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ABSTRACT

Restructuring of U.S. agriculture ("neoindustrialization") is having important effects on rural residents, requiring adaptations of supporting institutions such as education. Neoindustrialization involves concentration, specialization, and vertical and horizontal integration of agricultural production and marketing, as well as further reduction of labor, particularly family labor. Meanwhile, farm family members increasingly work off the farm. In 1990, the off-farm employment of farm families contributed 85 percent of total family income, on average. The most remarkable difference among farm operators by income class was not farm business characteristics, but level of educational attainment. Over a quarter of low-income farmers had less than a high school education. Neoindustrialization will demand proportionately more workers at both ends of the skills spectrum: persons with increased skills in management and technology and low-skilled personnel for routine repetitive tasks. The present rural farm labor supply is unlikely to match the increasing demand for skilled workers. Neoindustrialization may tend to reduce local job opportunities and, accordingly, both community incentive to enhance facilities and services and individual incentive to further education. Neoindustrialization will exacerbate the classic isolation of rural education. Educational improvement strategies will depend upon increased use of technology, enlarged social and cultural curricula that develop student abilities to understand and deal with large corporations and the changing economy, and a holistic outreach approach by community colleges and state college systems. Nevertheless, the paucity of local job options and education may still force some rural residents to relocate to urban areas. Contains 32 references. (SV)

RESTRUCTURING U.S. AGRICULTURE: IMPLICATIONS FOR RURAL EDUCATION AND OTHER COMMUNITY SERVICES

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ABSTRACT

Restructuring agriculture ("neoindustrialization") enhances its linkage to the general economy through concentration and integration of production and marketing, and labor force adjustments. Jobs in agriculture for most adults and youth thus parallel job types in the general economy, so that all workers and students need to upgrade cognitive skills in literacy and numeracy, and enhance their social and cultural orientation to work. Rural obstacles include isolation, and a population that, compared to urban residents, has less education, more low-income workers, poorer public support for education, and fewer local jobs. An implied successful strategy would forge national or regional linkages with rural education and other services. Adequate linkage of some isolated residents may require their relocation to distant "supurbs," new communities from which they would commute to both farm and other jobs.

Key words: restructuring, "neoindustrialization," U.S. agriculture, education, cognitive, isolation, linkages, relocation, "supurbs."The U.S. food and fiber system is much more closely linked to the general economy than ever before (O'Brien, 1994). This paper depicts components of the restructuring of U.S. agriculture associated with this increased linkage and explores the implications for parallel restructuring of rural education and other community services.

NEOINDUSTRIALIZATION OF AGRICULTURE

Restructuring U.S. agriculture involves three interrelated adjustments, here called "neoindustrialization." These adjustments are:

(1) concentration of production and marketing,
(2) specialization of product and function and associated integration of activities to cater to consumer demand, and
(3) reduction of farm labor, including family labor, both through farm enlargement and specialization and through increased off-farm work

These changes amount to the evolution of a new way of life for those who produce most food and fiber and for their rural neighbors. Accordingly, they create the need for the enhancement of supporting institutions, even the creation of new ones. Neoindustrialization implies that compatible adaptations of supporting institutions, such as education and health services, will tend to be more critical to the continued advancement of agriculture and rural people than traditional public programs, such as commodity price supports. Consider the components of neoindustrialization.

Concentration of Production and Marketing

U.S. farms accounting for most sales are getting bigger and will likely continue to do so. That is the implication of the systematic changes in farm numbers by sales class from 1982 to 1987, and the expected trend in the near future. For each successive sales class above $250,000, the percentage increase in farm numbers from 1982 to 1987 was greater (Table 1). By contrast, the number of farms in all lower sales classes decreased. Moreover, the larger the sales, the greater the percentage of incorporated farms, implying greater stability of large farms through continuity of funding and management. Yet nine of ten corporate farms are still family-held.

By 1987, farms with sales of $250,000 or more accounted for fewer than five percent of all farms but more than half the value of total sales and of net cash returns. Thus, even with current levels of technology and organizational expertise, a very few farms could sell most farm products.

Table 1. Changes in U.S. Farm Numbers, by Value of Sales, 1982-1987

Farms with sales of:	Number of Farms 1982*	Number of Farms 1987*	Percent change in number of farms
Less than $2,500	536,327	490,296	-9
$2,500 to $4,999	278,208	262,918	-5
$5,000 to $9,999	281,802	274,972	-2
$10,000 to $24,999	340,254	326,166	-4
$25,000 to $49,999	248,828	219,637	-12
$50,000 to $99,999	251,501	218,050	-13
$100,000 to $249,999	215,912	202,550	-6
$250,000 to $499,999	58,668	61,148	+4
$500,000 to $699,999	11,792	13,142	+11
$700,000 to $999,999	6,818	7,788	+14
$1 million to $5 mil.	8,123	9,738	+20
$5 mil. to $10 mil	610	759	+24
$10 mil or more	457	596	+30
Total	2,240,976	2,087,759	-7

*Abnormal farms excluded. The producer price index for farm products actually fell during this period from a base year value of 100.0 in 1982 to 95.5 in 1987 (Council of Economic Advisers, 1994)

Source: U.S. Census of Agriculture, unpublished data. Initial tabulation by Edward Reinsel, U.S. Dept. of Agr., Economic Research Service, Washington, DC

The largest farms also sell most of the products least directly involved in government commodity programs and products that face the likely greatest continuing increase in consumer demand. For example, the 1987 Census of Agriculture reports that a mere 1.5 percent of all farms (the 32,000 each with sales of $500,000 or more) together accounted for

—70 percent of sales of vegetables and melons,

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—70 percent of sales of nursery and greenhouse products,
—60 percent of sales of poultry and poultry products,
—55 percent of sales of fruit, nuts, and berries, and
—50 percent of sales of cattle and calves.

Even these data do not adequately illustrate the extent of concentration of U S. agriculture Most important, data on farm sales do not adequately reflect the extent of organizational i gration and contracting among components of the food industry, a matter we consider below

Specialization and Integration

Specialization already concentrates production on large farms Horizontal and vertical integration further concentrate the food and fiber system Horizontal integration occurs when firms at the same level of production are linked through contracts or common management, procurement, and/or sales and marketing activities. Vertical integration occurs when firms increase their interdependence through ownership contracts and/or organizational provisions between two or more successive stages of production

The leading example of specialization and integration in American agriculture is, of course, the almost totally integrated poultry industry (Christensen, 1993). About 92 percent of all broilers are produced under contract between the producer and a poultry company. The remaining 8 percent come from farms owned by a company that both supplies feed and supervision and processes the finished birds. Due to technological and organizational efficiencies achieved through integration, production of broilers, for example, zoomed from 34 million in 1934 to 6.4 billion in 1992 (Christensen, 1993). By 1993, some 20 companies produced 80 percent of the total weight of broilers (Thornton, 1993). Most turkeys (Hefferman, 1993) and eggs (Lazar, 1993) likewise come from very few firms.

Other components of the livestock industry are increasingly integrated. For example, dairies are cutting overhead costs by moving to more congenial climates, increasing herd size and herd yield, and adopting other techniques to intensify production (Fallert, Weimer, and Crawford, 1993) By 1987, there were already 1268 dairy herds of more than 5000 head in the United States, over half of which (755) were in California. Large dairies are also increasingly integrated with related activities. For example, Braum's Dairy in Tuttle, Oklahoma, is a family business with some 13,000 cows. Besides producing the milk, the Braums process fluid milk, yogurt, cottage cheese, and ice cream, and operate over 250 ice cream and dairy stores in five states In the southwest, using subsidized irrigation (Cody and Carr, 1990), some large farms specialize in high-quality hay production (Fallert, Weimer, and Crawford). Relying on purchased feed, a dairy can add hundreds, if not thousands, of cows.

Hog production is increasingly concentrated. In 1950, over 2 million farms and ranches raised hogs, but by 1987 only about 243,000 raised any A 1992 survey reported that fewer than 30,000 farms, each marketing 1,000 or more hogs, accounted for 78 percent of total marketings (Rhodes and Grimes). Farms generally have, of course, greatly improved their efficiency. For example, feed use declined 14 percent or 60 pounds per hundredweight of hogs and pigs sold from 1980 to 1988 (Shapouri, Mathews, and Bailey, 1994). Technology exists for more hogs to be economically produced, processed, and merchandised under integrated systems However, laws against corporate farming and integration have slowed this change in major producing areas and helped induce a shift in production to more hospitable states, such as North Carolina and Missouri

Beef feeding is increasingly concentrated on large feedlots. In 1964, lots with more than 1,000 head together sold only 40 percent of fed cattle. By 1990, 3 5 percent of feedlots, each with 12,000 head or more, together sold about 84 percent of all fed beef (Krause, 1992) Vertical coordination also enhances the supply of feed and animals, on the one hand, and the standardization and customer appeal of the products, on the other hand Impediments to the integration of fed beef include the huge investment requirements and many producers' preference for traditional production methods

Specialization, climate control, and the integration of production and marketing all tend to reinforce the concentration of crop production on very large farms, notably, in Florida and the southwest. Accordingly, California grew almost 200 percent more acres of fruit and vegetables in 1989 than in 1960 (Palerm, 1991). Increases in specific fruit, nuts, and vegetables were phenomenal, for example, almonds rose by 900 percent, wine-grapes by 650 percent, avocados by 440 percent, cauliflower by 394 percent, and strawberries by 391 percent In 1987, some 55 farms each had nursery and greenhouse sales of more than $5 million; some 24 farms each sold $5 million or more of mushrooms; eighteen farms in the southwest each grew at least 1,000 acres of carrots; and some 312 farms each irrigated 5,000 or more acres (Unpublished data from 1987 Census of Agriculture).

Vegetable production, notably in California, benefits also from a plentiful supply of low-cost labor. The share of all U.S. farm labor expenses attributed to fruit, vegetable and horticultural specialty farms grew from 34 percent in 1974 to 41 percent in 1987 (Oliveira, Effland, Runyan, and Hamm, 1993). Rural enclaves of farm worker families have formed throughout the fruit and vegetable producing areas of California (Palerm, 1991) Some 148 communities are Latino enclaves Sixty-one of these communities, Chicano and Mexican "Majority" Enclaves, average 65.6 percent Latino inhabitants, with an average age of 24.3 years, and an average household size of 3 6 This contrasts with the California average population which, in 1980, was 19.2 percent Latino, had an average age of 29.9 years and an average household size of 2.7. Similar enclaves are emerging elsewhere, for example, near meat packing plants in the Great Plains and mushroom farms in Pennsylvania.

Reduction of Labor

The third component of neoindustrialization is the further reduction in labor, particularly family labor. From 1975 to 1989, the value of farm output increased almost one-third at the same time as farm population decreased almost one-half (45.8 percent), and farm employment decreased one-third (33 9 percent), slightly more for farm family members (35.9 percent) than for hired workers (29.2 percent) (Council of Economic Advisers, 1994). Industries most closely related to farming achieved parallel efficiencies and hired fewer workers. Suppliers of fertilizer, equipment and other inputs lost 125,000 jobs and processing and marketing industries lost the largest number—368,000 (Majchrowicz and Salsgiver). These losses amounted to one job for every three jobs lost on the farm. They were only partially offset by new processing jobs, notably, 62,000 jobs in processing meat, mainly poultry, and 34,000 jobs in miscellaneous foods, such as macaroni and snack chips.

Increased Off-Farm Work for Farm Family Members

Meanwhile, farm family members increasingly work off the farm and many have some of their farm work performed through contracting or custom work. By 1990, the average income of farm operator households, $39,007, was similar to that of the average U.S household (Ahearn, Perry, and El-Osta, 1993). However, the average off-farm income of the farm households was $33,265, 85 percent of their total income. Either or both spouses in 60 percent of farm operator households earned off-farm income, mainly wages and salaries. Both operators and spouses on the smallest and the largest farms earned the most off-farm income, a 1990 average of $37,276 for the smallest and $32,698 for the largest. The households in which one spouse worked off the farm had the highest household incomes and the lowest poverty rates. Average off-farm income was lowest, but still noteworthy, for dairy farms (where the nature of the enterprise limits opportunities for off-farm work) and cash grain (Perry and Hoppe, 1993)(where farm remoteness limits access to off-farm jobs).

The most remarkable difference among farm operators by income class is not their farm business characteristics, however, but their level of educational attainment (Perry and Hoppe, 1993) More than a quarter of all low-income farmers (less than $15,000) have less than a high school education. Accordingly, they are less likely to have nonfarm income (fewer than half do) and their nonfarm

earnings are low (as they are also for nonfarm people with lower education levels) (Bird, 1993)

The Changing Composition of Farm and Nonfarm Labor Markets

As the overall number of jobs in agriculture continues to diminish, agriculture, like nonfarm industry, will demand proportionately more workers at each end of the spectrum of skills and abilities First, it will call for managers and assistants who are skilled in personnel management, inventory control, operations research, and a whole gamut of technical and interpersonal skills typical of large nonfarm businesses, as well as advanced knowledge and understanding of biological processes and their application. Second, agriculture will continue to demand a cadre of low-skilled and low-paid personnel for routine, repetitive tasks.

The diminished need and more selective demand for labor in agriculture evokes the need for a parallel outside linkage of this labor and all its supporting institutions, including education, training, and health services For two reasons, the turnover in farm and food labor is likely to exceed the net figures for population and employment loss. First, the industry will be increasingly likely to recruit professionals from outside agriculture—people skilled in marketing, inventory control, accounting, and a range of other specialties common to large businesses. Second, workers in agriculture are increasingly likely to enhance the security of their jobs and achieve career advancement by being ready, willing and able to take jobs outside agriculture and in distant locations. This changing demand for farm labor faces a labor supply within agriculture that, without explicit improvements, promises to be less likely to meet this demand. Both neoindustrialization itself and conditions outside agriculture contribute to this likely reduced matching of farm labor supply with farm labor demand Three key challenges are as follows.

Neoindustrialization and rural communities

Neoindustrialization may tend to reduce local job opportunities and, accordingly, both the community incentive to enhance facilities and services and the individual incentive to secure the education needed for a better job. Three noteworthy instances are as follows.

Large farms bypass rural communities.

Large farms tend to bypass local communities both in obtaining specialized staff and supplies and in selling and processing their products (Krause, 1989).

Large labor-intensive farms may encourage the formation of rural enclaves of unskilled labor.

Large fruit and vegetable farms, nurseries, and other farms catering to a growing market depend on intermittent recruiting of large numbers of low-wage labor (Palerm, 1991). They thus tend to encourage the development of poor ethnic enclaves that are unlikely to have a strong revenue base and progressive schools

State restrictions on corporations may encourage relocation.

Given the evident competitive success of large, integrated farms, states that seek to combat their growth, for example, by prohibiting farm incorporation, may simply encourage and accelerate the relocation of farm production to other states They would thus further reduce employment and earnings in some local agricultural areas This, in turn, could reduce local government revenues and further undermine local ability and willingness to support schools and other community services in some places

Poor rural job prospects

Rural areas generally lag urban areas in income levels and the availability of high-paying jobs A higher proportion of rural adult workers than employed urban workers are low earners (Bird, 1990b). In 1987, 36 percent of employed rural workers, aged 25 to 64, earned less than the official poverty income of $11,611 for a family of four, compared with the still very high 21 percent of the corresponding urban workers At the same time, the level of educational attainment of rural workers is less than that of their urban counterparts; but the relative scarcity of good high-paying jobs dampens the incentive for both rural adults and rural youth, including farm residents, to attain higher levels of education (Hoppe and Deavers, 1993).

National labor market—increasingly challenging

Beyond the rural community, changes in the national labor market pose a formidable new challenge to both individuals and institutions. The market is increasingly bipolar, comprised of high-skilled, high-income workers and low-skilled, low-income workers (Levy, 1987; Reich, 1991). Even highly skilled and well-educated people who want to work face an increasing need to continue in lifelong education and training, and to move to new jobs, even new occupations, that best use their talents and pay them accordingly. At the same time, the United States faces an increasing challenge in preparing its millions of functionally illiterate adults for work and in training for productive work the youth who typically do not go on to college (Kuttner, 1991; Thurow, 1985). Farm and other rural people face an increasing need to prepare for and to participate in this increasingly competitive labor market.

Implications for Rural Education

For improved linkage between jobs and workers, the same quality and variety of lifetime education should be available for all residents, from preschool through college and continuing education, including both academic and vocational education. Rural students have a special need to upgrade cognitive skills increasingly demanded by growing sectors of the economy (Swaim and Teixeira, 1991). Yet rural people face special barriers to education.

At the elementary and secondary levels, technology, particularly computer and telecommunications technology, promises to offer much to isolated children, even those taught at home. Much of this improvement can be in the spirit of Australia's successful schools of the air. Perhaps the biggest scope for enrichment is an enlarged social and cultural curriculum, including the development of abilities to understand and deal with large organizations, to be aware of broadening and changing career opportunities and the requirements to achieve them. Australia's Country Areas Program (Curriculum Corporation, 1989) appears to address these problems.

Especially for geographically or ethnically isolated areas, the biggest scope for improving education may lie in a more holistic approach. Community colleges and state university and college systems have the potential to reach both adults and children in offering broad, flexible and updated curricula at innumerable sites, some reached by circuit-riding faculty. In so doing, community colleges, in particular, can help remedy the deficiencies in rural high school curricula (Bird, 1990a), as well as enhance overall, lifelong learning and training opportunities for both adults and youth.

Neoindustialization of agriculture and the limited rural nonfarm economic base exacerbate the classic isolation of rural education due to heavy dependence on local funding, local staffing, and local curriculum development and implementation. In these respects, rural Australians appear to have more holistic educational opportunities. Like the United States, each Australian state is responsible for primary and secondary education. However, unlike the United States, where the states have delegated most authority for education to local governments, each Australian state finances, staffs, and provides curricula on a state-wide basis. Australian experience may illuminate the advantages of regional support for education and other services.

Implications for Other Institutions and Programs

For many rural residents, the paucity of local job options and education may still be so great that relocation nearer to urban areas is the surest way to a better education and associated opportunities for living and working The Australian government's Rural Adjustment Scheme offers such a way out (Stevens, 1994)—a "buyout" for farmers, in the form of grants of $45,000 to leave

farming. This new program demonstrates a potentially productive alternative to the traditional U.S. commodity support programs as a boost to both competitive food production and the welfare of farm families. Its extension to nonfarm families may warrant consideration.

The continuing intractability of isolation evokes the possible need for a new institution, the "supurb" (Bird, 1993). The supurb would be a community distant from farms and ranches, but within conventional commuting distance of a city and frequent commuting by air to distant farms. Tomorrow's work world may require that more and more farm families, including successful farm families, locate so that all family members can have access to broader work, education, training, health, recreational, and cultural options, and yet can commute to the farm as needed.

What about rural health? The kinds of improvements cited for education would also help improve rural health. Educated and informed citizens who also earn adequate incomes are better able to take care of their health needs. Neoindustrialization of agriculture also involves more teamwork, so that, while farm accidents may still be prevalent, they would also be more readily detected and the victims treated. Farm enlargement and increased population sparsity do, however, place a still higher premium on the availability of a competent and rapid response to accidents and emergencies. Hence, the need for airborne services, such as those provided in Australia by the Royal Flying Doctor Service, will continue to increase.

CONCLUSION

Rural living and rural institutions offer special opportunities and special challenges. Greater linkage of agriculture to the general economy is a dominant change that calls, in turn, for a greater linkage of rural education, health, and other services to corresponding services beyond rural areas.

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