itself (Kutscher 1988).

Another change that better explains producer service growth is the combination of increasing demand for specialized services and information, and the ability (new technology) to provide them efficiently (Kutscher 1988; Beyers 1990; Coffey and Bailly 1990). An example is the growing array of government regulations and laws that require specialized attention in such areas as finance, construction, environment, labor relations, safety and transportation. Also, the continuing innovation in types of services and information offered leads to their greater use in the production of both goods and services.

Other changes in manufacturing operation and organization make information and communications technology essential. One of these is the movement toward small-batch, flexible production techniques. This allows large firms to subcontract and save money by not having to maintain the facilities and labor to respond to a variety of demands (also called "out-sourcing"). This also takes advantage of independent subcontracting firms which specialize. Those sub-contractors, in turn, can pool demands for the specialized inputs from several sources. Uncertain and volatile markets also encourage this subcontracting, as it allows purchasing firms to insulate themselves from having to manage production irregularities (Barkley 1993). A related change in manufacturing organization is "just-in-time" production. This process allows business to avoid maintaining large inventories by having contracts with independent firms to supply certain [specialized] products on short notice.

For these processes to be successful, however, rapid and continual communications is necessary. Manufacturing firms receive small orders with demand for quick delivery. Production processes need to be retooled quickly using computer technology, which increasingly can be done from remote locations. Also, detailed engineering specifications and blueprints can be sent electronically. In this environment, a business that cannot send and receive electronic

or FAX information; cannot receive software instructions to retool equipment; or cannot get daily, or more frequent, access to requests for bids will not be able to compete effectively (Parker et al 1989).

The role of information and telecommunications technology is becoming increasingly important to the profitable and efficient operation of even the most traditional of rural industries—agriculture. Historically, farmers left marketing in the hands of others—wholesale buyers of crops and livestock, grain elevator cooperatives, or government purchase programs. They were primarily price takers in this market. Changes in government policies, and the opening up of national and international markets, are forcing individual farmers to be more aware of their markets, and to be more involved in marketing their products. They must know not only local prices, but those around the nation and in competing international markets. Elimination and reduction in U.S. government farm programs are making farm commodities more subject to national and international market prices. Such prices can vary greatly from day to day and from market to market. Selling at the right time and in the right market can mean the difference between a profit and a loss, or a tidy profit and just breaking even. To operate in this market environment, however, requires a computer connected with the Internet.

One example of the role of telecommunications in agriculture is in cattle marketing. The standard practice has been to truck the animals to a local livestock auction when they were of the proper weight. They would then be sold at a price determined by the buyers at the auction. Or, a wholesale buyer might come to the rancher and offer a price. Telecommunications has provided another option. Cattle producers can now participate in electronic auctions at more than one market, and thus make more informed and more profitable decisions about time and place of selling.

Modern telecommunications technology also holds promise for small, nontraditional and specialized farms. As the structure of agriculture changes toward larger and larger operations, many farmers who cannot or do not want to expand are looking to the possibilities of growing a variety of specialty crops for niche markets. This alternative has become particularly attractive for those at the urban fringe, or close to large urban areas. To be successful requires being in tune with rapidly changing demand and supply. In addition, the farmer may have the option of selling in more than one urban market on any given day. Instead of transporting an expensive perishable crop to one market, and finding it oversupplied, the farmer could maintain electronic contact with buyers and sellers in several markets, and make the marketing decision on the basis of more complete information. Specialty farmers also are accessing national and international markets with the use of modern telecommunications and transportation technology (Parker et al 1989).

The growing and diverse service sector is a prime example of the nature of the changing economy and the role telecommunications can play. Service industries are easily seen as information intensive. Information is a critical input to service production, and is the primary output for many services. And the key to many services is they transfer information. With the proper telecommunications infrastructure, rural areas can be locations for information-providing services as easily as urban areas. However, since these businesses can locate wherever they choose, locations in urban areas also can supply rural needs. One growing service industry with potential for rural areas is “back office” functions. These are basic clerical and data entry tasks that large businesses, such as finance or insurance, spin off or contract out in search of cheaper labor. The information increasingly must be sent and received electronically, however. Rural areas without this capability will miss out on these job opportunities.

Two other growing service businesses with importance in rural areas are particularly reliant on telecommunications—telecommuting and tourism. Telecommuting is working at home, either part- or full-time, and accessing and transferring information with a computer. This is becoming more attractive for individuals, particularly women with small children. Businesses with this potential are catalogue ordering functions, and the wide range of businesses that utilize 800-number contacts with customers.

Tourism has become a major focus of rural economic development efforts. Rural tourism used to mean a rustic, get-away-from-it-all experience. Increasingly, rural tourists are attracted by destination resorts and activities, where they expect toll-free reservations, multiple-channel and pay television, FAX machines and computer hook-ups. Telecommunications also are important for the tourism attractions themselves. An 800-number, FAX machine, and computer terminal are vital for reservations (Parker et al 1989). In addition, a web site is becoming an important marketing tool for all types of tourism businesses and rural communities. Without access to the hardware and software, rural areas will be left out.

Bollier (1989) cites several other examples of the key role telecommunications are beginning to play in certain rural businesses. These examples hold far-reaching implications for the future of rural economies. One is from the growing health industry. Maintaining inventories of medical and hospital supplies is a major management challenge. Using telecommunications technology, hospitals in major urban areas are negotiating contracts with medical supply companies to maintain online inventory control. This allows same-day, or more rapid, supply maintenance. Rural areas are feasible locations for these high tech medical supply businesses. However, to remain competitive in this market, similar online capability is necessary. In addition, this is not only an infrastructure and hardware issue, it also entails acquiring the knowledge of, and managing, the telecommunications.

Franchises of chain stores are another business that increasingly rely on telecommunications for ordering and inventory control. As rural business becomes more integrated into regional, national and multinational corporations, the ability to communicate by the Internet or FAX becomes essential. Without these, local businesses will not have access to nonlocal markets, and rural communities will not be able to attract or generate new business.

A growing trend in business is “electronic data interchange,” where routine documents such as purchase orders, invoices, and bills of lading are sent electronically. Many companies are moving entirely to this process, and 85 percent of the dollar volume of drugs ordered from distributors now occurs through this method. This trend works to the disadvantage of smaller businesses, which is the type of business that characterizes rural areas. Without the telecommunications technology, these businesses will be left out of the mainstream of modern business activity, and restricted to limited local markets.

## **Conclusions**

The effects of the changing national and international economic environment raise issues of the capabilities of rural communities to successfully adapt to the changes. Telecommunications and information technology can help break the barriers to rural development—economic, social and political. Access to information and services is essential to a modern market economy. And telecommunications infrastructure is essential to provide the information. If rural areas wish to attract, generate and retain business and industry that will grow and innovate in the modern economy—those that are on the leading edge—they will need a modern telecommunications system. This importance of telecommunications in rural areas can be compared to that of electricity. The rural electrification efforts begun in the 1930s enabled rural areas to participate more fully in the 20th Century economy. Telecommunications will play this role in the 21st Century.

Because of telecommunications and information technology, business and industry can choose a range of locations. Rural business, industry and people can be served from our large cities, or from foreign countries. Without the proper infrastructure, the locations will not be our rural communities. Existing and traditional rural economic activities, including agriculture, also need this infrastructure to compete in the modern economy. This is especially important to small business, which is the backbone of rural economies.

The more open and global economy makes access to information and telecommunications technology more essential to compete. Without this technology, rural areas will be more vulnerable to foreign competition, and will remain out of the mainstream. For example, United States companies are contracting with companies in Ireland for data processing. These are “back office”

functions that could just as easily locate in rural areas of the United States. High tech and computer engineering firms have relationships with similar firms in India. The skill levels are equal, the price is cheaper. Also, the work can be done during the hours when U.S. businesses are closed, and be ready when they open the next day.

A final, noneconomic, issue of importance to the development of rural communities, is the relationship between telecommunications and information technology and a democratic, participatory society. The low population densities and relatively great distances between people and communities in rural areas present barriers to interaction and communication. Wide and inexpensive availability of telecommunications technology could lead to increased participation by rural people in the affairs of society; greater involvement in the political process; more consumer activism; and greater availability and coordination of social services and volunteer activities.

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**Table 1. Employment and Percent Distribution by Major Industry Sector, 1955, 1972, 1990, and Projected<sup>a</sup> to 2000**

Sector	Employment (Thousands)				Percent Distribution			
	1955	1972	1990	2000	1955	1972	1990	2000
Total	60,631	77,037	113,058	122,073	100.0	100.0	100.0	100.0
Goods-producing	26,849	27,191	28,236	27,595	44.3	35.3	25.0	22.6
Agriculture	6,273	3,523	3,276	2,917	10.4	4.6	2.9	2.4
Mining	790	628	710	724	1.3	0.8	0.6	0.6
Construction	2,865	3,889	5,133	5,794	4.7	5.0	4.5	4.8
Manufacturing	16,921	19,151	19,177	18,160	27.9	24.9	16.9	14.9
Durable	9,567	11,050	11,130	10,731	15.8	14.3	9.8	8.8
Nondurable	7,354	8,101	7,988	7,429	12.1	10.5	7.1	6.1
Service-producing	33,782	49,846	84,822	94,478	55.7	64.7	75.0	77.4
Transportation, communications, & utilities	4,135	4,541	5,808	5,719	6.8	5.9	5.1	4.3
Wholesale trade	2,821	4,113	6,200	7,266	4.6	5.3	5.5	6.0
Retail trade	9,124	11,835	19,677	22,702	15.0	15.4	17.4	18.6
Finance, insurance, real estate	2,387	3,907	6,729	7,917	3.9	5.1	5.9	6.5
Services	8,374	12,117	28,103	32,545	13.8	15.7	24.9	26.7
Government	6,941	13,333	18,304	18,329	11.4	17.3	16.2	15.0

<sup>a</sup>Moderate projection, including only wage and salary employment and agriculture.

Sources: 1955 calculated from Table 50 in *The Structure of the U.S. Economy in 1980 and 1985*, U.S. Department of Labor, Bureau of Labor Statistics, Bulletin 1831, U.S. Government Printing Office, 1974. Years 1972 and 2000 are from Ronald E. Kutscher (1987). 1990 is from *Monthly Labor Review*, Vol. 115, No. 8 (August 1992) Table 4, p. 20, and Vol. 10 (October 1992), Table 12, p. 63.

**Table 2. Change in Wage and Salary Employment in Goods-and Service-Producing Industries, Metro and Nonmetro Counties, 1969-1989.**

Industrial Group	Average Annual Change in Employment					Share of Employment		
	Employment 1969 Millions	1969-1976 Millions    %		1975-1989 Millions    %		1969 %	1976 %	1989 %
United States:								
Goods-producing	25.8	-0.9	-0.5	0.3	1.0	32.9	28.8	24.0
Service-producing	52.6	8.7	2.2	2.5	3.7	67.1	71.2	76.0
<b>Total</b>	<b>78.4</b>	<b>7.8</b>	<b>1.4</b>	<b>2.8</b>	<b>2.9</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Metropolitan:								
Goods-producing	20.2	-1.5	-1.1	0.2	1.1	31.8	27.1	21.7
Service-producing	43.4	7.0	2.2	2.2	3.8	68.2	72.9	80.3
<b>Total</b>	<b>63.7</b>	<b>5.5</b>	<b>1.2</b>	<b>2.4</b>	<b>3.1</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
Nonmetropolitan:								
Goods-producing	5.5	0.6	1.4	0.1	0.1	37.4	35.8	33.7
Service-producing	9.2	1.7	2.5	0.3	2.9	62.6	64.2	66.3
<b>Total</b>	<b>14.7</b>	<b>2.3</b>	<b>2.1</b>	<b>0.4</b>	<b>1.9</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: Data for 1969-1976 from Miller and Bluestone (1988). Compiled from county data provided by the Bureau of Economic Analysis, U.S. Department of Commerce. Data for 1975-1989 provided by the Agriculture and Rural Economy Division, Economic Research Service, U.S. Department of Agriculture.



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