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# Rural Barriers to Job Creation Remain, Even in Today's Information Age

*New information technologies hold a promise of integrating rural businesses and communities more closely with the Nation's urban centers of commerce. But while allowing rural businesses to compete better for urban jobs, those technologies also allow urban businesses to compete better for rural jobs. To take advantage of the new opportunities, rural areas will have to modernize their communications networks, educate their workers, and broaden their outlook.*

The information age, with its microcomputers, facsimile machines, fiber optics, digital telephone switches, and related paraphernalia, has been heralded as promising an end to the tyranny of rural space. Distance from centers of population and commerce has long kept rural people and their businesses at the ends of the production and distribution lines. They were the last to get market information and the least able to deliver goods and services with any speed. Information technologies are seen as having the potential to overcome these problems.

That promise may go unfilled, however. The problem of creating rural jobs in today's information-based service economy is as much social and cultural as it is technological and economic. The physical barriers of distance can perhaps be overcome. But without a modernized telecommunications infrastructure, a technologically knowledgeable and sophisticated workforce, and a wider perspective of markets than just nearby

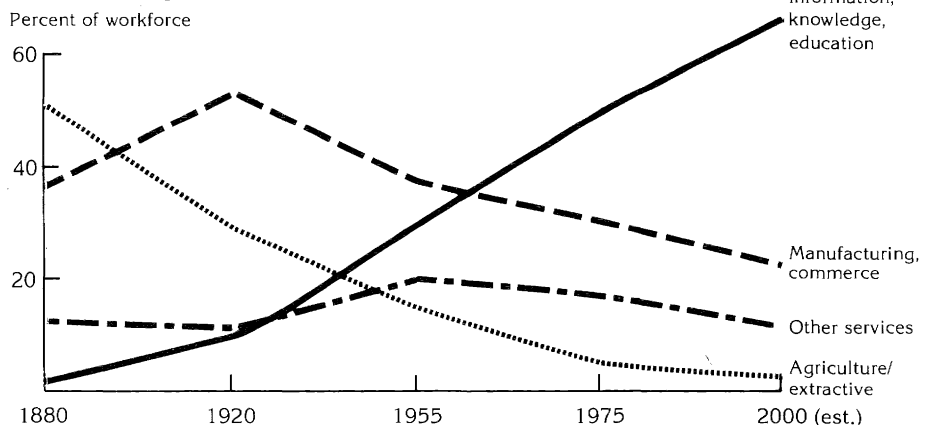
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communities, rural jobs and businesses will find little relief. Furthermore, the new technologies offer the opportunity to draw rural jobs to urban areas as well as draw urban jobs to rural areas.

Rural areas of the country were settled because that's where the natural resources, farmland, forests, and minerals, are. As the economy matured and mechanized, fewer jobs needed to be close to the resources. The proportion of the U.S. labor force employed in agriculture and extraction industries has declined throughout most of this century as a result. For a time, manufacturers in search of lower wage scales helped absorb the excess rural labor force by moving their factories to rural areas. That still happens, but not on the same scale as before. New rural jobs will now be concentrated in one of the service industries, will involve information work, and will have a strong connection outside the community where they are located. Consider:

- Job creation has become unhooked from natural resource industries. Only 2 percent of the population now live on farms, a number that continues to drop.

Figure 1  
**Information jobs to dominate U.S. workforce**



Source: Based on Cleveland (1985), P. 186

- The proportion of the U.S. labor force directly involved in manufacturing has declined from a peak of about 50 percent in 1920 to approximately 20 percent today, and is likely to decline further.

- By the end of this century, two-thirds of U.S. workers are expected to be in knowledge, information, and education jobs, ranging from writing software to answering 800 phone numbers and processing insurance records (fig. 1).

- Many service organizations can export from a city or region and are not restricted (as previously thought) to servicing local businesses.

- More and more U.S. jobs have a foreign connection, for example, receiving component parts for assembly or processing and targeting finished projects for export markets.

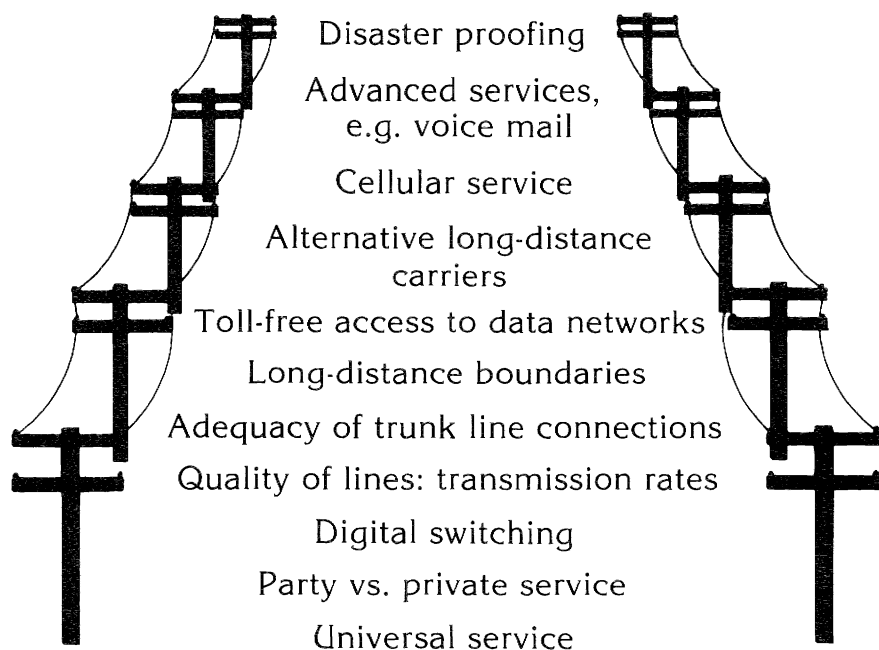
- Jobs are more likely to be created by small, rather than large, organizations. Trends toward downsizing of large organizations through contracting out some production and better access of small organizations to information about contract opportunities are among the reasons.

- Forty percent of equipment expenditures in the United States now go to telecommunications and computer equipment, compared with 20 percent 10 years ago, confirming that access to information and the ability to act on it are key factors affecting worker productivity.

- In 1981, there were 5.9 million computer work stations in the United States. The number had climbed to 33

Figure 2

**Multitude of problems leads to rural telecommunications inadequacy**



million by 1987, and by 1995 will likely rise to 60 million. If so, 9 out of 10 white-collar jobs will involve a computer work station.

**Technological Opportunities**

Dramatic improvements in computers and telecommunications have enhanced our ability to identify, sort, retrieve, create, transmit, and apply information. They have enabled the delivery of precise information when and where it is needed. Information is being substituted for time, labor, and energy in the production of both goods and services. Information technologies have become an integral part of modern production, sales, and distribution methods.

Manufacturers are likely to contract the production of component parts to other companies because of the computerized ability to specify exact characteristics of a desired product, the use of computer-assisted design and manufacturing methods to produce it, and more timely delivery of the product to assembly plants. Computer software, frequently operated from distant locations, facilitates the production of customized products.

Retailers are able to monitor daily sales of products and dramatically shorten the

time between when a decision is made to order a product and when they will have it in stock. Computers and facsimile machines are used to reorder quickly.

Local franchise stores are often connected by computer to a parent company as a means of controlling inventories, locating desired products quickly, ordering new merchandise, coordinating sales campaigns, and providing troubleshooting assistance. Some wholesalers require that orders be submitted by computer rather than by mail or telephone.

Mail order companies (most of which are now telephone order companies) use sophisticated computer systems to route calls and increasingly encourage customers to use touchtone telephones to key in their order information. Customer information from previous orders can be kept in computer banks to shorten the length and cost of long-distance telephone calls.

Combinations of computers, telephones, and two-way radio technologies allow business people of all sorts, from delivery truck drivers to plumbers, to be more accessible to callers. Such networks facilitate reassignments and reroutings that yield greater efficiency.

We are approaching the time in which

businesses not electronically hooked into other businesses may not be competitive. Just as important, a company's telephones and computers must be hooked into the telecommunications system. A company providing goods under contract for other companies will be unable to compete if it is not accessible by error-free transmissions over facsimile machines and perhaps even more advanced services like 24-hour voice mail.

The archetypal business in this new world takes small orders and utilizes software to retool equipment quickly to produce small production runs shipped in small quantities, often overnight, to multiple destinations. In fact, the products being shipped are often services instead of a manufactured product.

If rural Americans are to find jobs and if businesses in rural communities are to be competitive, they too must master these new technologies. Prospects for success are uncertain. Two interconnected issues are inhibitive: an inadequate rural telecommunications infrastructure and a tendency for rural areas to adopt new technologies slower than urban areas.

**Rural Telecommunications Often Inadequate**

Rural America does not have the technical information structure to participate fully in the information age. The telecommunications problem is less a single problem than an accumulation of problems that prevent rural businesses, particularly small ones, from having the same telecommunications opportunities as city-based businesses (fig. 2). The telecommunications needs of businesses vary. Whereas some businesses are affected by a few of these elements, others are affected by many of them.

The United States is close to achieving universal telephone service, with about 96 percent of households having basic residential service. Although prohibitive installation costs preclude some isolated homes from having telephone service, particularly some farms and ranches, we appear well on the way to solving that problem through new technology.

Residents of the rural countryside are significantly more likely to have party lines, which prevent operation of

computer modems, than are residents of towns and cities (table 1). In some counties, as many as half of the farmers have party lines and conversion to private lines often requires much higher rates.

Digital switching, the basic technological requirement for computers to talk to one another (modems, FAX, etc.), is not available in many rural communities, a situation that is changing rapidly but will not be entirely overcome for many years (table 2). Regardless of the presence of digital switching, many rural areas are served by old telephone lines and equipment, which makes for a noisy connection and interferes with data transmission. Poor lines and equipment can mean that transmission for facsimile machines or computer modems takes longer and therefore costs more.

Trunkline connections, the long-distance path out of a community, sometimes are a bottleneck. The design of these connection points may limit the effectiveness of locally available modern equipment and restrict the quantity and quality of long-distance calls below what is actually demanded.

Services, from insurance agencies to car repair, available via routine local calls in metropolitan areas often require long-distance calls from rural communities. A fourth of residents in the rural Washington State countryside must make a long-distance call to reach the community they most depend upon for goods and services (table 3).

People and businesses can access more and more national data networks and services to obtain useful information. Such networks typically provide access through local calls made within major cities. However, rural residents must almost always make a long-distance call to access networks not offering toll-free lines, increasing their cost by several times.

In addition, rural communities are substantially less likely to have access to alternative long-distance carriers, a factor that may result in higher telephone service costs. The cellular telephone, now available in most cities, is not yet available in most rural areas and is unlikely to be available in some locales for many years because of the cost. Other advanced services, like voice mail and video conferencing, are far from becoming a

**Table 1—Rural households in Washington State less likely to have more sophisticated information technologies**

Item	Urban counties		Rural counties	
	City	Country	City	Country
	<i>Percent</i>			
Private line	97	96	93	76
Touchtone	71	64	53	42
Call waiting	21	17	6	4
Telephone answering machine	20	14	10	11
Cordless telephone	12	15	10	13
Personal computer	21	16	13	12
Computer owners with modem	23	40	24	6

1986 data.

Source: Don A. Dillman, Lesli Peterson Scott, and John Allen, *Telecommunications in Washington: A Statewide Survey*. Social and Economic Sciences Research Center, Washington State University, Pullman, 1987.

**Table 2—Digital switching, essential to telecommunications, not available in most rural communities**

Item	U.S.	Northeast	North Central		
			South	West	
	<i>Percent of rural communities</i>				
One-party telephone service available to all households	83	91	82	82	74
Community served by digital switching equipment	44	39	42	48	46

1986 data.

Source: Unpublished data from National Rural Community Facilities Assessment Study, USDA, Economic Research Service, Rural Business and Government Branch, 1986.

reality for most rural Americans. Finally, it remains more difficult to make rural telephone networks disaster-proof by having parallel systems in place.

In sum, being rural in the United States exacts a telecommunications penalty, the result of multiple deficiencies rather than a single issue amenable to a quick fix.

### The Two-Edged Nature of Improved Rural Telecommunications

Creation of rural jobs depends, ultimately, upon giving appropriate attention to all of these problems. However, the most up-to-date technologies, even if they were installed in every rural community, will not guarantee rural development success. Information technologies provide as much potential to pull business out of the community as to bring it in. This seems especially true for service industries.

A case study and survey of all businesses

in three small rural communities in an agricultural region of rural Washington State amplifies these concerns (table 4). A substantial portion of businesses reported having computers, many of which are used for telephone communication. A number of them also reported pressure from suppliers or headquarters to install them. An implements dealer, for example, reported that to keep his franchise, the manufacturer required that he install an \$80,000 dedicated telecommunications system. A drugstore owner reported that wholesalers accepted only orders placed via computer.

The same case study found that information technologies eliminated 11 jobs, but created only 9. The jobs gained were in specialized businesses that served a wide geographic area, such as selling specialized insurance. The loss of jobs occurred in two ways. In some instances, the computer simply replaced workers who had done the work manually, for

example, inventory and ordering clerks in grocery stores. In other instances, jobs were shipped out of the community. A newspaper, for example, sent its stories by computer modem to a typesetter in another city. The typeset stories were then sent back by telephone for printing, thus eliminating local typesetting jobs.

A vivid example of this change in Washington State and its effects on smaller communities comes from the experience of a national pizza chain. Calls for pizza delivery are no longer accepted by this chain's local stores. Instead, all calls are made via 800 numbers to an office in the State's largest city, where they are entered into a computer and sent via long-distance telephone back to the local stores where each order is printed

out for use by those who make the pizzas. Telephone-answering jobs in the stores of many smaller communities throughout the State were eliminated as a result. Similarly, the local branches of some banks now only collect checks. The processing is done at night in centralized locations, thus eliminating jobs from many communities and concentrating them in one or two locations. These examples suggest that the adoption of information technologies in rural communities is not a guarantee of growth. These technologies can as easily be used to ship jobs out of a community as to bring them in.

Information technologies can pose a threat to a rural community's businesses far greater than that posed by regional

shopping malls. They allow local residents to access distant services without leaving the community. Examples include all manner of products, from prescription drugs to clothing, that can be obtained via telephone. Some orders can be taken without even talking to a clerk; the customer simply touches numbers on a touchtone phone. Automatic teller machines can be used to deposit checks and obtain cash. Stocks and bonds may be purchased and insurance obtained directly from national firms. Software operated from distant cities can be used to activate telephones for new subscribers as well as to retool machinery and factories. Cellular telephones can extend the operating range of electricians and other craftsmen working out of distant cities. In sum, local services are less protected by geography and distance than ever before.

**Table 3—Telephone problems more prevalent in rural areas of Washington State**

Item	Urban counties		Rural counties	
	City	Country	City	Country
	<i>Percent of respondents</i>			
Poor quality of connections	13	16	14	18
Getting busy signals on long-distance calls	13	14	19	19
Service is only fair or poor	10	13	15	21
A long-distance call is required to community most depended on for services	6	13	21	26

1986 data.

Source: Don A. Dillman, Lesli Peterson Scott, and John Allen, Telecommunications in Washington: A Statewide Survey, Social and Economic Sciences Research Center, Washington State University, Pullman.

**Table 4—Use of computers by rural businesses, Washington State, 1987**

Item	Unit	Town A	Town B	County seat	Total
Population	Number	500	500	3,000	NA
Businesses with computer technologies	Percent	35	28	70	52
Businesses pressured to adopt computers	Percent	19	28	22	24
Local jobs gained or lost through adoption of computers:					
Gained	Number	5.5	4	0	9.5
Lost		1	1	9	11

NA = Not applicable.

Source: John Allen and Don A. Dillman, "Availability and Use of Information Technologies in Rural America," presented at annual meeting of the Rural Sociological Society, Madison, WI, August 15, 1987.

Rural America has little choice but to get adequately connected to the Nation's telecommunications systems so that its businesses can compete. However, urban centers, which get and use telecommunications first, may use that infrastructure to drain business from rural communities before rural businesses develop the skills to expand their service boundaries.

### Rural Areas Less Likely to Innovate and Adopt New Technology

In the past, rural areas have been slow to accept new ways of doing things. In addition, urban areas are more likely to be the source of innovations. Claude Fisher explains that innovations are born in subcultures of large urban centers, spreading elsewhere in those centers and then to communities beyond. New ways of doing things and new material innovations generally flow from urban to rural areas.

Evidence of the slower adoption of telecommunications technologies in rural areas is provided by data from a survey of Washington State households (table 1). Differences are particularly dramatic for touchtone telephones (essential for certain business uses) and use of computer modems.

There is an additional problem for information technologies. Adoption of new technologies depends first upon installation of the technological

infrastructure, which is likely to be market-driven. It costs less in relation to expected returns to install information technologies in urban than in rural areas. Earlier in the century similar problems led to the establishment of the Rural Electrification Administration as a means of getting electricity to rural households.

A fundamental problem of slower adoption is the difficulty of penetrating the information culture of rural communities. Rural communities tend to place a high priority on modes and types of information more suitable for earlier eras than the present information age.

Associating with the same people or the same families over several generations tends to encourage spending more time on creation and consumption of local knowledge and less on seeking, sorting, and using information about distant places and ideas. Information needed by entrepreneurs, such as how to identify, supply, and monitor niche market opportunities, will come mainly from outside the community rather than over the backyard fence or from lifelong friends. The rural community is by nature homogenous and more limited in its information content than cities. Thus, rural communities are at a disadvantage in developing information age businesses because they fail to develop the elaborate business and social networks needed to compete.

### Recommendations for Rural Development

The Nation needs to invest in rural technical information infrastructures just as it has in rural electricity, railway, and highway systems. Indeed, telecommunications capacity for the two-way flow of information is to our age what the building of interstate highways and long-distance powerlines was a generation ago. A difficulty in achieving this goal is that digital switching, distortion-free fiber optic cable, adequate trunkline capacity, open network architecture (which allows outside vendors to use telephone company lines), and system reliability are no more visible or understood by most users than the underwater movements of submarines are to a shoreline observer. Rural communities need the capability for their local businesses to interact effectively with companies for which subcontracting can be done, software that can provide directions for computerized

### Bringing The Information Age To Rural Iowa

In Iowa, 128 rural telephone companies have joined Iowa Network Services, Inc. (INS), a first-in-the-Nation project designed to give rural Iowans an opportunity to choose between competing long-distance companies. At the core of this project to bring the information age to rural communities is the laying of some 800 miles of fiber

optic cable to provide the same quality of telephone service available to urban areas.

The cable will link small towns in rural Iowa to a \$5.6 million digital switch in downtown Des Moines, creating a "telecommunity" of 158,000 customers. Besides opening up the long distance telephone market in Iowa to competing customers, the cable will also let its small-town customers employ "1 - plus" dialing and provides the technological capability futuristic information services.



Photo by Bob Modersohn © Des Moines Register

equipment, and, most of all, information sources that allow entrepreneurs to respond to new market opportunities.

When a highway bridge fails, the event and consequences are visible. The accident, the letting of a repair contract, ground breaking, and ribbon cutting for the new bridge will be covered by the media. In contrast, the breakdown and construction of telephone and information services is not open to public view. One of the most worrisome issues facing rural development efforts is that the telecommunications infrastructure of rural America may deteriorate while that of urban America is modernized. A decade or so from now, rural America may find that it lacks infrastructure for development. The economic future of rural America could be jeopardized by unconscious neglect.

A major telephone service goal of this century has been to achieve universal service. Multiparty lines and low-quality transmission lines were sometimes

deemed acceptable to achieving that goal. They are acceptable no longer. We have reached a time in which a new standard of universal service needs to be propounded as a national goal. This new standard should provide that all U.S. households have access to private lines, digital switching, and line quality that permits reliable data transmission.

Few themes have been more prevalent in the rural development literature than investment in human capital. This remains critical to rural development, although with a slightly different emphasis. The information sorting, computing, word processing, and learning skills offered by information technologies provide comparative work advantages in all fields. Rural companies, schools, and local governments that do not teach their employees or students such skills are depriving their communities of human capital critical to future productivity.

Steps can be taken to encourage the use of information technologies. This process

can be speeded up by placing computers and other information technologies in rural schools and training teachers to integrate them into the curriculum. Another possibility is to adopt a European method. Lars Qvortrup reports that Sweden, Norway, Finland, and Denmark have set up experimental telecottages in many rural communities. Community buildings have been equipped with microcomputers and other advanced information technologies. They are available for telecommuting to work, for teaching skills to local residents, and for providing advanced information services. This concept could be explored on an experimental basis in the United States.

In addition to technical training, rural residents must gain a global perspective. In the future, rural commerce may depend as much on the experiences rural citizens have outside the community and the skills they develop for cross-cultural interaction with businesses and people in distant places, as with their neighbors.

In theory, traditional back-office jobs can be located wherever telecommunications are adequate. However, transfer of such jobs to rural areas requires new ways of thinking by both businesses and communities. Demonstration projects are needed to explore this concept further.

There are no inherent reasons that jobs like answering 800 numbers and processing medical records and insurance claims with computer-assisted techniques be done only in metropolitan centers. Many companies and people are learning to telecommunicate to work. For example, J.C. Penney has 126 telephone order takers working at home in five cities. According to the Census Bureau, 15,000 workers at 350 U.S. companies work with computers at home-based clerical jobs. However, most jobs of this nature appear to be located in urban areas.

Finally, any effort to explore the potential of telecommunications as a tool for rural development forces us to recognize how much is yet to be learned about their effects on job creation in rural communities. The speed with which information technologies have affected our lives has given very little time to understand their dynamics.

The question of whether information technologies will further centralize the U.S. population around large urban

centers or decentralize it has not been answered. Although there is fragmentary evidence that the truth lies somewhere in between, we simply don't know, nor do we know to what extent the outcome can be shaped by policy actions.

Businesses will locate and prosper in rural America only if those who run them want to live there. We need to understand current residential preferences and whether there is anything about them that can be leveraged to encourage the location and growth of businesses in rural locales. At a time when there is a trend toward smaller businesses and entrepreneurs can pursue many options for location, it is essential to understand the factors influencing the capability of rural communities to provide a satisfying quality of life for employees of information technology-dependent businesses.

## Conclusion

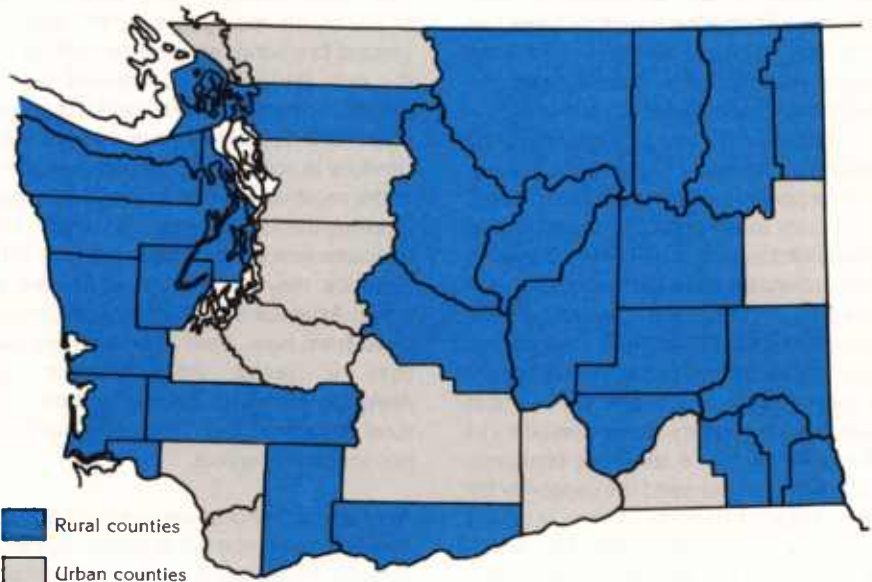
Only a generation or two ago, agricultural land and minerals attracted development. The utilization of natural resources

required that talent and tools be brought to rural areas. If rural communities are to prosper in the information age, they will need both the materials to be processed (which may in itself be information) and the tools to do so. There is no inherent reason these "new" raw materials and the means for their processing should flow to rural communities.

This situation raises the most fundamental rural development issue of all. Should new telecommunications technologies, with their substantial potential for influencing urban/rural distribution of population in the United States, be turned over solely to market forces to shape a new pattern of population distribution, regardless of what pattern may evolve? One possibility is that, if left to market forces alone, the United States may evolve even further toward large urban concentrations separated by sparsely populated hinterlands. Although we are too early into the information age to confidently predict such a long-range outcome, that possibility exists. Considering the apparent two-edged nature of telecommunications, public policy could be

### About the Survey

A stratified random sample of Washington residents, 489 from the 12 urban counties (largest city approximately 25,000) and 536 from the remaining 27 rural counties, was interviewed for this study. The 25-minute telephone interviews were completed during September-October 1986. An overall interview completion rate of 72 percent of the sampled telephone numbers was achieved. For purposes of this article, respondents within each stratum are further divided according to whether they live within the city limits of an incorporated area (city) or outside such an area (country).



formulated to encourage or discourage such an outcome.

It is beyond the scope of this article to consider the desirability of such intervention. However, the issue of whether to attempt to influence telecommunications availability and use in rural America should be placed on the public agenda for two reasons. First, the telecommunications infrastructure and utilization decisions that will influence rural development possibilities in the 1990's and beyond are already being made. Second, how the population is distributed is important to all Americans. It involves many tradeoffs affecting people's quality of life, such as effects of urban congestion versus broader job possibilities. Because of such consequences, the issue seems too important to leave only to rural residents or only to urban residents or only to market forces to decide. Policy discussions need to commence now, when the focus can be future-oriented rather than remedial. Placing information technology issues onto the public policy agenda represents perhaps our most important and pressing rural development challenge.

RDP

### For Additional Reading...

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Don A. Dillman, "The Social Impacts of Information Technologies in Rural North America," *Rural Sociology*, 1985, Vol. 50, No. 1, pp. 1-26.

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Timothy S. Parker and Leslie A. Whitener

# Farmers And Their Search For Off-Farm Employment

*Labor force analysts predict that as many as 300,000 farmers may leave farming by the turn of the century while many others will take supplemental off-farm jobs to enable them to remain in farming. However, many farmers will have difficulty competing for nonfarm jobs because they are generally older and have less education than others in the local labor force. Another obstacle: Farmers tend to live in areas where employment opportunities are limited and wages are low. Best prospects are in the Northeast.*

Continued economic pressure on farming will induce many operators to shift partially or entirely to off-farm work. Their success in finding good jobs will depend on the characteristics of the local labor market, the number and types of off-farm jobs and the wages they pay, as well as on how effectively farmers can compete with other job seekers in terms of education, skills, and work experience.

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Some farmers will have trouble finding off-farm work because their individual characteristics make them weak competitors for good jobs, or because the economic conditions of their local labor market limit their employment and wage opportunities, or both.

While the effects of the 1980's farm crisis have eased in recent years, long-term trends in farm consolidation and technological advances point to continued declines in the numbers of farms and farm operators. Since 1945, the number of farmers has fallen by over 3.6 million, a decline of over two-thirds. The Bureau of Labor Statistics predicts that these trends will continue, with a loss of an additional 300,000 farmers by the year 2000. Also, as economic pressure continues, many farmers will be forced to rely more heavily on nonfarm earnings. The Census of Agriculture reports that over half of the Nation's farmers did some off-farm work in 1982 and two-thirds of these worked 200 or more days at their nonfarm jobs. For some farmers, supplemental off-farm

Figure 1

**Labor market areas in the South and Midwest contain four-fifths of the Nation's farmers**

